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**Final**

# ROUND TWO
# REMEDIAL INVESTIGATION REPORT
# SITES 4, 21, and 22

## NAVAL WEAPONS STATION YORKTOWN
## YORKTOWN, VIRGINIA

## VOLUME III - APPENDICES

## CONTRACT TASK ORDER 0349

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**DEPARTMENT OF THE NAVY**
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*Prepared by:*

**BAKER ENVIRONMENTAL, INC.**
*Coraopolis, Pennsylvania*

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# APPENDIX J
# HUMAN HEALTH RISK ASSESSMENT CALCULATION SPREADSHEETS

TRESPASSERS - CURRENT SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 4 PROPER
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 0.000001 | |
| FI | Fraction of soil ingested from site | 0.5 | 0.5 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 1460 | 1460 | |

| | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(a)anthracene | 0.6485925 | 0.73 | NA | 1.0E-08 | 7.6E-09 | 2.4% | 1.8E-07 | -- | -- | 2.0E-08 | 1.4E-08 | 2.4% | 3.4E-07 | -- | -- |
| Benzo(b)fluoranthene | 0.687167 | 0.73 | NA | 1.1E-08 | 8.0E-09 | 2.5% | 1.9E-07 | -- | -- | 2.1E-08 | 1.5E-08 | 2.5% | 3.6E-07 | -- | -- |
| Benzo(a)pyrene | 0.6008975 | 7.3 | NA | 9.6E-09 | 7.0E-08 | 22.0% | 1.7E-07 | -- | -- | 1.8E-08 | 1.3E-07 | 22.0% | 3.2E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.390194 | 0.73 | NA | 6.2E-09 | 4.6E-09 | 1.4% | 1.1E-07 | -- | -- | 1.2E-08 | 8.6E-09 | 1.4% | 2.1E-07 | -- | -- |
| Dibenzo(a,h)anthracene | 0.2385259 | 7.3 | NA | 3.8E-09 | 2.8E-08 | 8.7% | 6.7E-08 | -- | -- | 7.2E-09 | 5.3E-08 | 8.7% | 1.3E-07 | -- | -- |
| Carbazole | 0.257 | 0.02 | NA | 4.1E-09 | 8.2E-11 | 0.0% | 7.2E-08 | -- | -- | 7.8E-09 | 1.6E-10 | 0.0% | 1.4E-07 | -- | -- |
| Chrysene | 0.649 | 0.0073 | NA | 1.0E-08 | 7.6E-11 | 0.0% | 1.8E-07 | -- | -- | 2.0E-08 | 1.4E-10 | 0.0% | 3.4E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.529 | 0.073 | NA | 8.5E-09 | 6.2E-10 | 0.2% | 1.5E-07 | -- | -- | 1.6E-08 | 1.2E-09 | 0.2% | 2.8E-07 | -- | -- |
| Aroclor-1260 | 0.0744713 | 2 | NA | 1.2E-09 | 2.4E-09 | 0.7% | 2.1E-08 | -- | -- | 2.3E-09 | 4.5E-09 | 0.7% | 3.9E-08 | -- | -- |
| 1,3-Dinitrobenzene | 0.169354 | NA | 0.0009 | 2.7E-09 | -- | -- | 4.7E-08 | 5.3E-05 | 0.1% | 5.1E-09 | -- | -- | 9.0E-08 | 1.0E-04 | 0.1% |
| 2,4,6-Trinitrotoluene | 7.911262 | 0.03 | 0.0005 | 1.3E-07 | 3.8E-09 | 1.2% | 2.2E-06 | 4.4E-03 | 8.4% | 2.4E-07 | 7.2E-09 | 1.2% | 4.2E-06 | 8.4E-03 | 8.4% |
| Amino-Dinitrotoluene | 0.79 | NA | 0.00006 | 1.3E-08 | -- | -- | 2.2E-07 | 3.7E-03 | 7.0% | 2.4E-08 | -- | -- | 4.2E-07 | 7.0E-03 | 7.0% |
| RDX | 7.841227 | 0.11 | 0.003 | 1.3E-07 | 1.4E-08 | 4.3% | 2.2E-06 | 7.3E-04 | 1.4% | 2.4E-07 | 2.6E-08 | 4.3% | 4.2E-06 | 1.4E-03 | 1.4% |
| Aluminum | 14241.483 | NA | 1 | 2.3E-04 | -- | -- | 4.0E-03 | 4.0E-03 | 7.5% | 4.3E-04 | -- | -- | 7.5E-03 | 7.5E-03 | 7.5% |
| Antimony | 1.7387782 | NA | 0.0004 | 2.8E-08 | -- | -- | 4.9E-07 | 1.2E-03 | 2.3% | 5.3E-08 | -- | -- | 9.2E-07 | 2.3E-03 | 2.3% |
| Arsenic | 7.4940421 | 1.5 | 0.0003 | 1.2E-07 | 1.8E-07 | 56.4% | 2.1E-06 | 7.0E-03 | 13.2% | 2.3E-07 | 3.4E-07 | 56.4% | 4.0E-06 | 1.3E-02 | 13.2% |
| Cadmium (soil) | 1.2836332 | NA | 0.001 | 2.1E-08 | -- | -- | 3.6E-07 | 3.6E-04 | 0.7% | 3.9E-08 | -- | -- | 6.8E-07 | 6.8E-04 | 0.7% |
| Chromium | 13.51 | NA | 0.003 | 2.2E-07 | -- | -- | 3.8E-06 | 1.3E-03 | 2.4% | 4.1E-07 | -- | -- | 7.2E-06 | 2.4E-03 | 2.4% |
| Copper | 37.977166 | NA | 0.04 | 6.1E-07 | -- | -- | 1.1E-05 | 2.7E-04 | 0.5% | 1.1E-06 | -- | -- | 2.0E-05 | 5.0E-04 | 0.5% |
| Iron | 13057.356 | NA | 0.3 | 2.1E-04 | -- | -- | 3.7E-03 | 1.2E-02 | 23.0% | 4.0E-04 | -- | -- | 6.9E-03 | 2.3E-02 | 23.0% |
| Manganese | 1202.7661 | NA | 0.02 | 1.9E-05 | -- | -- | 3.4E-04 | 1.7E-02 | 31.8% | 3.6E-05 | -- | -- | 6.4E-04 | 3.2E-02 | 31.8% |
| Zinc | 1011.2925 | NA | 0.3 | 1.6E-05 | -- | -- | 2.8E-04 | 9.4E-04 | 1.8% | 3.1E-05 | -- | -- | 5.4E-04 | 1.8E-03 | 1.8% |
| | | | | Total ILCR: | 3.2E-07 | 100.0% | Total HI: | 5.3E-02 | 100.0% | Total ILCR: | 6.0E-07 | 100.0% | Total HI: | 1.0E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable

TRESPASSERS - CURRENT SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 4 PROPER
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,480 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 1,460 | 1460 | |

| | | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(a)anthracene | 0.64859249 | 0.1 | NA | NA | 1.1E-07 | -- | -- | 1.9E-06 | -- | -- | 1.4E-07 | -- | -- | 2.4E-06 | -- | -- |
| Benzo(b)fluoranthene | 0.68716699 | 0.1 | NA | NA | 1.2E-07 | -- | -- | 2.0E-06 | -- | -- | 1.4E-07 | -- | -- | 2.5E-06 | -- | -- |
| Benzo(a)pyrene | 0.60089746 | 0.1 | NA | NA | 1.0E-07 | -- | -- | 1.8E-06 | -- | -- | 1.3E-07 | -- | -- | 2.2E-06 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.39019399 | 0.1 | NA | NA | 6.6E-08 | -- | -- | 1.2E-06 | -- | -- | 8.2E-08 | -- | -- | 1.4E-06 | -- | -- |
| Dibenzo(a,h)anthracene | 0.23852592 | 0.1 | NA | NA | 4.0E-08 | -- | -- | 7.1E-07 | -- | -- | 5.0E-08 | -- | -- | 8.8E-07 | -- | -- |
| Carbazole | 0.257 | 0.1 | NA | NA | 4.4E-08 | -- | -- | 7.6E-07 | -- | -- | 5.4E-08 | -- | -- | 9.5E-07 | -- | -- |
| Chrysene | 0.649 | 0.1 | NA | NA | 1.1E-07 | -- | -- | 1.9E-06 | -- | -- | 1.4E-07 | -- | -- | 2.4E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.529 | 0.1 | NA | NA | 9.0E-08 | -- | -- | 1.6E-06 | -- | -- | 1.1E-07 | -- | -- | 1.9E-06 | -- | -- |
| Aroclor-1260 | 0.07447131 | 0.06 | 2.247191 | NA | 7.6E-09 | 1.7E-08 | 2.0% | 1.3E-07 | -- | -- | 9.4E-09 | 2.1E-08 | 2.0% | 1.6E-07 | -- | -- |
| 1,3-Dinitrobenzene | 0.169354 | 0.1 | NA | 0.00045 | 2.9E-08 | -- | -- | 5.0E-07 | 1.1E-03 | 0.1% | 3.6E-08 | -- | -- | 6.2E-07 | 1.4E-03 | 0.1% |
| 2,4,6-Trinitrotoluene | 7.911262 | 0.1 | 0.0405405 | 0.00037 | 1.3E-06 | 5.4E-08 | 6.3% | 2.3E-05 | 6.3E-02 | 8.3% | 1.7E-06 | 6.8E-08 | 6.3% | 2.9E-05 | 7.9E-02 | 8.3% |
| Amino-Dinitrotoluene | 0.79 | 0.1 | NA | 0.000036 | 1.3E-07 | -- | -- | 2.3E-06 | 6.5E-02 | 8.5% | 1.7E-07 | -- | -- | 2.9E-06 | 8.1E-02 | 8.5% |
| RDX | 7.841227 | 0.1 | 0.11 | 0.003 | 1.3E-06 | 1.5E-07 | 17.0% | 2.3E-05 | 7.8E-03 | 1.0% | 1.7E-06 | 1.8E-07 | 17.0% | 2.9E-05 | 9.6E-03 | 1.0% |
| Aluminum | 14241.4825 | 0.01 | NA | 0.2 | 2.4E-04 | -- | -- | 4.2E-03 | 2.1E-02 | 2.8% | 3.0E-04 | -- | -- | 5.2E-03 | 2.6E-02 | 2.8% |
| Antimony | 1.73877823 | 0.01 | NA | 0.00004 | 2.9E-08 | -- | -- | 5.2E-07 | 1.3E-02 | 1.7% | 3.7E-08 | -- | -- | 6.4E-07 | 1.6E-02 | 1.7% |
| Arsenic | 7.49404214 | 0.032 | 1.5789474 | 0.000285 | 4.1E-07 | 6.4E-07 | 74.7% | 7.1E-06 | 2.5E-02 | 3.3% | 5.0E-07 | 8.0E-07 | 74.7% | 8.8E-06 | 3.1E-02 | 3.3% |
| Cadmium (soil) | 1.28363322 | 0.01 | NA | 0.00005 | 2.2E-08 | -- | -- | 3.8E-07 | 7.6E-03 | 1.0% | 2.7E-08 | -- | -- | 4.7E-07 | 9.5E-03 | 1.0% |
| Chromium | 13.51 | 0.01 | NA | 0.00003 | 2.3E-07 | -- | -- | 4.0E-06 | 1.3E-01 | 17.5% | 2.8E-07 | -- | -- | 5.0E-06 | 1.7E-01 | 17.5% |
| Copper | 37.9771664 | 0.01 | NA | 0.024 | 6.4E-07 | -- | -- | 1.1E-05 | 4.7E-04 | 0.1% | 8.0E-07 | -- | -- | 1.4E-05 | 5.8E-04 | 0.1% |
| Iron | 13057.3564 | 0.01 | NA | 0.06 | 2.2E-04 | -- | -- | 3.9E-03 | 6.5E-02 | 8.5% | 2.7E-04 | -- | -- | 4.8E-03 | 8.0E-02 | 8.5% |
| Manganese | 1202.76613 | 0.01 | NA | 0.001 | 2.0E-05 | -- | -- | 3.6E-04 | 3.6E-01 | 46.7% | 2.5E-05 | -- | -- | 4.4E-04 | 4.4E-01 | 46.7% |
| Zinc | 1011.2925 | 0.01 | NA | 0.075 | 1.7E-05 | -- | -- | 3.0E-04 | 4.0E-03 | 0.5% | 2.1E-05 | -- | -- | 3.7E-04 | 5.0E-03 | 0.5% |
| | | | | | Total ILCR: | 8.6E-07 | 100.0% | HI: | 7.6E-01 | 100.0% | Total ILCR: | 1.1E-06 | 100.0% | HI: | 9.5E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 4 HOT SPOT
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 0.000001 | |
| FI | Fraction of soil ingested from site | 0.5 | 0.5 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 1460 | 1460 | |

| | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Carbazole | 44 | 0.02 | NA | 7.0E-07 | 1.4E-08 | 0.1% | 1.2E-05 | -- | -- | 1.3E-06 | 2.7E-08 | 0.1% | 2.3E-05 | -- | -- |
| Benzo(a)anthracene | 67 | 0.73 | NA | 1.1E-06 | 7.8E-07 | 4.2% | 1.9E-05 | -- | -- | 2.0E-06 | 1.5E-06 | 4.2% | 3.5E-05 | -- | -- |
| Benzo(b)fluoranthene | 54 | 0.73 | NA | 8.6E-07 | 6.3E-07 | 3.4% | 1.5E-05 | -- | -- | 1.6E-06 | 1.2E-06 | 3.4% | 2.9E-05 | -- | -- |
| Benzo(a)pyrene | 56 | 7.3 | NA | 9.0E-07 | 6.5E-06 | 35.0% | 1.6E-05 | -- | -- | 1.7E-06 | 1.2E-05 | 35.0% | 3.0E-05 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 32 | 0.73 | NA | 5.1E-07 | 3.7E-07 | 2.0% | 9.0E-06 | -- | -- | 9.7E-07 | 7.1E-07 | 2.0% | 1.7E-05 | -- | -- |
| Dibenzo(a,h)anthracene | 6.1 | 7.3 | NA | 9.8E-08 | 7.1E-07 | 3.8% | 1.7E-06 | -- | -- | 1.8E-07 | 1.3E-06 | 3.8% | 3.2E-06 | -- | -- |
| Chrysene | 63 | 0.0073 | NA | 1.0E-06 | 7.4E-09 | 0.0% | 1.8E-05 | -- | -- | 1.9E-06 | 1.4E-08 | 0.0% | 3.3E-05 | -- | -- |
| Benzo(k)fluoranthene | 7.8 | 0.073 | NA | 1.2E-07 | 9.1E-09 | 0.0% | 2.2E-06 | -- | -- | 2.4E-07 | 1.7E-08 | 0.0% | 4.1E-06 | -- | -- |
| Antimony | 17.023329 | NA | 0.0004 | 2.7E-07 | -- | -- | 4.8E-06 | 1.2E-02 | 3.0% | 5.2E-07 | -- | -- | 9.0E-06 | 2.3E-02 | 3.0% |
| Arsenic | 399.6953 | 1.5 | 0.0003 | 6.4E-06 | 9.6E-06 | 51.4% | 1.1E-04 | 3.7E-01 | 94.1% | 1.2E-05 | 1.8E-05 | 51.4% | 2.1E-04 | 7.1E-01 | 94.1% |
| Iron | 8910 | NA | 0.3 | 1.4E-04 | -- | -- | 2.5E-03 | 8.3E-03 | 2.1% | 2.7E-04 | -- | -- | 4.7E-03 | 1.6E-02 | 2.1% |
| Manganese | 224 | NA | 0.02 | 3.6E-06 | -- | -- | 6.3E-05 | 3.1E-03 | 0.8% | 6.8E-06 | -- | -- | 1.2E-04 | 5.9E-03 | 0.8% |
| | | | | Total ILCR: | 1.9E-05 | 100.0% | Total HI: | 4.0E-01 | 100.0% | Total ILCR: | 3.5E-05 | 100.0% | Total HI: | 7.5E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 4 HOT SPOT
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,480 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 1,460 | 1460 | |

| | | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Carbazole | 44 | 0.1 | NA | NA | 7.5E-06 | -- | -- | 1.3E-04 | -- | -- | 9.3E-06 | -- | -- | 1.6E-04 | -- | -- |
| Benzo(a)anthracene | 67 | 0.1 | NA | NA | 1.1E-05 | -- | -- | 2.0E-04 | -- | -- | 1.4E-05 | -- | -- | 2.5E-04 | -- | -- |
| Benzo(b)fluoranthene | 54 | 0.1 | NA | NA | 9.2E-06 | -- | -- | 1.6E-04 | -- | -- | 1.1E-05 | -- | -- | 2.0E-04 | -- | -- |
| Benzo(a)pyrene | 56 | 0.1 | NA | NA | 9.5E-06 | -- | -- | 1.7E-04 | -- | -- | 1.2E-05 | -- | -- | 2.1E-04 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 32 | 0.1 | NA | NA | 5.4E-06 | -- | -- | 9.5E-05 | -- | -- | 6.7E-06 | -- | -- | 1.2E-04 | -- | -- |
| Dibenzo(a,h)anthracene | 6.1 | 0.1 | NA | NA | 1.0E-06 | -- | -- | 1.8E-05 | -- | -- | 1.3E-06 | -- | -- | 2.2E-05 | -- | -- |
| Chrysene | 63 | 0.1 | NA | NA | 1.1E-05 | -- | -- | 1.9E-04 | -- | -- | 1.3E-05 | -- | -- | 2.3E-04 | -- | -- |
| Benzo(k)fluoranthene | 7.8 | 0.1 | NA | NA | 1.3E-06 | -- | -- | 2.3E-05 | -- | -- | 1.6E-06 | -- | -- | 2.9E-05 | -- | -- |
| Antimony | 17.0233287 | 0.01 | NA | 0.00004 | 2.9E-07 | -- | -- | 5.0E-06 | 1.3E-01 | 8.1% | 3.6E-07 | -- | -- | 6.3E-06 | 1.6E-01 | 8.1% |
| Arsenic | 399.6953 | 0.032 | 1.5789474 | 0.000285 | 2.2E-05 | 3.4E-05 | 100.0% | 3.8E-04 | 1.3E+00 | 84.9% | 2.7E-05 | 4.3E-05 | 100.0% | 4.7E-04 | 1.7E+00 | 84.9% |
| Iron | 8910 | 0.01 | NA | 0.06 | 1.5E-04 | -- | -- | 2.6E-03 | 4.4E-02 | 2.8% | 1.9E-04 | -- | -- | 3.3E-03 | 5.5E-02 | 2.8% |
| Manganese | 224 | 0.01 | NA | 0.001 | 3.8E-06 | -- | -- | 6.6E-05 | 6.6E-02 | 4.2% | 4.7E-06 | -- | -- | 8.3E-05 | 8.3E-02 | 4.2% |
| | | | | | Total ILCR: | 3.4E-05 | 100.0% | HI: | 1.6E+00 | 100.0% | Total ILCR: | 4.3E-05 | 100.0% | HI: | 1.9E+00 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIO
ACCIDENTAL INGESTION OF SURFACE WATER - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*ET*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | |
|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | |
| IR | Ingestion Rate (L/hour) | 0.05 | 0.05 | |
| ET | Exposure Time (hours/day) | 2.6 | 2.6 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 1460 | 1460 | |

| | | | | Adult | | | | | | Older Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalate | 0.0395 | 0.014 | 0.02 | 1.6E-06 | 2.3E-08 | 8.4% | 2.9E-05 | 1.4E-03 | 2.1% | 3.1E-06 | 4.3E-08 | 8.4% | 5.4E-05 | 2.7E-03 | 2.1% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | NA | 0.002 | 4.4E-08 | -- | -- | 7.7E-07 | 3.9E-04 | 0.6% | 8.3E-08 | -- | -- | 1.5E-06 | 7.3E-04 | 0.6% |
| Amino-Dinitrotoluene | 0.00226 | NA | 0.00006 | 9.4E-08 | -- | -- | 1.6E-06 | 2.7E-02 | 40.8% | 1.8E-07 | -- | -- | 3.1E-06 | 5.2E-02 | 40.8% |
| RDX | 0.02466 | 0.11 | 0.003 | 1.0E-06 | 1.1E-07 | 41.2% | 1.8E-05 | 6.0E-03 | 8.9% | 1.9E-06 | 2.1E-07 | 41.2% | 3.4E-05 | 1.1E-02 | 8.9% |
| Antimony | 0.01464 | NA | 0.0004 | 6.1E-07 | -- | -- | 1.1E-05 | 2.7E-02 | 39.6% | 1.2E-06 | -- | -- | 2.0E-05 | 5.0E-02 | 39.6% |
| Arsenic | 0.00221 | 1.5 | 0.0003 | 9.2E-08 | 1.4E-07 | 50.4% | 1.6E-06 | 5.4E-03 | 8.0% | 1.7E-07 | 2.6E-07 | 50.4% | 3.0E-06 | 1.0E-02 | 8.0% |
| | | | | Total ILCR: | 2.7E-07 | 100.0% | HI: | 6.7E-02 | 100.0% | Total ILCR: | 5.2E-07 | 100.0% | HI: | 1.3E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIO
DERMAL CONTACT WITH SURFACE WATER - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Young Child | |
|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,480 | |
| EF | Exposure frequency (d/yr) | 143 | 143 | |
| ED | Exposure duration (yrs) | 4 | 4 | |
| ET | Exposure time (hrs/day) | 2.6 | 2.6 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 1460 | 1,460 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | |

| | | | | | Adult | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalate | 0.0395 | 3.3E-02 | 2.55E-02 | 1.10E-02 | 5.7E-06 | 1.5E-07 | 69.5% | 1.0E-04 | 9.1E-03 | 7.9% | 7.1E-06 | 1.8E-07 | 69.5% | 1.2E-04 | 1.1E-02 | 7.9% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | 3.7E-03 | NA | 2.00E-04 | 1.7E-08 | -- | -- | 3.0E-07 | 1.5E-03 | 1.3% | 2.1E-08 | -- | -- | 3.8E-07 | 1.9E-03 | 1.3% |
| Amino-Dinitrotoluene | 0.00226 | 3.7E-03 | NA | 3.60E-05 | 3.7E-08 | -- | -- | 6.4E-07 | 1.8E-02 | 15.4% | 4.6E-08 | -- | -- | 8.0E-07 | 2.2E-02 | 15.4% |
| RDX | 0.02466 | 1.5E-03 | 1.10E-01 | 3.00E-03 | 1.6E-07 | 1.8E-08 | 8.5% | 2.9E-06 | 9.5E-04 | 0.8% | 2.0E-07 | 2.2E-08 | 8.5% | 3.5E-06 | 1.2E-03 | 0.8% |
| Antimony | 0.01464 | 3.0E-03 | NA | 4.00E-05 | 1.9E-07 | -- | -- | 3.4E-06 | 8.5E-02 | 73.0% | 2.4E-07 | -- | -- | 4.2E-06 | 1.1E-01 | 73.0% |
| Arsenic | 0.00221 | 3.0E-03 | 1.58E+00 | 2.85E-04 | 2.9E-08 | 4.6E-08 | 21.9% | 5.1E-07 | 1.8E-03 | 1.5% | 3.6E-08 | 5.7E-08 | 21.9% | 6.4E-07 | 2.2E-03 | 1.5% |
| | | | | | Total ILCR: | 2.1E-07 | 100.0% | HI: | 1.2E-01 | 100.0% | Total ILCR: | 2.6E-07 | 100.0% | HI: | 1.4E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIO
ACCIDENTAL INGESTION OF SEDIMENT - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 0.000001 | |
| FI | Fraction of soil ingested from site | 0.5 | 0.5 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 1460 | 1460 | |

| | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | NA | 1 | 3.3E-04 | -- | -- | 5.7E-03 | 5.7E-03 | 8.4% | 6.2E-04 | -- | -- | 1.1E-02 | 1.1E-02 | 8.4% |
| Antimony | 14.27 | NA | 0.0004 | 2.3E-07 | -- | -- | 4.0E-06 | 1.0E-02 | 14.7% | 4.3E-07 | -- | -- | 7.6E-06 | 1.9E-02 | 14.7% |
| Arsenic | 11.68 | 1.5 | 0.0003 | 1.9E-07 | 2.8E-07 | 100.0% | 3.3E-06 | 1.1E-02 | 16.0% | 3.5E-07 | 5.3E-07 | 100.0% | 6.2E-06 | 2.1E-02 | 16.0% |
| Cadmium (soil) | 1.44 | NA | 0.001 | 2.3E-08 | -- | -- | 4.0E-07 | 4.0E-04 | 0.6% | 4.4E-08 | -- | -- | 7.6E-07 | 7.6E-04 | 0.6% |
| Chromium | 34.33 | NA | 0.003 | 5.5E-07 | -- | -- | 9.6E-06 | 3.2E-03 | 4.7% | 1.0E-06 | -- | -- | 1.8E-05 | 6.1E-03 | 4.7% |
| Iron | 32592.85 | NA | 0.3 | 5.2E-04 | -- | -- | 9.1E-03 | 3.0E-02 | 44.8% | 9.9E-04 | -- | -- | 1.7E-02 | 5.8E-02 | 44.8% |
| Manganese | 250.39 | NA | 0.02 | 4.0E-06 | -- | -- | 7.0E-05 | 3.5E-03 | 5.2% | 7.6E-06 | -- | -- | 1.3E-04 | 6.6E-03 | 5.2% |
| Thallium | 0.44 | NA | 0.00007 | 7.0E-09 | -- | -- | 1.2E-07 | 1.8E-03 | 2.6% | 1.3E-08 | -- | -- | 2.3E-07 | 3.3E-03 | 2.6% |
| Vanadium | 51.15 | NA | 0.007 | 8.2E-07 | -- | -- | 1.4E-05 | 2.0E-03 | 3.0% | 1.5E-06 | -- | -- | 2.7E-05 | 3.9E-03 | 3.0% |
| | | | | Total ILCR: | 2.8E-07 | 100.0% | HI: | 6.8E-02 | 100.0% | Total ILCR: | 5.3E-07 | 100.0% | HI: | 1.3E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIO
DERMAL CONTACT WITH SEDIMENT - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,480 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 1,460 | 1460 | |

| | | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | 0.01 | NA | 0.2 | 3.5E-04 | -- | -- | 6.1E-03 | 3.0E-02 | 3.5% | 4.3E-04 | -- | -- | 7.5E-03 | 3.8E-02 | 3.5% |
| Antimony | 14.27 | 0.01 | NA | 0.00004 | 2.4E-07 | -- | -- | 4.2E-06 | 1.1E-01 | 12.1% | 3.0E-07 | -- | -- | 5.3E-06 | 1.3E-01 | 12.1% |
| Arsenic | 11.68 | 0.032 | 1.57894737 | 0.000285 | 6.3E-07 | 1.0E-06 | 100.0% | 1.1E-05 | 3.9E-02 | 4.4% | 7.9E-07 | 1.2E-06 | 100.0% | 1.4E-05 | 4.8E-02 | 4.4% |
| Cadmium (soil) | 1.44 | 0.01 | NA | 0.00005 | 2.4E-08 | -- | -- | 4.3E-07 | 8.5E-03 | 1.0% | 3.0E-08 | -- | -- | 5.3E-07 | 1.1E-02 | 1.0% |
| Chromium | 34.33 | 0.01 | NA | 0.00003 | 5.8E-07 | -- | -- | 1.0E-05 | 3.4E-01 | 38.7% | 7.2E-07 | -- | -- | 1.3E-05 | 4.2E-01 | 38.7% |
| Iron | 32592.85 | 0.01 | NA | 0.06 | 5.5E-04 | -- | -- | 9.7E-03 | 1.6E-01 | 18.4% | 6.9E-04 | -- | -- | 1.2E-02 | 2.0E-01 | 18.4% |
| Manganese | 250.39 | 0.01 | NA | 0.001 | 4.2E-06 | -- | -- | 7.4E-05 | 7.4E-02 | 8.5% | 5.3E-06 | -- | -- | 9.2E-05 | 9.2E-02 | 8.5% |
| Thallium | 0.44 | 0.01 | NA | 0.000014 | 7.5E-09 | -- | -- | 1.3E-07 | 9.3E-03 | 1.1% | 9.3E-09 | -- | -- | 1.6E-07 | 1.2E-02 | 1.1% |
| Vanadium | 51.15 | 0.01 | NA | 0.00014 | 8.7E-07 | -- | -- | 1.5E-05 | 1.1E-01 | 12.4% | 1.1E-06 | -- | -- | 1.9E-05 | 1.3E-01 | 12.4% |
| | | | | | Total ILCR: | 1.0E-06 | 100.0% | HI: | 8.8E-01 | 100.0% | Total ILCR: | 1.2E-06 | 100.0% | HI: | 1.1E+00 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIOS
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 0.000001 | |
| FI | Fraction of soil ingested from site | 0.5 | 0.5 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 1460 | 1460 | |

| | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(b)fluoranthene | 0.40533 | 0.73 | NA | 6.5E-09 | 4.7E-09 | 4.1% | 1.1E-07 | -- | -- | 1.2E-08 | 9.0E-09 | 4.1% | 2.1E-07 | -- | -- |
| Benzo(a)pyrene | 0.14 | 7.3 | NA | 2.2E-09 | 1.6E-08 | 14.0% | 3.9E-08 | -- | -- | 4.2E-09 | 3.1E-08 | 14.0% | 7.4E-08 | -- | -- |
| Benzo(a)anthracene | 0.2 | 0.73 | NA | 3.2E-09 | 2.3E-09 | 2.0% | 5.6E-08 | -- | -- | 6.1E-09 | 4.4E-09 | 2.0% | 1.1E-07 | -- | -- |
| Chrysene | 0.26 | 0.0073 | NA | 4.2E-09 | 3.0E-11 | 0.0% | 7.3E-08 | -- | -- | 7.9E-09 | 5.7E-11 | 0.0% | 1.4E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.22 | 0.073 | NA | 3.5E-09 | 2.6E-10 | 0.2% | 6.2E-08 | -- | -- | 6.7E-09 | 4.9E-10 | 0.2% | 1.2E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0.73 | NA | 2.1E-09 | 1.5E-09 | 1.3% | 3.6E-08 | -- | -- | 3.9E-09 | 2.9E-09 | 1.3% | 6.9E-08 | -- | -- |
| Dieldrin | 0.01024 | 16 | 0.00005 | 1.6E-10 | 2.6E-09 | 2.2% | 2.9E-09 | 5.7E-05 | 0.2% | 3.1E-10 | 5.0E-09 | 2.2% | 5.4E-09 | 1.1E-04 | 0.2% |
| Aluminum | 10394.44 | NA | 1 | 1.7E-04 | -- | -- | 2.9E-03 | 2.9E-03 | 10.1% | 3.1E-04 | -- | -- | 5.5E-03 | 5.5E-03 | 10.1% |
| Arsenic | 3.71 | 1.5 | 0.0003 | 5.9E-08 | 8.9E-08 | 76.2% | 1.0E-06 | 3.5E-03 | 12.0% | 1.1E-07 | 1.7E-07 | 76.2% | 2.0E-06 | 6.5E-03 | 12.0% |
| Cadmium (soil) | 7.74 | NA | 0.001 | 1.2E-07 | -- | -- | 2.2E-06 | 2.2E-03 | 7.5% | 2.3E-07 | -- | -- | 4.1E-06 | 4.1E-03 | 7.5% |
| Chromium | 11.89 | NA | 0.003 | 1.9E-07 | -- | -- | 3.3E-06 | 1.1E-03 | 3.8% | 3.6E-07 | -- | -- | 6.3E-06 | 2.1E-03 | 3.8% |
| Iron | 10008.45 | NA | 0.3 | 1.6E-04 | -- | -- | 2.8E-03 | 9.3E-03 | 32.3% | 3.0E-04 | -- | -- | 5.3E-03 | 1.8E-02 | 32.3% |
| Manganese | 250.11 | NA | 0.02 | 4.0E-06 | -- | -- | 7.0E-05 | 3.5E-03 | 12.1% | 7.6E-06 | -- | -- | 1.3E-04 | 6.6E-03 | 12.1% |
| Mercury | 1.11 | NA | 0.0001 | 1.8E-08 | -- | -- | 3.1E-07 | 3.1E-03 | 10.7% | 3.4E-08 | -- | -- | 5.9E-07 | 5.9E-03 | 10.7% |
| Thallium | 0.55 | NA | 0.00007 | 8.8E-09 | -- | -- | 1.5E-07 | 2.2E-03 | 7.6% | 1.7E-08 | -- | -- | 2.9E-07 | 4.2E-03 | 7.6% |
| Zinc | 1144.05 | NA | 0.3 | 1.8E-05 | -- | -- | 3.2E-04 | 1.1E-03 | 3.7% | 3.5E-05 | -- | -- | 6.1E-04 | 2.0E-03 | 3.7% |
| | | | | Total ILCR: | 1.2E-07 | 100.0% | Total HI: | 2.9E-02 | 100.0% | Total ILCR: | 2.2E-07 | 100.0% | Total HI: | 5.5E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIOS
DERMAL CONTACT WITH SURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,480 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 1,460 | 1460 | |

| | | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(b)fluoranthene | 0.40533 | 0.1 | NA | NA | 6.9E-08 | -- | -- | 1.2E-06 | -- | -- | 8.5E-08 | -- | -- | 1.5E-06 | -- | -- |
| Benzo(a)pyrene | 0.14 | 0.1 | NA | NA | 2.4E-08 | -- | -- | 4.2E-07 | -- | -- | 2.9E-08 | -- | -- | 5.2E-07 | -- | -- |
| Benzo(a)anthracene | 0.2 | 0.1 | NA | NA | 3.4E-08 | -- | -- | 5.9E-07 | -- | -- | 4.2E-08 | -- | -- | 7.4E-07 | -- | -- |
| Chrysene | 0.26 | 0.1 | NA | NA | 4.4E-08 | -- | -- | 7.7E-07 | -- | -- | 5.5E-08 | -- | -- | 9.6E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.22 | 0.1 | NA | NA | 3.7E-08 | -- | -- | 6.5E-07 | -- | -- | 4.6E-08 | -- | -- | 8.1E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0.1 | NA | NA | 2.2E-08 | -- | -- | 3.9E-07 | -- | -- | 2.7E-08 | -- | -- | 4.8E-07 | -- | -- |
| Dieldrin | 0.01024 | 0.1 | 32 | 0.000025 | 1.7E-09 | 5.6E-08 | 14.9% | 3.0E-08 | 1.2E-03 | 0.3% | 2.2E-09 | 6.9E-08 | 14.9% | 3.8E-08 | 1.5E-03 | 0.3% |
| Aluminum | 10394.44 | 0.01 | NA | 0.2 | 1.8E-04 | -- | -- | 3.1E-03 | 1.5E-02 | 4.4% | 2.2E-04 | -- | -- | 3.8E-03 | 1.9E-02 | 4.4% |
| Arsenic | 3.71 | 0.032 | 1.5789474 | 0.000285 | 2.0E-07 | 3.2E-07 | 85.1% | 3.5E-06 | 1.2E-02 | 3.5% | 2.5E-07 | 3.9E-07 | 85.1% | 4.4E-06 | 1.5E-02 | 3.5% |
| Cadmium (soil) | 7.74 | 0.01 | NA | 0.00005 | 1.3E-07 | -- | -- | 2.3E-06 | 4.6E-02 | 13.0% | 1.6E-07 | -- | -- | 2.9E-06 | 5.7E-02 | 13.0% |
| Chromium | 11.89 | 0.01 | NA | 0.00003 | 2.0E-07 | -- | -- | 3.5E-06 | 1.2E-01 | 33.2% | 2.5E-07 | -- | -- | 4.4E-06 | 1.5E-01 | 33.2% |
| Iron | 10008.45 | 0.01 | NA | 0.06 | 1.7E-04 | -- | -- | 3.0E-03 | 4.9E-02 | 14.0% | 2.1E-04 | -- | -- | 3.7E-03 | 6.1E-02 | 14.0% |
| Manganese | 250.11 | 0.01 | NA | 0.001 | 4.2E-06 | -- | -- | 7.4E-05 | 7.4E-02 | 20.9% | 5.3E-06 | -- | -- | 9.2E-05 | 9.2E-02 | 20.9% |
| Mercury | 1.11 | 0.01 | NA | 0.000015 | 1.9E-08 | -- | -- | 3.3E-07 | 2.2E-02 | 6.2% | 2.3E-08 | -- | -- | 4.1E-07 | 2.7E-02 | 6.2% |
| Thallium | 0.55 | 0.01 | NA | 0.000014 | 9.3E-09 | -- | -- | 1.6E-07 | 1.2E-02 | 3.3% | 1.2E-08 | -- | -- | 2.0E-07 | 1.4E-02 | 3.3% |
| Zinc | 1144.05 | 0.01 | NA | 0.075 | 1.9E-05 | -- | -- | 3.4E-04 | 4.5E-03 | 1.3% | 2.4E-05 | -- | -- | 4.2E-04 | 5.6E-03 | 1.3% |
| | | | | | Total ILCR: | 3.7E-07 | 100.0% | HI: | 3.5E-01 | 100.0% | Total ILCR: | 4.6E-07 | 100.0% | HI: | 4.4E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIOS
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 0.000001 | |
| FI | Fraction of soil ingested from site | 0.5 | 0.5 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 1460 | 1460 | |

| | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| n-Nitroso-di-n-propylamine | 0.25 | 7 | NA | 4.0E-09 | 2.8E-08 | 12.2% | 7.0E-08 | -- | -- | 7.6E-09 | 5.3E-08 | 12.2% | 1.3E-07 | -- | -- |
| Benzo(a)pyrene | 0.11 | 7.3 | NA | 1.8E-09 | 1.3E-08 | 5.6% | 3.1E-08 | -- | -- | 3.3E-09 | 2.4E-08 | 5.6% | 5.8E-08 | -- | -- |
| Benzo(a)anthracene | 0.1 | 0.73 | NA | 1.6E-09 | 1.2E-09 | 0.5% | 2.8E-08 | -- | -- | 3.0E-09 | 2.2E-09 | 0.5% | 5.3E-08 | -- | -- |
| Chrysene | 0.2 | 0.0073 | NA | 3.2E-09 | 2.3E-11 | 0.0% | 5.6E-08 | -- | -- | 6.1E-09 | 4.4E-11 | 0.0% | 1.1E-07 | -- | -- |
| Benzo(b)fluoranthene | 0.25285 | 0.73 | NA | 4.0E-09 | 3.0E-09 | 1.3% | 7.1E-08 | -- | -- | 7.6E-09 | 5.6E-09 | 1.3% | 1.3E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.13 | 0.073 | NA | 2.1E-09 | 1.5E-10 | 0.1% | 3.6E-08 | -- | -- | 3.9E-09 | 2.9E-10 | 0.1% | 6.9E-08 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0.73 | NA | 2.6E-09 | 1.9E-09 | 0.8% | 4.5E-08 | -- | -- | 4.8E-09 | 3.5E-09 | 0.8% | 8.5E-08 | -- | -- |
| Aluminum | 12046.95 | NA | 1 | 1.9E-04 | -- | -- | 3.4E-03 | 3.4E-03 | 9.3% | 3.6E-04 | -- | -- | 6.4E-03 | 6.4E-03 | 9.3% |
| Arsenic | 7.64 | 1.5 | 0.0003 | 1.2E-07 | 1.8E-07 | 79.6% | 2.1E-06 | 7.1E-03 | 19.7% | 2.3E-07 | 3.5E-07 | 79.6% | 4.0E-06 | 1.3E-02 | 19.7% |
| Cadmium (soil) | 1.48 | NA | 0.001 | 2.4E-08 | -- | -- | 4.1E-07 | 4.1E-04 | 1.1% | 4.5E-08 | -- | -- | 7.8E-07 | 7.8E-04 | 1.1% |
| Chromium | 19.37 | NA | 0.003 | 3.1E-07 | -- | -- | 5.4E-06 | 1.8E-03 | 5.0% | 5.9E-07 | -- | -- | 1.0E-05 | 3.4E-03 | 5.0% |
| Copper | 180.65 | NA | 0.04 | 2.9E-06 | -- | -- | 5.1E-05 | 1.3E-03 | 3.5% | 5.5E-06 | -- | -- | 9.6E-05 | 2.4E-03 | 3.5% |
| Iron | 22276.88 | NA | 0.3 | 3.6E-04 | -- | -- | 6.2E-03 | 2.1E-02 | 57.3% | 6.7E-04 | -- | -- | 1.2E-02 | 3.9E-02 | 57.3% |
| Lead | 240.69 | NA | NA | 3.8E-06 | -- | -- | 6.7E-05 | -- | -- | 7.3E-06 | -- | -- | 1.3E-04 | -- | -- |
| Manganese | 105.93 | NA | 0.02 | 1.7E-06 | -- | -- | 3.0E-05 | 1.5E-03 | 4.1% | 3.2E-06 | -- | -- | 5.6E-05 | 2.8E-03 | 4.1% |
| | | | | Total ILCR: | 2.3E-07 | 100.0% | Total HI: | 3.6E-02 | 100.0% | Total ILCR: | 4.4E-07 | 100.0% | Total HI: | 6.9E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

TRESPASSERS - CURRENT SCENARIOS
DERMAL CONTACT WITH SURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Adolescent | |
|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | |
| HQ | Hazard quotient | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,480 | |
| EF | Exposure Frequency (d/yr) | 143 | 143 | |
| ED | Exposure Duration (yrs) | 4 | 4 | |
| BW | Body weight (kg) | 70 | 37 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 1,460 | 1460 | |

| | | | | | Adult | | | | | | Adolescent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| n-Nitroso-di-n-propylamine | 0.25 | 0.1 | 14 | NA | 4.2E-08 | 5.9E-07 | 47.6% | 7.4E-07 | -- | -- | 5.3E-08 | 7.4E-07 | 47.6% | 9.2E-07 | -- | -- |
| Benzo(a)pyrene | 0.11 | 0.1 | NA | NA | 1.9E-08 | -- | -- | 3.3E-07 | -- | -- | 2.3E-08 | -- | -- | 4.1E-07 | -- | -- |
| Benzo(a)anthracene | 0.1 | 0.1 | NA | NA | 1.7E-08 | -- | -- | 3.0E-07 | -- | -- | 2.1E-08 | -- | -- | 3.7E-07 | -- | -- |
| Chrysene | 0.2 | 0.1 | NA | NA | 3.4E-08 | -- | -- | 5.9E-07 | -- | -- | 4.2E-08 | -- | -- | 7.4E-07 | -- | -- |
| Benzo(b)fluoranthene | 0.25285 | 0.1 | NA | NA | 4.3E-08 | -- | -- | 7.5E-07 | -- | -- | 5.3E-08 | -- | -- | 9.3E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.13 | 0.1 | NA | NA | 2.2E-08 | -- | -- | 3.9E-07 | -- | -- | 2.7E-08 | -- | -- | 4.8E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0.1 | NA | NA | 2.7E-08 | -- | -- | 4.7E-07 | -- | -- | 3.4E-08 | -- | -- | 5.9E-07 | -- | -- |
| Aluminum | 12046.95 | 0.01 | NA | 0.2 | 2.0E-04 | -- | -- | 3.6E-03 | 1.8E-02 | 4.6% | 2.5E-04 | -- | -- | 4.4E-03 | 2.2E-02 | 4.6% |
| Arsenic | 7.64 | 0.032 | 1.57894737 | 0.000285 | 4.1E-07 | 6.5E-07 | 52.4% | 7.3E-06 | 2.5E-02 | 6.6% | 5.1E-07 | 8.1E-07 | 52.4% | 9.0E-06 | 3.2E-02 | 6.6% |
| Cadmium (soil) | 1.48 | 0.01 | NA | 0.00005 | 2.5E-08 | -- | -- | 4.4E-07 | 8.8E-03 | 2.3% | 3.1E-08 | -- | -- | 5.5E-07 | 1.1E-02 | 2.3% |
| Chromium | 19.37 | 0.01 | NA | 0.00003 | 3.3E-07 | -- | -- | 5.7E-06 | 1.9E-01 | 49.4% | 4.1E-07 | -- | -- | 7.1E-06 | 2.4E-01 | 49.4% |
| Copper | 180.65 | 0.01 | NA | 0.024 | 3.1E-06 | -- | -- | 5.4E-05 | 2.2E-03 | 0.6% | 3.8E-06 | -- | -- | 6.7E-05 | 2.8E-03 | 0.6% |
| Iron | 22276.88 | 0.01 | NA | 0.06 | 3.8E-04 | -- | -- | 6.6E-03 | 1.1E-01 | 28.4% | 4.7E-04 | -- | -- | 8.2E-03 | 1.4E-01 | 28.4% |
| Lead | 240.69 | 0.01 | NA | NA | 4.1E-06 | -- | -- | 7.1E-05 | -- | -- | 5.1E-06 | -- | -- | 8.9E-05 | -- | -- |
| Manganese | 105.93 | 0.01 | NA | 0.001 | 1.8E-06 | -- | -- | 3.1E-05 | 3.1E-02 | 8.1% | 2.2E-06 | -- | -- | 3.9E-05 | 3.9E-02 | 8.1% |
| | | | | | Total ILCR: | 1.2E-06 | 100.0% | HI: | 3.9E-01 | 100.0% | Total ILCR: | 1.5E-06 | 100.0% | HI: | 4.8E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 4 PROPER
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| IR | Ingestion Rate (mg/d) | 50 | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| FI | Fraction of soil ingested from site | 1 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(a)anthracene | 0.64859249 | 0.73 | NA | 1.1E-07 | 8.3E-08 | 2.4% | 3.2E-07 | -- | -- |
| Benzo(b)fluoranthene | 0.68716699 | 0.73 | NA | 1.2E-07 | 8.8E-08 | 2.5% | 3.4E-07 | -- | -- |
| Benzo(a)pyrene | 0.60089746 | 7.3 | NA | 1.0E-07 | 7.7E-07 | 22.0% | 2.9E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.39019399 | 0.73 | NA | 6.8E-08 | 5.0E-08 | 1.4% | 1.9E-07 | -- | -- |
| Dibenzo(a,h)anthracene | 0.23852592 | 7.3 | NA | 4.2E-08 | 3.0E-07 | 8.7% | 1.2E-07 | -- | -- |
| Carbazole | 0.257 | 0.02 | NA | 4.5E-08 | 9.0E-10 | 0.0% | 1.3E-07 | -- | -- |
| Chrysene | 0.649 | 0.0073 | NA | 1.1E-07 | 8.3E-10 | 0.0% | 3.2E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.529 | 0.073 | NA | 9.2E-08 | 6.7E-09 | 0.2% | 2.6E-07 | -- | -- |
| Aroclor-1260 | 0.07447131 | 2 | NA | 1.3E-08 | 2.6E-08 | 0.7% | 3.6E-08 | -- | -- |
| 1,3-Dinitrobenzene | 0.169354 | NA | 0.0009 | 3.0E-08 | -- | -- | 8.3E-08 | 9.2E-05 | 0.1% |
| 2,4,6-Trinitrotoluene | 7.911262 | 0.03 | 0.0005 | 1.4E-06 | 4.1E-08 | 1.2% | 3.9E-06 | 7.7E-03 | 8.4% |
| Amino-Dinitrotoluene | 0.79 | NA | 0.00006 | 1.4E-07 | -- | -- | 3.9E-07 | 6.4E-03 | 7.0% |
| RDX | 7.841227 | 0.11 | 0.003 | 1.4E-06 | 1.5E-07 | 4.3% | 3.8E-06 | 1.3E-03 | 1.4% |
| Aluminum | 14241.4825 | NA | 1 | 2.5E-03 | -- | -- | 7.0E-03 | 7.0E-03 | 7.5% |
| Antimony | 1.73877823 | NA | 0.0004 | 3.0E-07 | -- | -- | 8.5E-07 | 2.1E-03 | 2.3% |
| Arsenic | 7.49404214 | 1.5 | 0.0003 | 1.3E-06 | 2.0E-06 | 56.4% | 3.7E-06 | 1.2E-02 | 13.2% |
| Cadmium (soil) | 1.28363322 | NA | 0.001 | 2.2E-07 | -- | -- | 6.3E-07 | 6.3E-04 | 0.7% |
| Chromium | 13.51 | NA | 0.003 | 2.4E-06 | -- | -- | 6.6E-06 | 2.2E-03 | 2.4% |
| Copper | 37.9771664 | NA | 0.04 | 6.6E-06 | -- | -- | 1.9E-05 | 4.6E-04 | 0.5% |
| Iron | 13057.3564 | NA | 0.3 | 2.3E-03 | -- | -- | 6.4E-03 | 2.1E-02 | 23.0% |
| Manganese | 1202.76613 | NA | 0.02 | 2.1E-04 | -- | -- | 5.9E-04 | 2.9E-02 | 31.8% |
| Zinc | 1011.2925 | NA | 0.3 | 1.8E-04 | -- | -- | 4.9E-04 | 1.6E-03 | 1.8% |
| | | | | Total ILCR: | 3.5E-06 | 100.0% | Total HI: | 9.3E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 4 PROPER
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | |
|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | |
| ABS | Absorption fraction | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(a)anthracene | 0.64859249 | 0.1 | NA | NA | 1.2E-06 | -- | -- | 3.4E-06 | -- | -- |
| Benzo(b)fluoranthene | 0.68716699 | 0.1 | NA | NA | 1.3E-06 | -- | -- | 3.6E-06 | -- | -- |
| Benzo(a)pyrene | 0.60089746 | 0.1 | NA | NA | 1.1E-06 | -- | -- | 3.1E-06 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.39019399 | 0.1 | NA | NA | 7.2E-07 | -- | -- | 2.0E-06 | -- | -- |
| Dibenzo(a,h)anthracene | 0.23852592 | 0.1 | NA | NA | 4.4E-07 | -- | -- | 1.2E-06 | -- | -- |
| Carbazole | 0.257 | 0.1 | NA | NA | 4.8E-07 | -- | -- | 1.3E-06 | -- | -- |
| Chrysene | 0.649 | 0.1 | NA | NA | 1.2E-06 | -- | -- | 3.4E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.529 | 0.1 | NA | NA | 9.8E-07 | -- | -- | 2.7E-06 | -- | -- |
| Aroclor-1260 | 0.07447131 | 0.06 | 2.247191 | NA | 8.3E-08 | 1.9E-07 | 2.0% | 2.3E-07 | -- | -- |
| 1,3-Dinitrobenzene | 0.169354 | 0.1 | NA | 0.00045 | 3.1E-07 | -- | -- | 8.8E-07 | 2.0E-03 | 0.1% |
| 2,4,6-Trinitrotoluene | 7.911262 | 0.1 | 0.0405405 | 0.00037 | 1.5E-05 | 5.9E-07 | 6.3% | 4.1E-05 | 1.1E-01 | 8.3% |
| Amino-Dinitrotoluene | 0.79 | 0.1 | NA | 0.000036 | 1.5E-06 | -- | -- | 4.1E-06 | 1.1E-01 | 8.5% |
| RDX | 7.841227 | 0.1 | 0.11 | 0.003 | 1.5E-05 | 1.6E-06 | 17.0% | 4.1E-05 | 1.4E-02 | 1.0% |
| Aluminum | 14241.4825 | 0.01 | NA | 0.2 | 2.6E-03 | -- | -- | 7.4E-03 | 3.7E-02 | 2.8% |
| Antimony | 1.73877823 | 0.01 | NA | 0.00004 | 3.2E-07 | -- | -- | 9.0E-07 | 2.3E-02 | 1.7% |
| Arsenic | 7.49404214 | 0.032 | 1.5789474 | 0.000285 | 4.4E-06 | 7.0E-06 | 74.7% | 1.2E-05 | 4.4E-02 | 3.3% |
| Cadmium (soil) | 1.28363322 | 0.01 | NA | 0.00005 | 2.4E-07 | -- | -- | 6.7E-07 | 1.3E-02 | 1.0% |
| Chromium | 13.51 | 0.01 | NA | 0.00003 | 2.5E-06 | -- | -- | 7.0E-06 | 2.3E-01 | 17.5% |
| Copper | 37.9771664 | 0.01 | NA | 0.024 | 7.0E-06 | -- | -- | 2.0E-05 | 8.2E-04 | 0.1% |
| Iron | 13057.3564 | 0.01 | NA | 0.06 | 2.4E-03 | -- | -- | 6.8E-03 | 1.1E-01 | 8.5% |
| Manganese | 1202.76613 | 0.01 | NA | 0.001 | 2.2E-04 | -- | -- | 6.2E-04 | 6.2E-01 | 46.7% |
| Zinc | 1011.2925 | 0.01 | NA | 0.075 | 1.9E-04 | -- | -- | 5.2E-04 | 7.0E-03 | 0.5% |
| | | | | | Total ILCR: | 9.4E-06 | 100.0% | HI: | 1.3E+00 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
INHALATION OF FUGITIVE DUSTS EMANATING FROM SURFACE SOIL - SITE 4 PROPER
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Ca*RR*ET*EF*ED)/(BW*AT)
Where: Ca = Cs * (1/PEF)

ILCR = CDI*CSFI
HQ = CDI/RfDi

| Parameter | Description | Adult | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFi | Inhalation cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDi | Inhalation reference dose (mg/kg/d) | CS | |
| Ca | Concentration of chemical in air as fugitive dusts (mg/m3) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| PEF | Particulate emission factor (m3/kg) | 1.32E+09 | |
| RR | Respiration rate (m3/hr) | 0.83 | |
| ET | Exposure time (hrs/d) | 8 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | Ca (mg/m3) | CSFi 1/(mg/kg/d) | RfDi (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(a)anthracene | 0.6485925 | 4.91358E-10 | NA | NA | 1.1E-11 | -- | -- | 3.2E-11 | -- | -- |
| Benzo(b)fluoranthene | 0.687167 | 5.20581E-10 | NA | NA | 1.2E-11 | -- | -- | 3.4E-11 | -- | -- |
| Benzo(a)pyrene | 0.6008975 | 4.55225E-10 | 3.1 | NA | 1.1E-11 | 3.3E-11 | 0.3% | 3.0E-11 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.390194 | 2.95602E-10 | NA | NA | 6.9E-12 | -- | -- | 1.9E-11 | -- | -- |
| Dibenzo(a,h)anthracene | 0.2385259 | 1.80701E-10 | NA | NA | 4.2E-12 | -- | -- | 1.2E-11 | -- | -- |
| Carbazole | 0.257 | 1.94697E-10 | NA | NA | 4.5E-12 | -- | -- | 1.3E-11 | -- | -- |
| Chrysene | 0.649 | 4.91667E-10 | NA | NA | 1.1E-11 | -- | -- | 3.2E-11 | -- | -- |
| Benzo(k)fluoranthene | 0.529 | 4.00758E-10 | NA | NA | 9.3E-12 | -- | -- | 2.6E-11 | -- | -- |
| Aroclor-1260 | 0.0744713 | 5.64177E-11 | 2 | NA | 1.3E-12 | 2.6E-12 | 0.0% | 3.7E-12 | -- | -- |
| 1,3-Dinitrobenzene | 0.169354 | 1.28298E-10 | NA | NA | 3.0E-12 | -- | -- | 8.3E-12 | -- | -- |
| 2,4,6-Trinitrotoluene | 7.911262 | 5.99338E-09 | NA | NA | 1.4E-10 | -- | -- | 3.9E-10 | -- | -- |
| Amino-Dinitrotoluene | 0.79 | 5.98485E-10 | NA | NA | 1.4E-11 | -- | -- | 3.9E-11 | -- | -- |
| RDX | 7.841227 | 5.94032E-09 | NA | NA | 1.4E-10 | -- | -- | 3.9E-10 | -- | -- |
| Aluminum | 14241.483 | 1.0789E-05 | NA | 0.001 | 2.5E-07 | -- | -- | 7.0E-07 | 7.0E-04 | 14.4% |
| Antimony | 1.7387782 | 1.31726E-09 | NA | NA | 3.1E-11 | -- | -- | 8.6E-11 | -- | -- |
| Arsenic | 7.4940421 | 5.6773E-09 | 15.1 | NA | 1.3E-10 | 2.0E-09 | 16.7% | 3.7E-10 | -- | -- |
| Cadmium (soil) | 1.2836332 | 9.72449E-10 | 6.3 | 0.000057 | 2.3E-11 | 1.4E-10 | 1.2% | 6.3E-11 | 1.1E-06 | 0.0% |
| Chromium | 13.51 | 1.02348E-08 | 41 | 0.00003 | 2.4E-10 | 9.7E-09 | 81.8% | 6.6E-10 | 2.2E-05 | 0.5% |
| Copper | 37.977166 | 2.87706E-08 | NA | NA | 6.7E-10 | -- | -- | 1.9E-09 | -- | -- |
| Iron | 13057.356 | 9.89194E-06 | NA | NA | 2.3E-07 | -- | -- | 6.4E-07 | -- | -- |
| Manganese | 1202.7661 | 9.11186E-07 | NA | 1.43E-05 | 2.1E-08 | -- | -- | 5.9E-08 | 4.1E-03 | 85.1% |
| Zinc | 1011.2925 | 7.66131E-07 | NA | NA | 1.8E-08 | -- | -- | 5.0E-08 | -- | -- |
| | | | | | Total ILCR: | 1.2E-08 | 100.0% | HI: | 4.9E-03 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 4 HOT SPOT
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| IR | Ingestion Rate (mg/d) | 50 | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| FI | Fraction of soil ingested from site | 1 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Carbazole | 44 | 0.02 | NA | 7.7E-06 | 1.5E-07 | 0.1% | 2.2E-05 | -- | -- |
| Benzo(a)anthracene | 67 | 0.73 | NA | 1.2E-05 | 8.5E-06 | 4.2% | 3.3E-05 | -- | -- |
| Benzo(b)fluoranthene | 54 | 0.73 | NA | 9.4E-06 | 6.9E-06 | 3.4% | 2.6E-05 | -- | -- |
| Benzo(a)pyrene | 56 | 7.3 | NA | 9.8E-06 | 7.1E-05 | 35.0% | 2.7E-05 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 32 | 0.73 | NA | 5.6E-06 | 4.1E-06 | 2.0% | 1.6E-05 | -- | -- |
| Dibenzo(a,h)anthracene | 6.1 | 7.3 | NA | 1.1E-06 | 7.8E-06 | 3.8% | 3.0E-06 | -- | -- |
| Chrysene | 63 | 0.0073 | NA | 1.1E-05 | 8.0E-08 | 0.0% | 3.1E-05 | -- | -- |
| Benzo(k)fluoranthene | 7.8 | 0.073 | NA | 1.4E-06 | 9.9E-08 | 0.0% | 3.8E-06 | -- | -- |
| Antimony | 17.0233287 | NA | 0.0004 | 3.0E-06 | -- | -- | 8.3E-06 | 2.1E-02 | 3.0% |
| Arsenic | 399.6953 | 1.5 | 0.0003 | 7.0E-05 | 1.0E-04 | 51.4% | 2.0E-04 | 6.5E-01 | 94.1% |
| Iron | 8910 | NA | 0.3 | 1.6E-03 | -- | -- | 4.4E-03 | 1.5E-02 | 2.1% |
| Manganese | 224 | NA | 0.02 | 3.9E-05 | -- | -- | 1.1E-04 | 5.5E-03 | 0.8% |
| | | | | Total ILCR: | 2.0E-04 | 100.0% | Total HI: | 6.9E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 4 HOT SPOT
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | |
|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | |
| ABS | Absorption fraction | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Carbazole | 44 | 0.1 | NA | NA | 8.1E-05 | -- | -- | 2.3E-04 | -- | -- |
| Benzo(a)anthracene | 67 | 0.1 | NA | NA | 1.2E-04 | -- | -- | 3.5E-04 | -- | -- |
| Benzo(b)fluoranthene | 54 | 0.1 | NA | NA | 1.0E-04 | -- | -- | 2.8E-04 | -- | -- |
| Benzo(a)pyrene | 56 | 0.1 | NA | NA | 1.0E-04 | -- | -- | 2.9E-04 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 32 | 0.1 | NA | NA | 5.9E-05 | -- | -- | 1.7E-04 | -- | -- |
| Dibenzo(a,h)anthracene | 6.1 | 0.1 | NA | NA | 1.1E-05 | -- | -- | 3.2E-05 | -- | -- |
| Chrysene | 63 | 0.1 | NA | NA | 1.2E-04 | -- | -- | 3.3E-04 | -- | -- |
| Benzo(k)fluoranthene | 7.8 | 0.1 | NA | NA | 1.4E-05 | -- | -- | 4.0E-05 | -- | -- |
| Antimony | 17.0233287 | 0.01 | NA | 0.00004 | 3.2E-06 | -- | -- | 8.8E-06 | 2.2E-01 | 8.1% |
| Arsenic | 399.6953 | 0.032 | 1.5789474 | 0.000285 | 2.4E-04 | 3.7E-04 | 100.0% | 6.6E-04 | 2.3E+00 | 84.9% |
| Iron | 8910 | 0.01 | NA | 0.06 | 1.7E-03 | -- | -- | 4.6E-03 | 7.7E-02 | 2.8% |
| Manganese | 224 | 0.01 | NA | 0.001 | 4.1E-05 | -- | -- | 1.2E-04 | 1.2E-01 | 4.2% |
| | | | | | Total ILCR: | 3.7E-04 | 100.0% | HI: | 2.7E+00 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
INHALATION OF FUGITIVE DUSTS EMANATING FROM SURFACE SOIL - SITE 4 HOT SPOT
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Ca*RR*ET*EF*ED)/(BW*AT)
Where: Ca = Cs * (1/PEF)

ILCR = CDI*CSFi
HQ = CDI/RfDi

| Parameter | Description | Adult | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFi | Inhalation cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDi | Inhalation reference dose (mg/kg/d) | CS | |
| Ca | Concentration of chemical in air as fugitive dusts (mg/m3) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| PEF | Particulate emission factor (m3/kg) | 1.32E+09 | |
| RR | Respiration rate (m3/hr) | 0.83 | |
| ET | Exposure time (hrs/d) | 8 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | Ca (mg/m3) | CSFi 1/(mg/kg/d) | RfDi (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Carbazole | 44 | 3.33333E-08 | NA | NA | 7.7E-10 | -- | -- | 2.2E-09 | -- | -- |
| Benzo(a)anthracene | 67 | 5.07576E-08 | NA | NA | 1.2E-09 | -- | -- | 3.3E-09 | -- | -- |
| Benzo(b)fluoranthene | 54 | 4.09091E-08 | NA | NA | 9.5E-10 | -- | -- | 2.7E-09 | -- | -- |
| Benzo(a)pyrene | 56 | 4.24242E-08 | 3.1 | NA | 9.8E-10 | 3.1E-09 | 2.8% | 2.8E-09 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 32 | 2.42424E-08 | NA | NA | 5.6E-10 | -- | -- | 1.6E-09 | -- | -- |
| Dibenzo(a,h)anthracene | 6.1 | 4.62121E-09 | NA | NA | 1.1E-10 | -- | -- | 3.0E-10 | -- | -- |
| Chrysene | 63 | 4.77273E-08 | NA | NA | 1.1E-09 | -- | -- | 3.1E-09 | -- | -- |
| Benzo(k)fluoranthene | 7.8 | 5.90909E-09 | NA | NA | 1.4E-10 | -- | -- | 3.8E-10 | -- | -- |
| Antimony | 17.0233287 | 1.28965E-08 | NA | NA | 3.0E-10 | -- | -- | 8.4E-10 | -- | -- |
| Arsenic | 399.6953 | 3.02799E-07 | 15.1 | NA | 7.0E-09 | 1.1E-07 | 97.2% | 2.0E-08 | -- | -- |
| Iron | 8910 | 0.00000675 | NA | NA | 1.6E-07 | -- | -- | 4.4E-07 | -- | -- |
| Manganese | 224 | 1.69697E-07 | NA | 1.43E-05 | 3.9E-09 | -- | -- | 1.1E-08 | 7.7E-04 | 100.0% |
| | | | | | Total ILCR: | 1.1E-07 | 100.0% | HI: | 7.7E-04 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| IR | Ingestion Rate (mg/d) | 50 | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| FI | Fraction of soil ingested from site | 1 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(b)fluoranthene | 0.40533 | 0.73 | NA | 7.1E-08 | 5.2E-08 | 4.1% | 2.0E-07 | -- | -- |
| Benzo(a)pyrene | 0.14 | 7.3 | NA | 2.4E-08 | 1.8E-07 | 14.0% | 6.8E-08 | -- | -- |
| Benzo(a)anthracene | 0.2 | 0.73 | NA | 3.5E-08 | 2.6E-08 | 2.0% | 9.8E-08 | -- | -- |
| Chrysene | 0.26 | 0.0073 | NA | 4.5E-08 | 3.3E-10 | 0.0% | 1.3E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.22 | 0.073 | NA | 3.8E-08 | 2.8E-09 | 0.2% | 1.1E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0.73 | NA | 2.3E-08 | 1.7E-08 | 1.3% | 6.4E-08 | -- | -- |
| Dieldrin | 0.01024 | 16 | 0.00005 | 1.8E-09 | 2.9E-08 | 2.2% | 5.0E-09 | 1.0E-04 | 0.2% |
| Aluminum | 10394.44 | NA | 1 | 1.8E-03 | -- | -- | 5.1E-03 | 5.1E-03 | 10.1% |
| Arsenic | 3.71 | 1.5 | 0.0003 | 6.5E-07 | 9.7E-07 | 76.2% | 1.8E-06 | 6.1E-03 | 12.0% |
| Cadmium (soil) | 7.74 | NA | 0.001 | 1.4E-06 | -- | -- | 3.8E-06 | 3.8E-03 | 7.5% |
| Chromium | 11.89 | NA | 0.003 | 2.1E-06 | -- | -- | 5.8E-06 | 1.9E-03 | 3.8% |
| Iron | 10008.45 | NA | 0.3 | 1.7E-03 | -- | -- | 4.9E-03 | 1.6E-02 | 32.3% |
| Manganese | 250.11 | NA | 0.02 | 4.4E-05 | -- | -- | 1.2E-04 | 6.1E-03 | 12.1% |
| Mercury | 1.11 | NA | 0.0001 | 1.9E-07 | -- | -- | 5.4E-07 | 5.4E-03 | 10.7% |
| Thallium | 0.55 | NA | 0.00007 | 9.6E-08 | -- | -- | 2.7E-07 | 3.8E-03 | 7.6% |
| Zinc | 1144.05 | NA | 0.3 | 2.0E-04 | -- | -- | 5.6E-04 | 1.9E-03 | 3.7% |
| | | | | Total ILCR: | 1.3E-06 | 100.0% | Total HI: | 5.1E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | |
|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | |
| ABS | Absorption fraction | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(b)fluoranthene | 0.40533 | 0.1 | NA | NA | 7.5E-07 | -- | -- | 2.1E-06 | -- | -- |
| Benzo(a)pyrene | 0.14 | 0.1 | NA | NA | 2.6E-07 | -- | -- | 7.3E-07 | -- | -- |
| Benzo(a)anthracene | 0.2 | 0.1 | NA | NA | 3.7E-07 | -- | -- | 1.0E-06 | -- | -- |
| Chrysene | 0.26 | 0.1 | NA | NA | 4.8E-07 | -- | -- | 1.3E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.22 | 0.1 | NA | NA | 4.1E-07 | -- | -- | 1.1E-06 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0.1 | NA | NA | 2.4E-07 | -- | -- | 6.7E-07 | -- | -- |
| Dieldrin | 0.01024 | 0.1 | 32 | 0.000025 | 1.9E-08 | 6.1E-07 | 14.9% | 5.3E-08 | 2.1E-03 | 0.3% |
| Aluminum | 10394.44 | 0.01 | NA | 0.2 | 1.9E-03 | -- | -- | 5.4E-03 | 2.7E-02 | 4.4% |
| Arsenic | 3.71 | 0.032 | 1.5789474 | 0.000285 | 2.2E-06 | 3.5E-06 | 85.1% | 6.2E-06 | 2.2E-02 | 3.5% |
| Cadmium (soil) | 7.74 | 0.01 | NA | 0.00005 | 1.4E-06 | -- | -- | 4.0E-06 | 8.0E-02 | 13.0% |
| Chromium | 11.89 | 0.01 | NA | 0.00003 | 2.2E-06 | -- | -- | 6.2E-06 | 2.1E-01 | 33.2% |
| Iron | 10008.45 | 0.01 | NA | 0.06 | 1.9E-03 | -- | -- | 5.2E-03 | 8.7E-02 | 14.0% |
| Manganese | 250.11 | 0.01 | NA | 0.001 | 4.6E-05 | -- | -- | 1.3E-04 | 1.3E-01 | 20.9% |
| Mercury | 1.11 | 0.01 | NA | 0.000015 | 2.1E-07 | -- | -- | 5.8E-07 | 3.8E-02 | 6.2% |
| Thallium | 0.55 | 0.01 | NA | 0.000014 | 1.0E-07 | -- | -- | 2.9E-07 | 2.0E-02 | 3.3% |
| Zinc | 1144.05 | 0.01 | NA | 0.075 | 2.1E-04 | -- | -- | 5.9E-04 | 7.9E-03 | 1.3% |
| | | | | | Total ILCR: | 4.1E-06 | 100.0% | HI: | 6.2E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
INHALATION OF FUGITIVE DUSTS EMANATING FROM SURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Ca*RR*ET*EF*ED)/(BW*AT)
Where: Ca = Cs * (1/PEF)

ILCR = CDI*CSFi
HQ = CDI/RfDi

| Parameter | Description | Adult | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFi | Inhalation cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDi | Inhalation reference dose (mg/kg/d) | CS | |
| Ca | Concentration of chemical in air as fugitive dusts (mg/m3) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| PEF | Particulate emission factor (m3/kg) | 1.32E+09 | |
| RR | Respiration rate (m3/hr) | 0.83 | |
| ET | Exposure time (hrs/d) | 8 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | Ca (mg/m3) | CSFi 1/(mg/kg/d) | RfDi (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(b)fluoranthene | 0.40533 | 3.07068E-10 | NA | NA | 7.1E-12 | -- | -- | 2.0E-11 | -- | -- |
| Benzo(a)pyrene | 0.14 | 1.06061E-10 | 3.1 | NA | 2.5E-12 | 7.6E-12 | 0.1% | 6.9E-12 | -- | -- |
| Benzo(a)anthracene | 0.2 | 1.51515E-10 | NA | NA | 3.5E-12 | -- | -- | 9.8E-12 | -- | -- |
| Chrysene | 0.26 | 1.9697E-10 | NA | NA | 4.6E-12 | -- | -- | 1.3E-11 | -- | -- |
| Benzo(k)fluoranthene | 0.22 | 1.66667E-10 | NA | NA | 3.9E-12 | -- | -- | 1.1E-11 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.13 | 9.84848E-11 | NA | NA | 2.3E-12 | -- | -- | 6.4E-12 | -- | -- |
| Dieldrin | 0.01024 | 7.75758E-12 | 16 | NA | 1.8E-13 | 2.9E-12 | 0.0% | 5.0E-13 | -- | -- |
| Aluminum | 10394.44 | 7.87458E-06 | NA | 0.001 | 1.8E-07 | -- | -- | 5.1E-07 | 5.1E-04 | 36.6% |
| Arsenic | 3.71 | 2.81061E-09 | 15.1 | NA | 6.5E-11 | 9.8E-10 | 9.4% | 1.8E-10 | -- | -- |
| Cadmium (soil) | 7.74 | 5.86364E-09 | 6.3 | 0.000057 | 1.4E-10 | 8.6E-10 | 8.2% | 3.8E-10 | 6.7E-06 | 0.5% |
| Chromium | 11.89 | 9.00758E-09 | 41 | 0.00003 | 2.1E-10 | 8.6E-09 | 82.2% | 5.9E-10 | 2.0E-05 | 1.4% |
| Iron | 10008.45 | 7.58216E-06 | NA | NA | 1.8E-07 | -- | -- | 4.9E-07 | -- | -- |
| Manganese | 250.11 | 1.89477E-07 | NA | 1.43E-05 | 4.4E-09 | -- | -- | 1.2E-08 | 8.6E-04 | 61.5% |
| Mercury | 1.11 | 8.40909E-10 | NA | 0.000086 | 2.0E-11 | -- | -- | 5.5E-11 | 6.4E-07 | 0.0% |
| Thallium | 0.55 | 4.16667E-10 | NA | NA | 9.7E-12 | -- | -- | 2.7E-11 | -- | -- |
| Zinc | 1144.05 | 8.66705E-07 | NA | NA | 2.0E-08 | -- | -- | 5.6E-08 | -- | -- |
| | | | | | Total ILCR: | 1.0E-08 | 100.0% | HI: | 1.4E-03 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| IR | Ingestion Rate (mg/d) | 50 | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| FI | Fraction of soil ingested from site | 1 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| n-Nitroso-di-n-propylamine | 0.25 | 7 | NA | 4.4E-08 | 3.1E-07 | 12.2% | 1.2E-07 | -- | -- |
| Benzo(a)pyrene | 0.11 | 7.3 | NA | 1.9E-08 | 1.4E-07 | 5.6% | 5.4E-08 | -- | -- |
| Benzo(a)anthracene | 0.1 | 0.73 | NA | 1.7E-08 | 1.3E-08 | 0.5% | 4.9E-08 | -- | -- |
| Chrysene | 0.2 | 0.0073 | NA | 3.5E-08 | 2.6E-10 | 0.0% | 9.8E-08 | -- | -- |
| Benzo(b)fluoranthene | 0.25285 | 0.73 | NA | 4.4E-08 | 3.2E-08 | 1.3% | 1.2E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.13 | 0.073 | NA | 2.3E-08 | 1.7E-09 | 0.1% | 6.4E-08 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0.73 | NA | 2.8E-08 | 2.0E-08 | 0.8% | 7.8E-08 | -- | -- |
| Aluminum | 12046.95 | NA | 1 | 2.1E-03 | -- | -- | 5.9E-03 | 5.9E-03 | 9.3% |
| Arsenic | 7.64 | 1.5 | 0.0003 | 1.3E-06 | 2.0E-06 | 79.6% | 3.7E-06 | 1.2E-02 | 19.7% |
| Cadmium | 1.48 | NA | 0.001 | 2.6E-07 | -- | -- | 7.2E-07 | 7.2E-04 | 1.1% |
| Chromium | 19.37 | NA | 0.003 | 3.4E-06 | -- | -- | 9.5E-06 | 3.2E-03 | 5.0% |
| Copper | 180.65 | NA | 0.04 | 3.2E-05 | -- | -- | 8.8E-05 | 2.2E-03 | 3.5% |
| Iron | 22276.88 | NA | 0.3 | 3.9E-03 | -- | -- | 1.1E-02 | 3.6E-02 | 57.3% |
| Lead | 240.69 | NA | NA | 4.2E-05 | -- | -- | 1.2E-04 | -- | -- |
| Manganese | 105.93 | NA | 0.02 | 1.9E-05 | -- | -- | 5.2E-05 | 2.6E-03 | 4.1% |
| | | | | Total ILCR: | 2.5E-06 | 100.0% | Total HI: | 6.3E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | |
|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | |
| ABS | Absorption fraction | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| n-Nitroso-di-n-propylamine | 0.25 | 0.1 | 14 | NA | 4.6E-07 | 6.5E-06 | 47.6% | 1.3E-06 | -- | -- |
| Benzo(a)pyrene | 0.11 | 0.1 | NA | NA | 2.0E-07 | -- | -- | 5.7E-07 | -- | -- |
| Benzo(a)anthracene | 0.1 | 0.1 | NA | NA | 1.9E-07 | -- | -- | 5.2E-07 | -- | -- |
| Chrysene | 0.2 | 0.1 | NA | NA | 3.7E-07 | -- | -- | 1.0E-06 | -- | -- |
| Benzo(b)fluoranthene | 0.25285 | 0.1 | NA | NA | 4.7E-07 | -- | -- | 1.3E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.13 | 0.1 | NA | NA | 2.4E-07 | -- | -- | 6.7E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0.1 | NA | NA | 3.0E-07 | -- | -- | 8.3E-07 | -- | -- |
| Aluminum | 12046.95 | 0.01 | NA | 0.2 | 2.2E-03 | -- | -- | 6.2E-03 | 3.1E-02 | 4.6% |
| Arsenic | 7.64 | 0.032 | 1.5789474 | 0.000285 | 4.5E-06 | 7.1E-06 | 52.4% | 1.3E-05 | 4.4E-02 | 6.6% |
| Cadmium | 1.48 | 0.01 | NA | 0.00005 | 2.7E-07 | -- | -- | 7.7E-07 | 1.5E-02 | 2.3% |
| Chromium | 19.37 | 0.01 | NA | 0.00003 | 3.6E-06 | -- | -- | 1.0E-05 | 3.3E-01 | 49.4% |
| Copper | 180.65 | 0.01 | NA | 0.024 | 3.3E-05 | -- | -- | 9.4E-05 | 3.9E-03 | 0.6% |
| Iron | 22276.88 | 0.01 | NA | 0.06 | 4.1E-03 | -- | -- | 1.2E-02 | 1.9E-01 | 28.4% |
| Lead | 240.69 | 0.01 | NA | NA | 4.5E-05 | -- | -- | 1.2E-04 | -- | -- |
| Manganese | 105.93 | 0.01 | NA | 0.001 | 2.0E-05 | -- | -- | 5.5E-05 | 5.5E-02 | 8.1% |
| | | | | | Total ILCR: | 1.4E-05 | 100.0% | HI: | 6.8E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

COMMERCIAL / UTILITY WORKER - CURRENT SCENARIO
INHALATION OF FUGITIVE DUSTS EMANATING FROM SURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Ca*RR*ET*EF*ED)/(BW*AT)
Where: Ca = Cs * (1/PEF)

ILCR = CDI*CSFi
HQ = CDI/RfDi

| Parameter | Description | Adult | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFi | Inhalation cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDi | Inhalation reference dose (mg/kg/d) | CS | |
| Ca | Concentration of chemical in air as fugitive dusts (mg/m3) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| PEF | Particulate emission factor (m3/kg) | 1.32E+09 | |
| RR | Respiration rate (m3/hr) | 0.83 | |
| ET | Exposure time (hrs/d) | 8 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 25 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 9,125 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | Ca (mg/m3) | CSFi 1/(mg/kg/d) | RfDi (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| n-Nitroso-di-n-propylamine | 0.25 | 1.89394E-10 | NA | NA | 4.4E-12 | -- | -- | 1.2E-11 | -- | -- |
| Benzo(a)pyrene | 0.11 | 8.33333E-11 | 3.1 | NA | 1.9E-12 | 6.0E-12 | 0.0% | 5.4E-12 | -- | -- |
| Benzo(a)anthracene | 0.1 | 7.57576E-11 | NA | NA | 1.8E-12 | -- | -- | 4.9E-12 | -- | -- |
| Chrysene | 0.2 | 1.51515E-10 | NA | NA | 3.5E-12 | -- | -- | 9.8E-12 | -- | -- |
| Benzo(b)fluoranthene | 0.25285 | 1.91553E-10 | NA | NA | 4.4E-12 | -- | -- | 1.2E-11 | -- | -- |
| Benzo(k)fluoranthene | 0.13 | 9.84848E-11 | NA | NA | 2.3E-12 | -- | -- | 6.4E-12 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.16 | 1.21212E-10 | NA | NA | 2.8E-12 | -- | -- | 7.9E-12 | -- | -- |
| Aluminum | 12046.95 | 9.12648E-06 | NA | 0.001 | 2.1E-07 | -- | -- | 5.9E-07 | 5.9E-04 | 59.9% |
| Arsenic | 7.64 | 5.78788E-09 | 15.1 | NA | 1.3E-10 | 2.0E-09 | 12.6% | 3.8E-10 | -- | -- |
| Cadmium | 1.48 | 1.12121E-09 | 6.3 | 0.000057 | 2.6E-11 | 1.6E-10 | 1.0% | 7.3E-11 | 1.3E-06 | 0.1% |
| Chromium | 19.37 | 1.46742E-08 | 41 | 0.00003 | 3.4E-10 | 1.4E-08 | 86.4% | 9.5E-10 | 3.2E-05 | 3.2% |
| Copper | 180.65 | 1.36856E-07 | NA | NA | 3.2E-09 | -- | -- | 8.9E-09 | -- | -- |
| Iron | 22276.88 | 1.68764E-05 | NA | NA | 3.9E-07 | -- | -- | 1.1E-06 | -- | -- |
| Lead | 240.69 | 1.82341E-07 | NA | NA | 4.2E-09 | -- | -- | 1.2E-08 | -- | -- |
| Manganese | 105.93 | 8.025E-08 | NA | 1.43E-05 | 1.9E-09 | -- | -- | 5.2E-09 | 3.6E-04 | 36.8% |
| | | | | | Total ILCR: | 1.6E-08 | 100.0% | HI: | 9.9E-04 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 4 PROPER
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | 200 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 350 | 350 | 350 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(a)anthracene | 0.648592491 | 0.73 | NA | 1.9E-07 | 1.4E-07 | 2.4% | 8.9E-07 | -- | -- | 2.2E-07 | 1.6E-07 | 2.4% | 1.7E-06 | -- | -- | 7.1E-07 | 5.2E-07 | 2.4% | 8.3E-06 | -- | -- |
| Benzo(b)fluoranthene | 0.68716699 | 0.73 | NA | 2.0E-07 | 1.5E-07 | 2.5% | 9.4E-07 | -- | -- | 2.3E-07 | 1.7E-07 | 2.5% | 1.8E-06 | -- | -- | 7.5E-07 | 5.5E-07 | 2.5% | 8.8E-06 | -- | -- |
| Benzo(a)pyrene | 0.600897461 | 7.3 | NA | 1.8E-07 | 1.3E-06 | 22.0% | 8.2E-07 | -- | -- | 2.0E-07 | 1.5E-06 | 22.0% | 1.6E-06 | -- | -- | 6.6E-07 | 4.8E-06 | 22.0% | 7.7E-06 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.390193992 | 0.73 | NA | 1.1E-07 | 8.4E-08 | 1.4% | 5.3E-07 | -- | -- | 1.3E-07 | 9.5E-08 | 1.4% | 1.0E-06 | -- | -- | 4.3E-07 | 3.1E-07 | 1.4% | 5.0E-06 | -- | -- |
| Dibenzo(a,h)anthracen | 0.238525925 | 7.3 | NA | 7.0E-08 | 5.1E-07 | 8.7% | 3.3E-07 | -- | -- | 7.9E-08 | 5.8E-07 | 8.7% | 6.2E-07 | -- | -- | 2.6E-07 | 1.9E-06 | 8.7% | 3.0E-06 | -- | -- |
| Carbazole | 0.257 | 0.02 | NA | 7.5E-08 | 1.5E-09 | 0.0% | 3.5E-07 | -- | -- | 8.6E-08 | 1.7E-09 | 0.0% | 6.7E-07 | -- | -- | 2.8E-07 | 5.6E-09 | 0.0% | 3.3E-06 | -- | -- |
| Chrysene | 0.649 | 0.0073 | NA | 1.9E-07 | 1.4E-09 | 0.0% | 8.9E-07 | -- | -- | 2.2E-07 | 1.6E-09 | 0.0% | 1.7E-06 | -- | -- | 7.1E-07 | 5.2E-09 | 0.0% | 8.3E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.529 | 0.073 | NA | 1.6E-07 | 1.1E-08 | 0.2% | 7.2E-07 | -- | -- | 1.8E-07 | 1.3E-08 | 0.2% | 1.4E-06 | -- | -- | 5.8E-07 | 4.2E-08 | 0.2% | 6.8E-06 | -- | -- |
| Aroclor-1260 | 0.07447131 | 2 | NA | 2.2E-08 | 4.4E-08 | 0.7% | 1.0E-07 | -- | -- | 2.5E-08 | 5.0E-08 | 0.7% | 1.9E-07 | -- | -- | 8.2E-08 | 1.6E-07 | 0.7% | 9.5E-07 | -- | -- |
| 1,3-Dinitrobenzene | 0.169354 | NA | 0.0009 | 6.0E-08 | -- | -- | 2.3E-07 | 2.6E-04 | 0.1% | 5.6E-08 | -- | -- | 4.4E-07 | 4.9E-04 | 0.1% | 1.9E-07 | -- | -- | 2.2E-06 | 2.4E-03 | 0.1% |
| 2,4,6-Trinitrotoluene | 7.911262 | 0.03 | 0.0005 | 2.3E-06 | 7.0E-08 | 1.2% | 1.1E-05 | 2.2E-02 | 8.4% | 2.6E-06 | 7.9E-08 | 1.2% | 2.1E-05 | 4.1E-02 | 8.4% | 8.7E-06 | 2.6E-07 | 1.2% | 1.0E-04 | 2.0E-01 | 8.4% |
| Amino-Dinitrotoluene | 0.79 | NA | 0.00006 | 2.3E-07 | -- | -- | 1.1E-06 | 1.8E-02 | 7.0% | 2.6E-07 | -- | -- | 2.0E-06 | 3.4E-02 | 7.0% | 8.7E-07 | -- | -- | 1.0E-05 | 1.7E-01 | 7.0% |
| RDX | 7.841227 | 0.11 | 0.003 | 2.3E-06 | 2.5E-07 | 4.3% | 1.1E-05 | 3.6E-03 | 1.4% | 2.6E-06 | 2.9E-07 | 4.3% | 2.0E-05 | 6.8E-03 | 1.4% | 8.6E-06 | 9.5E-07 | 4.3% | 1.0E-04 | 3.3E-02 | 1.4% |
| Aluminum | 14241.48251 | NA | 1 | 4.2E-03 | -- | -- | 2.0E-02 | 2.0E-02 | 7.5% | 4.7E-03 | -- | -- | 3.7E-02 | 3.7E-02 | 7.5% | 1.6E-02 | -- | -- | 1.8E-01 | 1.8E-01 | 7.5% |
| Antimony | 1.738778228 | NA | 0.0004 | 5.1E-07 | -- | -- | 2.4E-06 | 6.0E-03 | 2.3% | 5.8E-07 | -- | -- | 4.5E-06 | 1.1E-02 | 2.3% | 1.9E-06 | -- | -- | 2.2E-05 | 5.6E-02 | 2.3% |
| Arsenic | 7.494042145 | 1.5 | 0.0003 | 2.2E-06 | 3.3E-06 | 56.4% | 1.0E-05 | 3.4E-02 | 13.2% | 2.5E-06 | 3.7E-06 | 56.4% | 1.9E-05 | 6.5E-02 | 13.2% | 8.2E-06 | 1.2E-05 | 56.4% | 9.6E-05 | 3.2E-01 | 13.2% |
| Cadmium (soil) | 1.283633215 | NA | 0.001 | 3.8E-07 | -- | -- | 1.8E-06 | 1.8E-03 | 0.7% | 4.3E-07 | -- | -- | 3.3E-06 | 3.3E-03 | 0.7% | 1.4E-06 | -- | -- | 1.6E-05 | 1.6E-02 | 0.7% |
| Chromium | 13.51 | NA | 0.003 | 4.0E-06 | -- | -- | 1.9E-05 | 6.2E-03 | 2.4% | 4.5E-06 | -- | -- | 3.5E-05 | 1.2E-02 | 2.4% | 1.5E-05 | -- | -- | 1.7E-04 | 5.8E-02 | 2.4% |
| Copper | 37.97716641 | NA | 0.04 | 1.1E-05 | -- | -- | 5.2E-05 | 1.3E-03 | 0.5% | 1.3E-05 | -- | -- | 9.8E-05 | 2.5E-03 | 0.5% | 4.2E-05 | -- | -- | 4.9E-04 | 1.2E-02 | 0.5% |
| Iron | 13057.35637 | NA | 0.3 | 3.8E-03 | -- | -- | 1.8E-02 | 6.0E-02 | 23.0% | 4.4E-03 | -- | -- | 3.4E-02 | 1.1E-01 | 23.0% | 1.4E-02 | -- | -- | 1.7E-01 | 5.6E-01 | 23.0% |
| Manganese | 1202.766133 | NA | 0.02 | 3.5E-04 | -- | -- | 1.6E-03 | 8.2E-02 | 31.8% | 4.0E-04 | -- | -- | 3.1E-03 | 1.6E-01 | 31.8% | 1.3E-03 | -- | -- | 1.5E-02 | 7.7E-01 | 31.8% |
| Zinc | 1011.292497 | NA | 0.3 | 3.0E-04 | -- | -- | 1.4E-03 | 4.6E-03 | 1.8% | 3.4E-04 | -- | -- | 2.6E-03 | 8.7E-03 | 1.8% | 1.1E-03 | -- | -- | 1.3E-02 | 4.3E-02 | 1.8% |
| | | | | Total ILCR: | 5.8E-06 | 100.0% | HI: | 2.6E-01 | 100.0% | Total ILCR: | 6.6E-06 | 100.0% | HI: | 4.9E-01 | 100.0% | otal ILCR | 2.2E-05 | 100.0% | HI: | 2.4E+00 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 4 PROPER
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 50 | 50 | 100 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 234 | 234 | 234 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(a)anthracene | 0.648592491 | 0.73 | NA | 6.4E-08 | 4.6E-08 | 2.4% | 3.0E-07 | -- | -- | 7.2E-08 | 5.3E-08 | 2.4% | 5.6E-07 | -- | -- | 2.4E-07 | 1.7E-07 | 2.4% | 2.8E-06 | -- | -- |
| Benzo(b)fluoranthene | 0.68716699 | 0.73 | NA | 6.7E-08 | 4.9E-08 | 2.5% | 3.1E-07 | -- | -- | 7.7E-08 | 5.6E-08 | 2.5% | 6.0E-07 | -- | -- | 2.5E-07 | 1.8E-07 | 2.5% | 2.9E-06 | -- | -- |
| Benzo(a)pyrene | 0.600897461 | 7.3 | NA | 5.9E-08 | 4.3E-07 | 22.0% | 2.8E-07 | -- | -- | 6.7E-08 | 4.9E-07 | 22.0% | 5.2E-07 | -- | -- | 2.2E-07 | 1.6E-06 | 22.0% | 2.6E-06 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.390193992 | 0.73 | NA | 3.8E-08 | 2.8E-08 | 1.4% | 1.8E-07 | -- | -- | 4.3E-08 | 3.2E-08 | 1.4% | 3.4E-07 | -- | -- | 1.4E-07 | 1.0E-07 | 1.4% | 1.7E-06 | -- | -- |
| Dibenzo(a,h)anthracene | 0.238525925 | 7.3 | NA | 2.3E-08 | 1.7E-07 | 8.7% | 1.1E-07 | -- | -- | 2.7E-08 | 1.9E-07 | 8.7% | 2.1E-07 | -- | -- | 8.7E-08 | 6.4E-07 | 8.7% | 1.0E-06 | -- | -- |
| Carbazole | 0.257 | 0.02 | NA | 2.5E-08 | 5.0E-10 | 0.0% | 1.2E-07 | -- | -- | 2.9E-08 | 5.7E-10 | 0.0% | 2.2E-07 | -- | -- | 9.4E-08 | 1.9E-09 | 0.0% | 1.1E-06 | -- | -- |
| Chrysene | 0.649 | 0.0073 | NA | 6.4E-08 | 4.6E-10 | 0.0% | 3.0E-07 | -- | -- | 7.2E-08 | 5.3E-10 | 0.0% | 5.6E-07 | -- | -- | 2.4E-07 | 1.7E-09 | 0.0% | 2.8E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.529 | 0.073 | NA | 5.2E-08 | 3.8E-09 | 0.2% | 2.4E-07 | -- | -- | 5.9E-08 | 4.3E-09 | 0.2% | 4.6E-07 | -- | -- | 1.9E-07 | 1.4E-08 | 0.2% | 2.3E-06 | -- | -- |
| Aroclor-1260 | 0.07447131 | 2 | NA | 7.3E-09 | 1.5E-08 | 0.7% | 3.4E-08 | -- | -- | 8.3E-09 | 1.7E-08 | 0.7% | 6.5E-08 | -- | -- | 2.7E-08 | 5.5E-08 | 0.7% | 3.2E-07 | -- | -- |
| 1,3-Dinitrobenzene | 0.169354 | NA | 0.0009 | 1.7E-08 | -- | -- | 7.8E-08 | 8.6E-05 | 0.1% | 1.9E-08 | -- | -- | 1.5E-07 | 1.6E-04 | 0.1% | 6.2E-08 | -- | -- | 7.2E-07 | 8.0E-04 | 0.1% |
| 2,4,6-Trinitrotoluene | 7.911262 | 0.03 | 0.0005 | 7.8E-07 | 2.3E-08 | 1.2% | 3.6E-06 | 7.2E-03 | 8.4% | 8.8E-07 | 2.6E-08 | 1.2% | 6.9E-06 | 1.4E-02 | 8.4% | 2.9E-06 | 8.7E-08 | 1.2% | 3.4E-05 | 6.8E-02 | 8.4% |
| Amino-Dinitrotoluene | 0.79 | NA | 0.00006 | 7.8E-08 | -- | -- | 3.6E-07 | 6.0E-03 | 7.0% | 8.8E-08 | -- | -- | 6.8E-07 | 1.1E-02 | 7.0% | 2.9E-07 | -- | -- | 3.4E-06 | 5.6E-02 | 7.0% |
| RDX | 7.841227 | 0.11 | 0.003 | 7.7E-07 | 8.5E-08 | 4.3% | 3.6E-06 | 1.2E-03 | 1.4% | 8.7E-07 | 9.6E-08 | 4.3% | 6.8E-06 | 2.3E-03 | 1.4% | 2.9E-06 | 3.2E-07 | 4.3% | 3.4E-05 | 1.1E-02 | 1.4% |
| Aluminum | 14241.48251 | NA | 1 | 1.4E-03 | -- | -- | 6.5E-03 | 6.5E-03 | 7.5% | 1.6E-03 | -- | -- | 1.2E-02 | 1.2E-02 | 7.5% | 5.2E-03 | -- | -- | 6.1E-02 | 6.1E-02 | 7.5% |
| Antimony | 1.738778228 | NA | 0.0004 | 1.7E-07 | -- | -- | 8.0E-07 | 2.0E-03 | 2.3% | 1.9E-07 | -- | -- | 1.5E-06 | 3.8E-03 | 2.3% | 6.4E-07 | -- | -- | 7.4E-06 | 1.9E-02 | 2.3% |
| Arsenic | 7.494042145 | 1.5 | 0.0003 | 7.4E-07 | 1.1E-06 | 56.4% | 3.4E-06 | 1.1E-02 | 13.2% | 8.3E-07 | 1.3E-06 | 56.4% | 6.5E-06 | 2.2E-02 | 13.2% | 2.7E-06 | 4.1E-06 | 56.4% | 3.2E-05 | 1.1E-01 | 13.2% |
| Cadmium (soil) | 1.283633215 | NA | 0.001 | 1.3E-07 | -- | -- | 5.9E-07 | 5.9E-04 | 0.7% | 1.4E-07 | -- | -- | 1.1E-06 | 1.1E-03 | 0.7% | 4.7E-07 | -- | -- | 5.5E-06 | 5.5E-03 | 0.7% |
| Chromium | 13.51 | NA | 0.003 | 1.3E-06 | -- | -- | 6.2E-06 | 2.1E-03 | 2.4% | 1.5E-06 | -- | -- | 1.2E-05 | 3.9E-03 | 2.4% | 4.9E-06 | -- | -- | 5.8E-05 | 1.9E-02 | 2.4% |
| Copper | 37.97716641 | NA | 0.04 | 3.7E-06 | -- | -- | 1.7E-05 | 4.3E-04 | 0.5% | 4.2E-06 | -- | -- | 3.3E-05 | 8.2E-04 | 0.5% | 1.4E-05 | -- | -- | 1.6E-04 | 4.1E-03 | 0.5% |
| Iron | 13057.35637 | NA | 0.3 | 1.3E-03 | -- | -- | 6.0E-03 | 2.0E-02 | 23.0% | 1.5E-03 | -- | -- | 1.1E-02 | 3.8E-02 | 23.0% | 4.8E-03 | -- | -- | 5.6E-02 | 1.9E-01 | 23.0% |
| Manganese | 1202.766133 | NA | 0.02 | 1.2E-04 | -- | -- | 5.5E-04 | 2.8E-02 | 31.8% | 1.3E-04 | -- | -- | 1.0E-03 | 5.2E-02 | 31.8% | 4.4E-04 | -- | -- | 5.1E-03 | 2.6E-01 | 31.8% |
| Zinc | 1011.292497 | NA | 0.3 | 9.9E-05 | -- | -- | 4.6E-04 | 1.5E-03 | 1.8% | 1.1E-04 | -- | -- | 8.8E-04 | 2.9E-03 | 1.8% | 3.7E-04 | -- | -- | 4.3E-03 | 1.4E-02 | 1.8% |
| | | | | Total ILCR: | 2.0E-06 | 100.0% | HI: | 8.7E-02 | 100.0% | Total ILCR: | 2.2E-06 | 100.0% | HI: | 1.6E-01 | 100.0% | otal ILCR | 7.3E-06 | 100.0% | HI: | 8.1E-01 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 4 PROPER
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*A*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | CS | |
| A | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure Frequency (d/yr) | 350 | 350 | 350 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(a)anthracene | 0.64859249 | 0.1 | NA | NA | 1.0E-06 | -- | -- | 4.7E-06 | -- | -- | 8.5E-07 | -- | -- | 6.6E-06 | -- | -- | 7.1E-07 | -- | -- | 8.3E-06 | -- | -- |
| Benzo(b)fluoranthene | 0.68716699 | 0.1 | NA | NA | 1.1E-06 | -- | -- | 5.0E-06 | -- | -- | 9.0E-07 | -- | -- | 7.0E-06 | -- | -- | 7.6E-07 | -- | -- | 8.8E-06 | -- | -- |
| Benzo(a)pyrene | 0.60089746 | 0.1 | NA | NA | 9.3E-07 | -- | -- | 4.4E-06 | -- | -- | 7.9E-07 | -- | -- | 6.1E-06 | -- | -- | 6.6E-07 | -- | -- | 7.7E-06 | -- | -- |
| Indeno(1,2,3-cd)pyren | 0.39019399 | 0.1 | NA | NA | 6.1E-07 | -- | -- | 2.8E-06 | -- | -- | 5.1E-07 | -- | -- | 4.0E-06 | -- | -- | 4.3E-07 | -- | -- | 5.0E-06 | -- | -- |
| Dibenzo(a,h)anthracen | 0.23852592 | 0.1 | NA | NA | 3.7E-07 | -- | -- | 1.7E-06 | -- | -- | 3.1E-07 | -- | -- | 2.4E-06 | -- | -- | 2.6E-07 | -- | -- | 3.1E-06 | -- | -- |
| Carbazole | 0.257 | 0.1 | NA | NA | 4.0E-07 | -- | -- | 1.9E-06 | -- | -- | 3.4E-07 | -- | -- | 2.6E-06 | -- | -- | 2.8E-07 | -- | -- | 3.3E-06 | -- | -- |
| Chrysene | 0.649 | 0.1 | NA | NA | 1.0E-06 | -- | -- | 4.7E-06 | -- | -- | 8.5E-07 | -- | -- | 6.6E-06 | -- | -- | 7.1E-07 | -- | -- | 8.3E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.529 | 0.1 | NA | NA | 8.2E-07 | -- | -- | 3.8E-06 | -- | -- | 6.9E-07 | -- | -- | 5.4E-06 | -- | -- | 5.8E-07 | -- | -- | 6.8E-06 | -- | -- |
| Aroclor-1260 | 0.07447131 | 0.06 | 2.247191 | NA | 7.0E-08 | 1.6E-07 | 2.0% | 3.2E-07 | -- | -- | 5.8E-08 | 1.3E-07 | 2.0% | 4.5E-07 | -- | -- | 4.9E-08 | 1.1E-07 | 2.0% | 5.7E-07 | -- | -- |
| 1,3-Dinitrobenzene | 0.169354 | 0.1 | NA | 0.00045 | 2.6E-07 | -- | -- | 1.2E-06 | 2.7E-03 | 0.1% | 2.2E-07 | -- | -- | 1.7E-06 | 3.8E-03 | 0.1% | 1.9E-07 | -- | -- | 2.2E-06 | 4.8E-03 | 0.1% |
| 2,4,6-Trinitrotoluene | 7.911262 | 0.1 | 0.0405405 | 0.00037 | 1.2E-05 | 5.0E-07 | 6.3% | 5.7E-05 | 1.6E-01 | 8.3% | 1.0E-05 | 4.2E-07 | 6.3% | 8.0E-05 | 2.2E-01 | 8.3% | 8.7E-06 | 3.5E-07 | 6.3% | 1.0E-04 | 2.7E-01 | 8.3% |
| Amino-Dinitrotoluene | 0.79 | 0.1 | NA | 0.000036 | 1.2E-06 | -- | -- | 5.7E-06 | 1.6E-01 | 8.5% | 1.0E-06 | -- | -- | 8.0E-06 | 2.2E-01 | 8.5% | 8.7E-07 | -- | -- | 1.0E-05 | 2.8E-01 | 8.5% |
| RDX | 7.841227 | 0.1 | 0.11 | 0.003 | 1.2E-05 | 1.3E-06 | 17.0% | 5.7E-05 | 1.9E-02 | 1.0% | 1.0E-05 | 1.1E-06 | 17.0% | 8.0E-05 | 2.7E-02 | 1.0% | 8.6E-06 | 9.5E-07 | 17.0% | 1.0E-04 | 3.4E-02 | 1.0% |
| Aluminum | 14241.4825 | 0.01 | NA | 0.2 | 2.2E-03 | -- | -- | 1.0E-02 | 5.2E-02 | 2.8% | 1.9E-03 | -- | -- | 1.4E-02 | 7.2E-02 | 2.8% | 1.6E-03 | -- | -- | 1.8E-02 | 9.1E-02 | 2.8% |
| Antimony | 1.73877823 | 0.01 | NA | 0.00004 | 2.7E-07 | -- | -- | 1.3E-06 | 3.2E-02 | 1.7% | 2.3E-07 | -- | -- | 1.8E-06 | 4.4E-02 | 1.7% | 1.9E-07 | -- | -- | 2.2E-06 | 5.6E-02 | 1.7% |
| Arsenic | 7.49404214 | 0.032 | 1.5789474 | 0.000285 | 3.7E-06 | 5.9E-06 | 74.7% | 1.7E-05 | 6.1E-02 | 3.3% | 3.1E-06 | 5.0E-06 | 74.7% | 2.4E-05 | 8.6E-02 | 3.3% | 2.6E-06 | 4.2E-06 | 74.7% | 3.1E-05 | 1.1E-01 | 3.3% |
| Cadmium (soil) | 1.28363322 | 0.01 | NA | 0.00005 | 2.0E-07 | -- | -- | 9.3E-07 | 1.9E-02 | 1.0% | 1.7E-07 | -- | -- | 1.3E-06 | 2.6E-02 | 1.0% | 1.4E-07 | -- | -- | 1.6E-06 | 3.3E-02 | 1.0% |
| Chromium | 13.51 | 0.01 | NA | 0.00003 | 2.1E-06 | -- | -- | 9.8E-06 | 3.3E-01 | 17.5% | 1.8E-06 | -- | -- | 1.4E-05 | 4.6E-01 | 17.5% | 1.5E-06 | -- | -- | 1.7E-05 | 5.8E-01 | 17.5% |
| Copper | 37.9771664 | 0.01 | NA | 0.024 | 5.9E-06 | -- | -- | 2.8E-05 | 1.1E-03 | 0.1% | 5.0E-06 | -- | -- | 3.9E-05 | 1.6E-03 | 0.1% | 4.2E-06 | -- | -- | 4.9E-05 | 2.0E-03 | 0.1% |
| Iron | 13057.3564 | 0.01 | NA | 0.06 | 2.0E-03 | -- | -- | 9.5E-03 | 1.6E-01 | 8.5% | 1.7E-03 | -- | -- | 1.3E-02 | 2.2E-01 | 8.5% | 1.4E-03 | -- | -- | 1.7E-02 | 2.8E-01 | 8.5% |
| Manganese | 1202.76613 | 0.01 | NA | 0.001 | 1.9E-04 | -- | -- | 8.7E-04 | 8.7E-01 | 46.7% | 1.6E-04 | -- | -- | 1.2E-03 | 1.2E+00 | 46.7% | 1.3E-04 | -- | -- | 1.5E-03 | 1.5E+00 | 46.7% |
| Zinc | 1011.2925 | 0.01 | NA | 0.075 | 1.6E-04 | -- | -- | 7.3E-04 | 9.8E-03 | 0.5% | 1.3E-04 | -- | -- | 1.0E-03 | 1.4E-02 | 0.5% | 1.1E-04 | -- | -- | 1.3E-03 | 1.7E-02 | 0.5% |
| | | | | | Total ILCR: | 7.9E-06 | 100.0% | HI: | 1.9E+00 | 100.0% | Total ILCR: | 6.6E-06 | 100.0% | HI: | 2.6E+00 | 100.0% | otal ILCR | 5.6E-06 | 100.0% | HI: | 3.3E+00 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 4 PROPER
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*A*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 0.2 | 0.2 | 0.2 | |
| ABS | Absorption fraction | CS | CS | CS | |
| A | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure Frequency (d/yr) | 234 | 234 | 234 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(a)anthracene | 0.64859249 | 0.1 | NA | NA | 1.3E-07 | -- | -- | 5.9E-07 | -- | -- | 9.2E-08 | -- | -- | 7.2E-07 | -- | -- | 8.3E-08 | -- | -- | 9.7E-07 | -- | -- |
| Benzo(b)fluoranthene | 0.68716699 | 0.1 | NA | NA | 1.3E-07 | -- | -- | 6.3E-07 | -- | -- | 9.8E-08 | -- | -- | 7.6E-07 | -- | -- | 8.8E-08 | -- | -- | 1.0E-06 | -- | -- |
| Benzo(a)pyrene | 0.60089746 | 0.1 | NA | NA | 1.2E-07 | -- | -- | 5.5E-07 | -- | -- | 8.5E-08 | -- | -- | 6.6E-07 | -- | -- | 7.7E-08 | -- | -- | 9.0E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.39019399 | 0.1 | NA | NA | 7.7E-08 | -- | -- | 3.6E-07 | -- | -- | 5.5E-08 | -- | -- | 4.3E-07 | -- | -- | 5.0E-08 | -- | -- | 5.8E-07 | -- | -- |
| Dibenzo(a,h)anthracene | 0.23852592 | 0.1 | NA | NA | 4.7E-08 | -- | -- | 2.2E-07 | -- | -- | 3.4E-08 | -- | -- | 2.6E-07 | -- | -- | 3.0E-08 | -- | -- | 3.6E-07 | -- | -- |
| Carbazole | 0.257 | 0.1 | NA | NA | 5.0E-08 | -- | -- | 2.4E-07 | -- | -- | 3.7E-08 | -- | -- | 2.8E-07 | -- | -- | 3.3E-08 | -- | -- | 3.8E-07 | -- | -- |
| Chrysene | 0.649 | 0.1 | NA | NA | 1.3E-07 | -- | -- | 5.9E-07 | -- | -- | 9.2E-08 | -- | -- | 7.2E-07 | -- | -- | 8.3E-08 | -- | -- | 9.7E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.529 | 0.1 | NA | NA | 1.0E-07 | -- | -- | 4.8E-07 | -- | -- | 7.5E-08 | -- | -- | 5.8E-07 | -- | -- | 6.8E-08 | -- | -- | 7.9E-07 | -- | -- |
| Aroclor-1260 | 0.07447131 | 0.06 | 2.247191 | NA | 8.8E-09 | 2.0E-08 | 2.0% | 4.1E-08 | -- | -- | 6.3E-09 | 1.4E-08 | 2.0% | 4.9E-08 | -- | -- | 5.7E-09 | 1.3E-08 | 2.0% | 6.7E-08 | -- | -- |
| 1,3-Dinitrobenzene | 0.169354 | 0.1 | NA | 0.00045 | 3.3E-08 | -- | -- | 1.6E-07 | 3.4E-04 | 0.1% | 2.4E-08 | -- | -- | 1.9E-07 | 4.2E-04 | 0.1% | 2.2E-08 | -- | -- | 2.5E-07 | 5.6E-04 | 0.1% |
| 2,4,6-Trinitrotoluene | 7.911262 | 0.1 | 0.0405405 | 0.00037 | 1.6E-06 | 6.3E-08 | 6.3% | 7.2E-06 | 2.0E-02 | 8.3% | 1.1E-06 | 4.6E-08 | 6.3% | 8.7E-06 | 2.4E-02 | 8.3% | 1.0E-06 | 4.1E-08 | 6.3% | 1.2E-05 | 3.2E-02 | 8.3% |
| Amino-Dinitrotoluene | 0.79 | 0.1 | NA | 0.000036 | 1.6E-07 | -- | -- | 7.2E-07 | 2.0E-02 | 8.5% | 1.1E-07 | -- | -- | 8.7E-07 | 2.4E-02 | 8.5% | 1.0E-07 | -- | -- | 1.2E-06 | 3.3E-02 | 8.5% |
| RDX | 7.841227 | 0.1 | 0.11 | 0.003 | 1.5E-06 | 1.7E-07 | 17.0% | 7.2E-06 | 2.4E-03 | 1.0% | 1.1E-06 | 1.2E-07 | 17.0% | 8.7E-06 | 2.9E-03 | 1.0% | 1.0E-06 | 1.1E-07 | 17.0% | 1.2E-05 | 3.9E-03 | 1.0% |
| Aluminum | 14241.4825 | 0.01 | NA | 0.2 | 2.8E-04 | -- | -- | 1.3E-03 | 6.5E-03 | 2.8% | 2.0E-04 | -- | -- | 1.6E-03 | 7.9E-03 | 2.8% | 1.8E-04 | -- | -- | 2.1E-03 | 1.1E-02 | 2.8% |
| Antimony | 1.73877823 | 0.01 | NA | 0.00004 | 3.4E-08 | -- | -- | 1.6E-07 | 4.0E-03 | 1.7% | 2.5E-08 | -- | -- | 1.9E-07 | 4.8E-03 | 1.7% | 2.2E-08 | -- | -- | 2.6E-07 | 6.5E-03 | 1.7% |
| Arsenic | 7.49404214 | 0.032 | 1.5789474 | 0.000285 | 4.7E-07 | 7.4E-07 | 74.7% | 2.2E-06 | 7.7E-03 | 3.3% | 3.4E-07 | 5.4E-07 | 74.7% | 2.6E-06 | 9.3E-03 | 3.3% | 3.1E-07 | 4.8E-07 | 74.7% | 3.6E-06 | 1.3E-02 | 3.3% |
| Cadmium (soil) | 1.28363322 | 0.01 | NA | 0.00005 | 2.5E-08 | -- | -- | 1.2E-07 | 2.4E-03 | 1.0% | 1.8E-08 | -- | -- | 1.4E-07 | 2.8E-03 | 1.0% | 1.6E-08 | -- | -- | 1.9E-07 | 3.8E-03 | 1.0% |
| Chromium | 13.51 | 0.01 | NA | 0.00003 | 2.7E-07 | -- | -- | 1.2E-06 | 4.1E-02 | 17.5% | 1.9E-07 | -- | -- | 1.5E-06 | 5.0E-02 | 17.5% | 1.7E-07 | -- | -- | 2.0E-06 | 6.7E-02 | 17.5% |
| Copper | 37.9771664 | 0.01 | NA | 0.024 | 7.5E-07 | -- | -- | 3.5E-06 | 1.4E-04 | 0.1% | 5.4E-07 | -- | -- | 4.2E-06 | 1.7E-04 | 0.1% | 4.9E-07 | -- | -- | 5.7E-06 | 2.4E-04 | 0.1% |
| Iron | 13057.3564 | 0.01 | NA | 0.06 | 2.6E-04 | -- | -- | 1.2E-03 | 2.0E-02 | 8.5% | 1.9E-04 | -- | -- | 1.4E-03 | 2.4E-02 | 8.5% | 1.7E-04 | -- | -- | 1.9E-03 | 3.2E-02 | 8.5% |
| Manganese | 1202.76613 | 0.01 | NA | 0.001 | 2.4E-05 | -- | -- | 1.1E-04 | 1.1E-01 | 46.7% | 1.7E-05 | -- | -- | 1.3E-04 | 1.3E-01 | 46.7% | 1.5E-05 | -- | -- | 1.8E-04 | 1.8E-01 | 46.7% |
| Zinc | 1011.2925 | 0.01 | NA | 0.075 | 2.0E-05 | -- | -- | 9.3E-05 | 1.2E-03 | 0.5% | 1.4E-05 | -- | -- | 1.1E-04 | 1.5E-03 | 0.5% | 1.3E-05 | -- | -- | 1.5E-04 | 2.0E-03 | 0.5% |
| | | | | | Total ILCR: | 1.0E-06 | 100.0% | HI: | 2.4E-01 | 100.0% | Total ILCR: | 7.2E-07 | 100.0% | HI: | 2.8E-01 | 100.0% | otal ILCR | 6.5E-07 | 100.0% | HI: | 3.8E-01 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 4 HOT SPOT
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | 200 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 350 | 350 | 350 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Carbazole | 44 | 0.02 | NA | 1.3E-05 | 2.6E-07 | 0.1% | 6.0E-05 | -- | -- | 1.5E-05 | 2.9E-07 | 0.1% | 1.1E-04 | -- | -- | 4.8E-05 | 9.6E-07 | 0.1% | 5.6E-04 | -- | -- |
| Benzo(a)anthracene | 67 | 0.73 | NA | 2.0E-05 | 1.4E-05 | 4.2% | 9.2E-05 | -- | -- | 2.2E-05 | 1.6E-05 | 4.2% | 1.7E-04 | -- | -- | 7.3E-05 | 5.4E-05 | 4.2% | 8.6E-04 | -- | -- |
| Benzo(b)fluoranthene | 54 | 0.73 | NA | 1.6E-05 | 1.2E-05 | 3.4% | 7.4E-05 | -- | -- | 1.8E-05 | 1.3E-05 | 3.4% | 1.4E-04 | -- | -- | 5.9E-05 | 4.3E-05 | 3.4% | 6.9E-04 | -- | -- |
| Benzo(a)pyrene | 56 | 7.3 | NA | 1.6E-05 | 1.2E-04 | 35.0% | 7.7E-05 | -- | -- | 1.9E-05 | 1.4E-04 | 35.0% | 1.5E-04 | -- | -- | 6.1E-05 | 4.5E-04 | 35.0% | 7.2E-04 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 32 | 0.73 | NA | 9.4E-06 | 6.9E-06 | 2.0% | 4.4E-05 | -- | -- | 1.1E-05 | 7.8E-06 | 2.0% | 8.3E-05 | -- | -- | 3.5E-05 | 2.6E-05 | 2.0% | 4.1E-04 | -- | -- |
| Dibenzo(a,h)anthracen | 6.1 | 7.3 | NA | 1.8E-06 | 1.3E-05 | 3.8% | 8.4E-06 | -- | -- | 2.0E-06 | 1.5E-05 | 3.8% | 1.6E-05 | -- | -- | 6.7E-06 | 4.9E-05 | 3.8% | 7.8E-05 | -- | -- |
| Chrysene | 63 | 0.0073 | NA | 1.8E-05 | 1.4E-07 | 0.0% | 8.6E-05 | -- | -- | 2.1E-05 | 1.5E-07 | 0.0% | 1.6E-04 | -- | -- | 6.9E-05 | 5.0E-07 | 0.0% | 8.1E-04 | -- | -- |
| Benzo(k)fluoranthene | 7.8 | 0.073 | NA | 2.3E-06 | 1.7E-07 | 0.0% | 1.1E-05 | -- | -- | 2.6E-06 | 1.9E-07 | 0.0% | 2.0E-05 | -- | -- | 8.5E-06 | 6.2E-07 | 0.0% | 1.0E-04 | -- | -- |
| Antimony | 17.02332872 | NA | 0.0004 | 5.0E-06 | -- | -- | 2.3E-05 | 5.8E-02 | 3.0% | 5.7E-06 | -- | -- | 4.4E-05 | 1.1E-01 | 3.0% | 1.9E-05 | -- | -- | 2.2E-04 | 5.4E-01 | 3.0% |
| Arsenic | 399.6953 | 1.5 | 0.0003 | 1.2E-04 | 1.8E-04 | 51.4% | 5.5E-04 | 1.8E+00 | 94.1% | 1.3E-04 | 2.0E-04 | 51.4% | 1.0E-03 | 3.5E+00 | 94.1% | 4.4E-04 | 6.6E-04 | 51.4% | 5.1E-03 | 1.7E+01 | 94.1% |
| Iron | 8910 | NA | 0.3 | 2.6E-03 | -- | -- | 1.2E-02 | 4.1E-02 | 2.1% | 3.0E-03 | -- | -- | 2.3E-02 | 7.7E-02 | 2.1% | 9.8E-03 | -- | -- | 1.1E-01 | 3.8E-01 | 2.1% |
| Manganese | 224 | NA | 0.02 | 6.6E-05 | -- | -- | 3.1E-04 | 1.5E-02 | 0.8% | 7.5E-05 | -- | -- | 5.8E-04 | 2.9E-02 | 0.8% | 2.5E-04 | -- | -- | 2.9E-03 | 1.4E-01 | 0.8% |
| | | | | Total ILCR: | 3.4E-04 | 100.0% | HI: | 1.9E+00 | 100.0% | Total ILCR: | 3.9E-04 | 100.0% | HI: | 3.7E+00 | 100.0% | otal ILCR | 1.3E-03 | 100.0% | HI: | 1.8E+01 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 4 HOT SPOT
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | *Concentration of chemical in soil (mg/kg)* | *CS* | *CS* | *CS* | |
| IR | Ingestion Rate (mg/d) | 50 | 50 | 100 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 234 | 234 | 234 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Carbazole | 44 | 0.02 | NA | 4.3E-06 | 8.6E-08 | 0.1% | 2.0E-05 | -- | -- | 4.9E-06 | 9.8E-08 | 0.1% | 3.8E-05 | -- | -- | 1.6E-05 | 3.2E-07 | 0.1% | 1.9E-04 | -- | -- |
| Benzo(a)anthracene | 67 | 0.73 | NA | 6.6E-06 | 4.8E-06 | 4.2% | 3.1E-05 | -- | -- | 7.5E-06 | 5.4E-06 | 4.2% | 5.8E-05 | -- | -- | 2.5E-05 | 1.8E-05 | 4.2% | 2.9E-04 | -- | -- |
| Benzo(b)fluoranthene | 54 | 0.73 | NA | 5.3E-06 | 3.9E-06 | 3.4% | 2.5E-05 | -- | -- | 6.0E-06 | 4.4E-06 | 3.4% | 4.7E-05 | -- | -- | 2.0E-05 | 1.4E-05 | 3.4% | 2.3E-04 | -- | -- |
| Benzo(a)pyrene | 56 | 7.3 | NA | 5.5E-06 | 4.0E-05 | 35.0% | 2.6E-05 | -- | -- | 6.2E-06 | 4.6E-05 | 35.0% | 4.9E-05 | -- | -- | 2.1E-05 | 1.5E-04 | 35.0% | 2.4E-04 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 32 | 0.73 | NA | 3.1E-06 | 2.3E-06 | 2.0% | 1.5E-05 | -- | -- | 3.6E-06 | 2.6E-06 | 2.0% | 2.8E-05 | -- | -- | 1.2E-05 | 8.6E-06 | 2.0% | 1.4E-04 | -- | -- |
| Dibenzo(a,h)anthracene | 6.1 | 7.3 | NA | 6.0E-07 | 4.4E-06 | 3.8% | 2.8E-06 | -- | -- | 6.8E-07 | 5.0E-06 | 3.8% | 5.3E-06 | -- | -- | 2.2E-06 | 1.6E-05 | 3.8% | 2.6E-05 | -- | -- |
| Chrysene | 63 | 0.0073 | NA | 6.2E-06 | 4.5E-08 | 0.0% | 2.9E-05 | -- | -- | 7.0E-06 | 5.1E-08 | 0.0% | 5.5E-05 | -- | -- | 2.3E-05 | 1.7E-07 | 0.0% | 2.7E-04 | -- | -- |
| Benzo(k)fluoranthene | 7.8 | 0.073 | NA | 7.7E-07 | 5.6E-08 | 0.0% | 3.6E-06 | -- | -- | 8.7E-07 | 6.3E-08 | 0.0% | 6.8E-06 | -- | -- | 2.9E-06 | 2.1E-07 | 0.0% | 3.3E-05 | -- | -- |
| Antimony | 17.02332872 | NA | 0.0004 | 1.7E-06 | -- | -- | 7.8E-06 | 1.9E-02 | 3.0% | 1.9E-06 | -- | -- | 1.5E-05 | 3.7E-02 | 3.0% | 6.2E-06 | -- | -- | 7.3E-05 | 1.8E-01 | 3.0% |
| Arsenic | 399.6953 | 1.5 | 0.0003 | 3.9E-05 | 5.9E-05 | 51.4% | 1.8E-04 | 6.1E-01 | 94.1% | 4.5E-05 | 6.7E-05 | 51.4% | 3.5E-04 | 1.2E+00 | 94.1% | 1.5E-04 | 2.2E-04 | 51.4% | 1.7E-03 | 5.7E+00 | 94.1% |
| Iron | 8910 | NA | 0.3 | 8.7E-04 | -- | -- | 4.1E-03 | 1.4E-02 | 2.1% | 9.9E-04 | -- | -- | 7.7E-03 | 2.6E-02 | 2.1% | 3.3E-03 | -- | -- | 3.8E-02 | 1.3E-01 | 2.1% |
| Manganese | 224 | NA | 0.02 | 2.2E-05 | -- | -- | 1.0E-04 | 5.1E-03 | 0.8% | 2.5E-05 | -- | -- | 1.9E-04 | 9.7E-03 | 0.8% | 8.2E-05 | -- | -- | 9.6E-04 | 4.8E-02 | 0.8% |
| | | | | Total ILCR: | 1.1E-04 | 100.0% | HI: | 6.5E-01 | 100.0% | Total ILCR: | 1.3E-04 | 100.0% | HI: | 1.2E+00 | 100.0% | otal ILCR | 4.3E-04 | 100.0% | HI: | 6.1E+00 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 4 HOT SPOT
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*A*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | CS | |
| A | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure Frequency (d/yr) | 350 | 350 | 350 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Carbazole | 44 | 0.1 | NA | NA | 6.8E-05 | -- | -- | 3.2E-04 | -- | -- | 5.8E-05 | -- | -- | 4.5E-04 | -- | -- | 4.8E-05 | -- | -- | 5.6E-04 | -- | -- |
| Benzo(a)anthracene | 67 | 0.1 | NA | NA | 1.0E-04 | -- | -- | 4.9E-04 | -- | -- | 8.8E-05 | -- | -- | 6.8E-04 | -- | -- | 7.4E-05 | -- | -- | 8.6E-04 | -- | -- |
| Benzo(b)fluoranthene | 54 | 0.1 | NA | NA | 8.4E-05 | -- | -- | 3.9E-04 | -- | -- | 7.1E-05 | -- | -- | 5.5E-04 | -- | -- | 5.9E-05 | -- | -- | 6.9E-04 | -- | -- |
| Benzo(a)pyrene | 56 | 0.1 | NA | NA | 8.7E-05 | -- | -- | 4.1E-04 | -- | -- | 7.3E-05 | -- | -- | 5.7E-04 | -- | -- | 6.2E-05 | -- | -- | 7.2E-04 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 32 | 0.1 | NA | NA | 5.0E-05 | -- | -- | 2.3E-04 | -- | -- | 4.2E-05 | -- | -- | 3.3E-04 | -- | -- | 3.5E-05 | -- | -- | 4.1E-04 | -- | -- |
| Dibenzo(a,h)anthracen | 6.1 | 0.1 | NA | NA | 9.5E-06 | -- | -- | 4.4E-05 | -- | -- | 8.0E-06 | -- | -- | 6.2E-05 | -- | -- | 6.7E-06 | -- | -- | 7.8E-05 | -- | -- |
| Chrysene | 63 | 0.1 | NA | NA | 9.8E-05 | -- | -- | 4.6E-04 | -- | -- | 8.2E-05 | -- | -- | 6.4E-04 | -- | -- | 6.9E-05 | -- | -- | 8.1E-04 | -- | -- |
| Benzo(k)fluoranthene | 7.8 | 0.1 | NA | NA | 1.2E-05 | -- | -- | 5.7E-05 | -- | -- | 1.0E-05 | -- | -- | 7.9E-05 | -- | -- | 8.6E-06 | -- | -- | 1.0E-04 | -- | -- |
| Antimony | 17.0233287 | 0.01 | NA | 0.00004 | 2.6E-06 | -- | -- | 1.2E-05 | 3.1E-01 | 8.1% | 2.2E-06 | -- | -- | 1.7E-05 | 4.3E-01 | 8.1% | 1.9E-06 | -- | -- | 2.2E-05 | 5.5E-01 | 8.1% |
| Arsenic | 399.6953 | 0.032 | 1.5789474 | 0.000285 | 2.0E-04 | 3.1E-04 | 100.0% | 9.3E-04 | 3.3E+00 | 84.9% | 1.7E-04 | 2.6E-04 | 100.0% | 1.3E-03 | 4.6E+00 | 84.9% | 1.4E-04 | 2.2E-04 | 100.0% | 1.6E-03 | 5.8E+00 | 84.9% |
| Iron | 8910 | 0.01 | NA | 0.06 | 1.4E-03 | -- | -- | 6.5E-03 | 1.1E-01 | 2.8% | 1.2E-03 | -- | -- | 9.1E-03 | 1.5E-01 | 2.8% | 9.8E-04 | -- | -- | 1.1E-02 | 1.9E-01 | 2.8% |
| Manganese | 224 | 0.01 | NA | 0.001 | 3.5E-05 | -- | -- | 1.6E-04 | 1.6E-01 | 4.2% | 2.9E-05 | -- | -- | 2.3E-04 | 2.3E-01 | 4.2% | 2.5E-05 | -- | -- | 2.9E-04 | 2.9E-01 | 4.2% |
| | | | | | Total ILCR: | 3.1E-04 | 100.0% | HI: | 3.8E+00 | 100.0% | Total ILCR: | 2.6E-04 | 100.0% | HI: | 5.4E+00 | 100.0% | otal ILCR | 2.2E-04 | 100.0% | HI: | 6.8E+00 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 4
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| 1,2-Dichloroethene (total | 0.00651 | 0.01 | NA | 0.0072 | 1.6E-07 | -- | -- | 5.4E-07 | 7.5E-05 | 0.6% | 9.7E-08 | -- | -- | 7.6E-07 | 1.1E-04 | 0.6% | 8.2E-08 | -- | -- | 9.5E-07 | 1.3E-04 | 0.6% |
| Trichloroethene | 0.0067 | 0.016 | 0.014 | 0.0048 | 2.7E-07 | 3.7E-09 | 3.9% | 8.9E-07 | 1.9E-04 | 1.4% | 1.6E-07 | 2.2E-09 | 3.9% | 1.2E-06 | 2.6E-04 | 1.4% | 1.3E-07 | 1.9E-09 | 3.9% | 1.6E-06 | 3.3E-04 | 1.4% |
| Heptachlor | 0.00009 | 0.011 | 9 | 0.00025 | 2.5E-09 | 2.2E-08 | 23.4% | 8.2E-09 | 3.3E-05 | 0.2% | 1.5E-09 | 1.3E-08 | 23.4% | 1.2E-08 | 4.6E-05 | 0.2% | 1.2E-09 | 1.1E-08 | 23.4% | 1.5E-08 | 5.8E-05 | 0.2% |
| 2,4-/2,6-Dinitrotoluene | 0.0002 | 0.0037 | NA | 0.0002 | 1.8E-09 | -- | -- | 6.1E-09 | 3.1E-05 | 0.2% | 1.1E-09 | -- | -- | 8.6E-09 | 4.3E-05 | 0.2% | 9.3E-10 | -- | -- | 1.1E-08 | 5.4E-05 | 0.2% |
| Amino-Dinitrotoluene | 0.00047 | 0.0037 | NA | 0.000036 | 4.3E-09 | -- | -- | 1.4E-08 | 4.0E-04 | 3.0% | 2.6E-09 | -- | -- | 2.0E-08 | 5.6E-04 | 3.0% | 2.2E-09 | -- | -- | 2.5E-08 | 7.1E-04 | 3.0% |
| RDX | 0.00236 | 0.0015 | 0.11 | 0.003 | 8.8E-09 | 9.7E-10 | 1.0% | 2.9E-08 | 9.8E-06 | 0.1% | 5.3E-09 | 5.8E-10 | 1.0% | 4.1E-08 | 1.4E-05 | 0.1% | 4.4E-09 | 4.9E-10 | 1.0% | 5.2E-08 | 1.7E-05 | 0.1% |
| Arsenic | 0.00578 | 0.003 | 1.579 | 0.000285 | 4.3E-08 | 6.8E-08 | 71.8% | 1.4E-07 | 5.0E-04 | 3.8% | 2.6E-08 | 4.1E-08 | 71.8% | 2.0E-07 | 7.1E-04 | 3.8% | 2.2E-08 | 3.4E-08 | 71.8% | 2.5E-07 | 8.9E-04 | 3.8% |
| Iron | 1.18235 | 0.003 | NA | 0.06 | 8.8E-06 | -- | -- | 2.9E-05 | 4.9E-04 | 3.7% | 5.3E-06 | -- | -- | 4.1E-05 | 6.9E-04 | 3.7% | 4.5E-06 | -- | -- | 5.2E-05 | 8.7E-04 | 3.7% |
| Manganese | 0.17687 | 0.003 | NA | 0.001 | 1.3E-06 | -- | -- | 4.4E-06 | 4.4E-03 | 32.9% | 7.9E-07 | -- | -- | 6.2E-06 | 6.2E-03 | 32.9% | 6.7E-07 | -- | -- | 7.8E-06 | 7.8E-03 | 32.9% |
| Nickel | 0.05825 | 0.003 | NA | 0.0002 | 4.3E-07 | -- | -- | 1.4E-06 | 7.2E-03 | 54.2% | 2.6E-07 | -- | -- | 2.0E-06 | 1.0E-02 | 54.2% | 2.2E-07 | -- | -- | 2.6E-06 | 1.3E-02 | 54.2% |
| | | | | | Total ILCR: | 9.5E-08 | 100.0% | HI: | 1.3E-02 | 100.0% | Total ILCR: | 5.7E-08 | 100.0% | HI: | 1.9E-02 | 100.0% | Total ILCR: | 4.8E-08 | 100.0% | HI: | 2.4E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 4
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| 1,2-Dichloroethene (total) | 0.00651 | 0.01 | NA | 0.0072 | 1.5E-07 | -- | -- | 5.1E-07 | 7.1E-05 | 0.6% | 7.9E-08 | -- | -- | 6.1E-07 | 8.5E-05 | 0.6% | 7.1E-08 | -- | -- | 8.3E-07 | 1.2E-04 | 0.6% |
| Trichloroethene | 0.0067 | 0.016 | 0.01375 | 0.0048 | 2.5E-07 | 3.5E-09 | 3.9% | 8.4E-07 | 1.7E-04 | 1.4% | 1.3E-07 | 1.8E-09 | 3.9% | 1.0E-06 | 2.1E-04 | 1.4% | 1.2E-07 | 1.6E-09 | 3.9% | 1.4E-06 | 2.8E-04 | 1.4% |
| Heptachlor | 0.00009 | 0.011 | 9 | 0.00025 | 2.3E-09 | 2.1E-08 | 23.4% | 7.7E-09 | 3.1E-05 | 0.2% | 1.2E-09 | 1.1E-08 | 23.4% | 9.3E-09 | 3.7E-05 | 0.2% | 1.1E-09 | 9.7E-09 | 23.4% | 1.3E-08 | 5.0E-05 | 0.2% |
| 2,4-/2,6-Dinitrotoluene | 0.0002 | 0.0037 | NA | 0.0002 | 1.7E-09 | -- | -- | 5.8E-09 | 2.9E-05 | 0.2% | 9.0E-10 | -- | -- | 7.0E-09 | 3.5E-05 | 0.2% | 8.1E-10 | -- | -- | 9.4E-09 | 4.7E-05 | 0.2% |
| Amino-Dinitrotoluene | 0.00047 | 0.0037 | NA | 0.000036 | 4.1E-09 | -- | -- | 1.4E-08 | 3.8E-04 | 3.0% | 2.1E-09 | -- | -- | 1.6E-08 | 4.6E-04 | 3.0% | 1.9E-09 | -- | -- | 2.2E-08 | 6.2E-04 | 3.0% |
| RDX | 0.00236 | 0.0015 | 0.11 | 0.003 | 8.3E-09 | 9.1E-10 | 1.0% | 2.8E-08 | 9.2E-06 | 0.1% | 4.3E-09 | 4.7E-10 | 1.0% | 3.3E-08 | 1.1E-05 | 0.1% | 3.9E-09 | 4.3E-10 | 1.0% | 4.5E-08 | 1.5E-05 | 0.1% |
| Arsenic | 0.00578 | 0.003 | 1.5789474 | 0.000285 | 4.1E-08 | 6.4E-08 | 71.8% | 1.4E-07 | 4.8E-04 | 3.8% | 2.1E-08 | 3.3E-08 | 71.8% | 1.6E-07 | 5.7E-04 | 3.8% | 1.9E-08 | 3.0E-08 | 71.8% | 2.2E-07 | 7.8E-04 | 3.8% |
| Iron | 1.18235 | 0.003 | NA | 0.06 | 8.3E-06 | -- | -- | 2.8E-05 | 4.6E-04 | 3.7% | 4.3E-06 | -- | -- | 3.3E-05 | 5.6E-04 | 3.7% | 3.9E-06 | -- | -- | 4.5E-05 | 7.5E-04 | 3.7% |
| Manganese | 0.17687 | 0.003 | NA | 0.001 | 1.2E-06 | -- | -- | 4.2E-06 | 4.2E-03 | 32.9% | 6.4E-07 | -- | -- | 5.0E-06 | 5.0E-03 | 32.9% | 5.8E-07 | -- | -- | 6.8E-06 | 6.8E-03 | 32.9% |
| Nickel | 0.05825 | 0.003 | NA | 0.0002 | 4.1E-07 | -- | -- | 1.4E-06 | 6.8E-03 | 54.2% | 2.1E-07 | -- | -- | 1.7E-06 | 8.3E-03 | 54.2% | 1.9E-07 | -- | -- | 2.2E-06 | 1.1E-02 | 54.2% |
| | | | | | Total ILCR: | 9.0E-08 | 100.0% | HI: | 1.3E-02 | 100.0% | Total ILCR: | 4.6E-08 | 100.0% | HI: | 1.5E-02 | 100.0% | otal ILCR | 4.2E-08 | 100.0% | HI: | 2.1E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 4 WELL 4GW05
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| 1,2-Dichloroethene (total | 0.01 | NA | 0.009 | 2.3E-07 | -- | -- | 7.8E-07 | 8.7E-05 | 19.1% | 1.9E-07 | -- | -- | 1.5E-06 | 1.6E-04 | 19.1% | 3.1E-07 | -- | -- | 3.7E-06 | 4.1E-04 | 19.1% |
| Trichloroethene | 0.009 | 0.011 | 0.006 | 2.1E-07 | 2.3E-09 | 14.5% | 7.0E-07 | 1.2E-04 | 25.8% | 1.7E-07 | 1.9E-09 | 14.5% | 1.3E-06 | 2.2E-04 | 25.8% | 2.8E-07 | 3.1E-09 | 14.5% | 3.3E-06 | 5.5E-04 | 25.8% |
| RDX | 0.0053 | 0.11 | 0.003 | 1.2E-07 | 1.4E-08 | 85.5% | 4.1E-07 | 1.4E-04 | 30.4% | 1.0E-07 | 1.1E-08 | 85.5% | 7.8E-07 | 2.6E-04 | 30.4% | 1.7E-07 | 1.8E-08 | 85.5% | 1.9E-06 | 6.5E-04 | 30.4% |
| Manganese | 0.0286 | NA | 0.02 | 6.7E-07 | -- | -- | 2.2E-06 | 1.1E-04 | 24.6% | 5.4E-07 | -- | -- | 4.2E-06 | 2.1E-04 | 24.6% | 9.0E-07 | -- | -- | 1.0E-05 | 5.2E-04 | 24.6% |
| | | | | Total ILCR: | 1.6E-08 | 100.0% | HI: | 4.5E-04 | 100.0% | Total ILCR: | 1.3E-08 | 100.0% | HI: | 8.6E-04 | 100.0% | otal ILC | 2.1E-08 | 100.0% | HI: | 2.1E-03 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 4 HOT SPOT
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*A*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 0.2 | 0.2 | 0.2 | |
| ABS | Absorption fraction | CS | CS | CS | |
| A | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure Frequency (d/yr) | 234 | 234 | 234 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Carbazole | 44 | 0.1 | NA | NA | 8.6E-06 | -- | -- | 4.0E-05 | -- | -- | 6.2E-06 | -- | -- | 4.9E-05 | -- | -- | 5.6E-06 | -- | -- | 6.6E-05 | -- | -- |
| Benzo(a)anthracene | 67 | 0.1 | NA | NA | 1.3E-05 | -- | -- | 6.1E-05 | -- | -- | 9.5E-06 | -- | -- | 7.4E-05 | -- | -- | 8.6E-06 | -- | -- | 1.0E-04 | -- | -- |
| Benzo(b)fluoranthene | 54 | 0.1 | NA | NA | 1.1E-05 | -- | -- | 4.9E-05 | -- | -- | 7.7E-06 | -- | -- | 6.0E-05 | -- | -- | 6.9E-06 | -- | -- | 8.1E-05 | -- | -- |
| Benzo(a)pyrene | 56 | 0.1 | NA | NA | 1.1E-05 | -- | -- | 5.1E-05 | -- | -- | 8.0E-06 | -- | -- | 6.2E-05 | -- | -- | 7.2E-06 | -- | -- | 8.4E-05 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 32 | 0.1 | NA | NA | 6.3E-06 | -- | -- | 2.9E-05 | -- | -- | 4.5E-06 | -- | -- | 3.5E-05 | -- | -- | 4.1E-06 | -- | -- | 4.8E-05 | -- | -- |
| Dibenzo(a,h)anthracene | 8.1 | 0.1 | NA | NA | 1.2E-06 | -- | -- | 5.6E-06 | -- | -- | 8.7E-07 | -- | -- | 6.7E-06 | -- | -- | 7.8E-07 | -- | -- | 9.1E-06 | -- | -- |
| Chrysene | 63 | 0.1 | NA | NA | 1.2E-05 | -- | -- | 5.8E-05 | -- | -- | 8.9E-06 | -- | -- | 7.0E-05 | -- | -- | 8.1E-06 | -- | -- | 9.4E-05 | -- | -- |
| Benzo(k)fluoranthene | 7.8 | 0.1 | NA | NA | 1.5E-06 | -- | -- | 7.1E-06 | -- | -- | 1.1E-06 | -- | -- | 8.6E-06 | -- | -- | 1.0E-06 | -- | -- | 1.2E-05 | -- | -- |
| Antimony | 17.0233287 | 0.01 | NA | 0.00004 | 3.3E-07 | -- | -- | 1.6E-06 | 3.9E-02 | 8.1% | 2.4E-07 | -- | -- | 1.9E-06 | 4.7E-02 | 8.1% | 2.2E-07 | -- | -- | 2.5E-06 | 6.3E-02 | 8.1% |
| Arsenic | 399.6953 | 0.032 | 1.5789474 | 0.000285 | 2.5E-05 | 4.0E-05 | 100.0% | 1.2E-04 | 4.1E-01 | 84.9% | 1.8E-05 | 2.9E-05 | 100.0% | 1.4E-04 | 5.0E-01 | 84.9% | 1.6E-05 | 2.6E-05 | 100.0% | 1.9E-04 | 6.7E-01 | 84.9% |
| Iron | 8910 | 0.01 | NA | 0.06 | 1.7E-04 | -- | -- | 8.2E-04 | 1.4E-02 | 2.8% | 1.3E-04 | -- | -- | 9.8E-04 | 1.6E-02 | 2.8% | 1.1E-04 | -- | -- | 1.3E-03 | 2.2E-02 | 2.8% |
| Manganese | 224 | 0.01 | NA | 0.001 | 4.4E-06 | -- | -- | 2.1E-05 | 2.1E-02 | 4.2% | 3.2E-06 | -- | -- | 2.5E-05 | 2.5E-02 | 4.2% | 2.9E-06 | -- | -- | 3.3E-05 | 3.3E-02 | 4.2% |
| | | | | | Total ILCR: | 4.0E-05 | 100.0% | HI: | 4.8E-01 | 100.0% | Total ILCR: | 2.9E-05 | 100.0% | HI: | 5.8E-01 | 100.0% | otal ILCR | 2.6E-05 | 100.0% | HI: | 7.9E-01 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 4
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| 1,2-Dichloroethene (total) | 0.00651 | NA | 0.009 | 1.5E-07 | -- | -- | 5.1E-07 | 5.7E-05 | 1.6% | 1.2E-07 | -- | -- | 9.6E-07 | 1.1E-04 | 1.6% | 2.0E-07 | -- | -- | 2.4E-06 | 2.6E-04 | 1.6% |
| Trichloroethene | 0.0067 | 0.011 | 0.006 | 1.6E-07 | 1.7E-09 | 0.8% | 5.2E-07 | 8.7E-05 | 2.4% | 1.3E-07 | 1.4E-09 | 0.8% | 9.9E-07 | 1.7E-04 | 2.4% | 2.1E-07 | 2.3E-09 | 0.8% | 2.4E-06 | 4.1E-04 | 2.4% |
| Heptachlor | 0.00009 | 4.5 | 0.0005 | 2.1E-09 | 9.5E-09 | 4.3% | 7.0E-09 | 1.4E-05 | 0.4% | 1.7E-09 | 7.7E-09 | 4.3% | 1.3E-08 | 2.7E-05 | 0.4% | 2.8E-09 | 1.3E-08 | 4.3% | 3.3E-08 | 6.6E-05 | 0.4% |
| 2,4-/2,6-Dinitrotoluene | 0.0002 | NA | 0.002 | 4.7E-09 | -- | -- | 1.6E-08 | 7.8E-06 | 0.2% | 3.8E-09 | -- | -- | 3.0E-08 | 1.5E-05 | 0.2% | 6.3E-09 | -- | -- | 7.3E-08 | 3.7E-05 | 0.2% |
| Amino-Dinitrotoluene | 0.00047 | NA | 0.00006 | 1.1E-08 | -- | -- | 3.7E-08 | 6.1E-04 | 17.1% | 8.9E-09 | -- | -- | 7.0E-08 | 1.2E-03 | 17.1% | 1.5E-08 | -- | -- | 1.7E-07 | 2.9E-03 | 17.1% |
| RDX | 0.00236 | 0.11 | 0.003 | 5.5E-08 | 6.1E-09 | 2.8% | 1.8E-07 | 6.2E-05 | 1.7% | 4.5E-08 | 4.9E-09 | 2.8% | 3.5E-07 | 1.2E-04 | 1.7% | 7.4E-08 | 8.1E-09 | 2.8% | 8.6E-07 | 2.9E-04 | 1.7% |
| Arsenic | 0.00578 | 1.5 | 0.0003 | 1.4E-07 | 2.0E-07 | 92.2% | 4.5E-07 | 1.5E-03 | 42.2% | 1.1E-07 | 1.7E-07 | 92.2% | 8.6E-07 | 2.9E-03 | 42.2% | 1.8E-07 | 2.7E-07 | 92.2% | 2.1E-06 | 7.0E-03 | 42.2% |
| Iron | 1.18235 | NA | 0.3 | 2.8E-05 | -- | -- | 9.3E-05 | 3.1E-04 | 8.6% | 2.3E-05 | -- | -- | 1.8E-04 | 5.8E-04 | 8.6% | 3.7E-05 | -- | -- | 4.3E-04 | 1.4E-03 | 8.6% |
| Manganese | 0.17687 | NA | 0.02 | 4.2E-06 | -- | -- | 1.4E-05 | 6.9E-04 | 19.3% | 3.4E-06 | -- | -- | 2.6E-05 | 1.3E-03 | 19.3% | 5.5E-06 | -- | -- | 6.5E-05 | 3.2E-03 | 19.3% |
| Nickel | 0.05825 | NA | 0.02 | 1.4E-06 | -- | -- | 4.6E-06 | 2.3E-04 | 6.4% | 1.1E-06 | -- | -- | 8.6E-06 | 4.3E-04 | 6.4% | 1.8E-06 | -- | -- | 2.1E-05 | 1.1E-03 | 6.4% |
| | | | | Total ILCR: | 2.2E-07 | 100.0% | HI: | 3.6E-03 | 100.0% | Total ILCR: | 1.8E-07 | 100.0% | HI: | 6.8E-03 | 100.0% | Total ILCR: | 2.9E-07 | 100.0% | HI: | 1.7E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 4
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| 1,2-Dichloroethene (total) | 0.00651 | NA | 0.009 | 1.5E-07 | -- | -- | 5.1E-07 | 5.7E-05 | 1.6% | 1.2E-07 | -- | -- | 9.6E-07 | 1.1E-04 | 1.6% | 2.0E-07 | -- | -- | 2.4E-06 | 2.6E-04 | 1.6% |
| Trichloroethene | 0.0067 | 0.011 | 0.006 | 1.6E-07 | 1.7E-09 | 0.8% | 5.2E-07 | 8.7E-05 | 2.4% | 1.3E-07 | 1.4E-09 | 0.8% | 9.9E-07 | 1.7E-04 | 2.4% | 2.1E-07 | 2.3E-09 | 0.8% | 2.4E-06 | 4.1E-04 | 2.4% |
| Heptachlor | 0.00009 | 4.5 | 0.0005 | 2.1E-09 | 9.5E-09 | 4.3% | 7.0E-09 | 1.4E-05 | 0.4% | 1.7E-09 | 7.7E-09 | 4.3% | 1.3E-08 | 2.7E-05 | 0.4% | 2.8E-09 | 1.3E-08 | 4.3% | 3.3E-08 | 6.6E-05 | 0.4% |
| 2,4-/2,6-Dinitrotoluene | 0.0002 | NA | 0.002 | 4.7E-09 | -- | -- | 1.6E-08 | 7.8E-06 | 0.2% | 3.8E-09 | -- | -- | 3.0E-08 | 1.5E-05 | 0.2% | 6.3E-09 | -- | -- | 7.3E-08 | 3.7E-05 | 0.2% |
| Amino-Dinitrotoluene | 0.00047 | NA | 0.00006 | 1.1E-08 | -- | -- | 3.7E-08 | 6.1E-04 | 17.1% | 8.9E-09 | -- | -- | 7.0E-08 | 1.2E-03 | 17.1% | 1.5E-08 | -- | -- | 1.7E-07 | 2.9E-03 | 17.1% |
| RDX | 0.00236 | 0.11 | 0.003 | 5.5E-08 | 6.1E-09 | 2.8% | 1.8E-07 | 6.2E-05 | 1.7% | 4.5E-08 | 4.9E-09 | 2.8% | 3.5E-07 | 1.2E-04 | 1.7% | 7.4E-08 | 8.1E-09 | 2.8% | 8.6E-07 | 2.9E-04 | 1.7% |
| Arsenic | 0.00578 | 1.5 | 0.0003 | 1.4E-07 | 2.0E-07 | 92.2% | 4.5E-07 | 1.5E-03 | 42.2% | 1.1E-07 | 1.7E-07 | 92.2% | 8.6E-07 | 2.9E-03 | 42.2% | 1.8E-07 | 2.7E-07 | 92.2% | 2.1E-06 | 7.0E-03 | 42.2% |
| Iron | 1.18235 | NA | 0.3 | 2.8E-05 | -- | -- | 9.3E-05 | 3.1E-04 | 8.6% | 2.3E-05 | -- | -- | 1.8E-04 | 5.8E-04 | 8.6% | 3.7E-05 | -- | -- | 4.3E-04 | 1.4E-03 | 8.6% |
| Manganese | 0.17687 | NA | 0.02 | 4.2E-06 | -- | -- | 1.4E-05 | 6.9E-04 | 19.3% | 3.4E-06 | -- | -- | 2.6E-05 | 1.3E-03 | 19.3% | 5.5E-06 | -- | -- | 6.5E-05 | 3.2E-03 | 19.3% |
| Nickel | 0.05825 | NA | 0.02 | 1.4E-06 | -- | -- | 4.6E-06 | 2.3E-04 | 6.4% | 1.1E-06 | -- | -- | 8.6E-06 | 4.3E-04 | 6.4% | 1.8E-06 | -- | -- | 2.1E-05 | 1.1E-03 | 6.4% |
| | | | | Total ILCR: | 2.2E-07 | 100.0% | HI: | 3.6E-03 | 100.0% | Total ILCR: | 1.8E-07 | 100.0% | HI: | 6.8E-03 | 100.0% | otal ILCR | 2.9E-07 | 100.0% | HI: | 1.7E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 4 WELL 4GW05
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| 1,2-Dichloroethene (total | 0.01 | NA | 0.009 | 2.3E-07 | -- | -- | 7.8E-07 | 8.7E-05 | 19.1% | 1.9E-07 | -- | -- | 1.5E-06 | 1.6E-04 | 19.1% | 3.1E-07 | -- | -- | 3.7E-06 | 4.1E-04 | 19.1% |
| Trichloroethene | 0.009 | 0.011 | 0.006 | 2.1E-07 | 2.3E-09 | 14.5% | 7.0E-07 | 1.2E-04 | 25.8% | 1.7E-07 | 1.9E-09 | 14.5% | 1.3E-06 | 2.2E-04 | 25.8% | 2.8E-07 | 3.1E-09 | 14.5% | 3.3E-06 | 5.5E-04 | 25.8% |
| RDX | 0.0053 | 0.11 | 0.003 | 1.2E-07 | 1.4E-08 | 85.5% | 4.1E-07 | 1.4E-04 | 30.4% | 1.0E-07 | 1.1E-08 | 85.5% | 7.8E-07 | 2.6E-04 | 30.4% | 1.7E-07 | 1.8E-08 | 85.5% | 1.9E-06 | 6.5E-04 | 30.4% |
| Manganese | 0.0266 | NA | 0.02 | 6.7E-07 | -- | -- | 2.2E-06 | 1.1E-04 | 24.6% | 5.4E-07 | -- | -- | 4.2E-06 | 2.1E-04 | 24.6% | 9.0E-07 | -- | -- | 1.0E-05 | 5.2E-04 | 24.6% |
| | | | | Total ILCR: | 1.6E-08 | 100.0% | HI: | 4.5E-04 | 100.0% | Total ILCR: | 1.3E-08 | 100.0% | HI: | 8.6E-04 | 100.0% | otal ILC | 2.1E-08 | 100.0% | HI: | 2.1E-03 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 4 WELL 4GW05
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd /(mg/kg/d | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| 1,2-Dichloroethene (total | 0.01 | 0.01 | NA | 0.0072 | 2.5E-07 | -- | -- | 8.3E-07 | 1.2E-04 | 10.5% | 1.5E-07 | -- | -- | 1.2E-06 | 1.6E-04 | 10.5% | 1.3E-07 | -- | -- | 1.5E-06 | 2.0E-04 | 10.5% |
| Trichloroethene | 0.009 | 0.016 | 0.01375 | 0.0048 | 3.6E-07 | 4.9E-09 | 69.4% | 1.2E-06 | 2.5E-04 | 22.7% | 2.2E-07 | 3.0E-09 | 69.4% | 1.7E-06 | 3.5E-04 | 22.7% | 1.8E-07 | 2.5E-09 | 69.4% | 2.1E-06 | 4.4E-04 | 22.7% |
| RDX | 0.0053 | 0.0015 | 0.11 | 0.003 | 2.0E-08 | 2.2E-09 | 30.6% | 6.6E-08 | 2.2E-05 | 2.0% | 1.2E-08 | 1.3E-09 | 30.6% | 9.2E-08 | 3.1E-05 | 2.0% | 1.0E-08 | 1.1E-09 | 30.6% | 1.2E-07 | 3.9E-05 | 2.0% |
| Manganese | 0.0286 | 0.003 | NA | 0.001 | 2.1E-07 | -- | -- | 7.1E-07 | 7.1E-04 | 64.8% | 1.3E-07 | -- | -- | 1.0E-06 | 1.0E-03 | 64.8% | 1.1E-07 | -- | -- | 1.3E-06 | 1.3E-03 | 64.8% |
| | | | | | Total ILCR: | 7.1E-09 | 100.0% | HI: | 1.1E-03 | 100.0% | Total ILCR: | 4.3E-09 | 100.0% | HI: | 1.5E-03 | 100.0% | Total ILCR: | 3.6E-09 | 100.0% | HI: | 1.9E-03 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 4
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| 1,2-Dichloroethene (total) | 0.00651 | 0.01 | NA | 0.0072 | 1.5E-07 | -- | -- | 5.1E-07 | 7.1E-05 | 0.6% | 7.9E-08 | -- | -- | 6.1E-07 | 8.5E-05 | 0.6% | 7.1E-08 | -- | -- | 8.3E-07 | 1.2E-04 | 0.6% |
| Trichloroethene | 0.0067 | 0.016 | 0.01375 | 0.0048 | 2.5E-07 | 3.5E-09 | 3.9% | 8.4E-07 | 1.7E-04 | 1.4% | 1.3E-07 | 1.8E-09 | 3.9% | 1.0E-06 | 2.1E-04 | 1.4% | 1.2E-07 | 1.6E-09 | 3.9% | 1.4E-06 | 2.8E-04 | 1.4% |
| Heptachlor | 0.00009 | 0.011 | 9 | 0.00025 | 2.3E-09 | 2.1E-08 | 23.4% | 7.7E-09 | 3.1E-05 | 0.2% | 1.2E-09 | 1.1E-08 | 23.4% | 9.3E-09 | 3.7E-05 | 0.2% | 1.1E-09 | 9.7E-09 | 23.4% | 1.3E-08 | 5.0E-05 | 0.2% |
| 2,4-/2,6-Dinitrotoluene | 0.0002 | 0.0037 | NA | 0.0002 | 1.7E-09 | -- | -- | 5.8E-09 | 2.9E-05 | 0.2% | 9.0E-10 | -- | -- | 7.0E-09 | 3.5E-05 | 0.2% | 8.1E-10 | -- | -- | 9.4E-09 | 4.7E-05 | 0.2% |
| Amino-Dinitrotoluene | 0.00047 | 0.0037 | NA | 0.000036 | 4.1E-09 | -- | -- | 1.4E-08 | 3.8E-04 | 3.0% | 2.1E-09 | -- | -- | 1.6E-08 | 4.6E-04 | 3.0% | 1.9E-09 | -- | -- | 2.2E-08 | 6.2E-04 | 3.0% |
| RDX | 0.00236 | 0.0015 | 0.11 | 0.003 | 8.3E-09 | 9.1E-10 | 1.0% | 2.8E-08 | 9.2E-06 | 0.1% | 4.3E-09 | 4.7E-10 | 1.0% | 3.3E-08 | 1.1E-05 | 0.1% | 3.9E-09 | 4.3E-10 | 1.0% | 4.5E-08 | 1.5E-05 | 0.1% |
| Arsenic | 0.00578 | 0.003 | 1.5789474 | 0.000285 | 4.1E-08 | 6.4E-08 | 71.8% | 1.4E-07 | 4.8E-04 | 3.8% | 2.1E-08 | 3.3E-08 | 71.8% | 1.6E-07 | 5.7E-04 | 3.8% | 1.9E-08 | 3.0E-08 | 71.8% | 2.2E-07 | 7.8E-04 | 3.8% |
| Iron | 1.18235 | 0.003 | NA | 0.06 | 8.3E-06 | -- | -- | 2.8E-05 | 4.6E-04 | 3.7% | 4.3E-06 | -- | -- | 3.3E-05 | 5.6E-04 | 3.7% | 3.9E-06 | -- | -- | 4.5E-05 | 7.5E-04 | 3.7% |
| Manganese | 0.17687 | 0.003 | NA | 0.001 | 1.2E-06 | -- | -- | 4.2E-06 | 4.2E-03 | 32.9% | 6.4E-07 | -- | -- | 5.0E-06 | 5.0E-03 | 32.9% | 5.8E-07 | -- | -- | 6.8E-06 | 6.8E-03 | 32.9% |
| Nickel | 0.05825 | 0.003 | NA | 0.0002 | 4.1E-07 | -- | -- | 1.4E-06 | 6.8E-03 | 54.2% | 2.1E-07 | -- | -- | 1.7E-06 | 8.3E-03 | 54.2% | 1.9E-07 | -- | -- | 2.2E-06 | 1.1E-02 | 54.2% |
| | | | | | Total ILCR: | 9.0E-08 | 100.0% | HI: | 1.3E-02 | 100.0% | Total ILCR: | 4.6E-08 | 100.0% | HI: | 1.5E-02 | 100.0% | otal ILCR | 4.2E-08 | 100.0% | HI: | 2.1E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE WATER - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*ET*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/hour) | 0.05 | 0.05 | 0.05 | |
| ET | Exposure Time (hours/day) | 2.6 | 2.6 | 2.6 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalat | 0.0395 | 0.014 | 0.02 | 1.7E-06 | 2.4E-08 | 8.4% | 8.0E-06 | 4.0E-04 | 2.1% | 2.0E-06 | 2.7E-08 | 8.4% | 1.5E-05 | 7.6E-04 | 2.1% | 3.2E-06 | 4.5E-08 | 8.4% | 3.8E-05 | 1.9E-03 | 2.1% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | NA | 0.002 | 4.6E-08 | -- | -- | 2.2E-07 | 1.1E-04 | 0.6% | 5.2E-08 | -- | -- | 4.1E-07 | 2.0E-04 | 0.6% | 8.6E-08 | -- | -- | 1.0E-06 | 5.0E-04 | 0.6% |
| Amino-Dinitrotoluene | 0.00226 | NA | 0.00006 | 9.9E-08 | -- | -- | 4.6E-07 | 7.7E-03 | 40.8% | 1.1E-07 | -- | -- | 8.7E-07 | 1.5E-02 | 40.8% | 1.8E-07 | -- | -- | 2.1E-06 | 3.6E-02 | 40.8% |
| RDX | 0.02466 | 0.11 | 0.003 | 1.1E-06 | 1.2E-07 | 41.2% | 5.0E-06 | 1.7E-03 | 8.9% | 1.2E-06 | 1.3E-07 | 41.2% | 9.5E-06 | 3.2E-03 | 8.9% | 2.0E-06 | 2.2E-07 | 41.2% | 2.3E-05 | 7.8E-03 | 8.9% |
| Antimony | 0.01464 | NA | 0.0004 | 6.4E-07 | -- | -- | 3.0E-06 | 7.4E-03 | 39.6% | 7.2E-07 | -- | -- | 5.6E-06 | 1.4E-02 | 39.6% | 1.2E-06 | -- | -- | 1.4E-05 | 3.5E-02 | 39.6% |
| Arsenic | 0.00221 | 1.5 | 0.0003 | 9.6E-08 | 1.4E-07 | 50.4% | 4.5E-07 | 1.5E-03 | 8.0% | 1.1E-07 | 1.6E-07 | 50.4% | 8.5E-07 | 2.8E-03 | 8.0% | 1.8E-07 | 2.7E-07 | 50.4% | 2.1E-06 | 7.0E-03 | 8.0% |
| | | | | Total ILCR | 2.9E-07 | 100.0% | HI: | 1.9E-02 | 100.0% | Total ILCR: | 3.3E-07 | 100.0% | HI: | 3.6E-02 | 100.0% | otal ILCR | 5.4E-07 | 100.0% | HI: | 8.8E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE WATER - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*ET*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/hour) | 0.05 | 0.05 | 0.05 | |
| ET | Exposure Time (hours/day) | 2.6 | 2.6 | 2.6 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalate | 0.0395 | 0.014 | 0.02 | 1.7E-06 | 2.4E-08 | 8.4% | 8.0E-06 | 4.0E-04 | 2.1% | 2.0E-06 | 2.7E-08 | 8.4% | 1.5E-05 | 7.6E-04 | 2.1% | 3.2E-06 | 4.5E-08 | 8.4% | 3.8E-05 | 1.9E-03 | 2.1% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | NA | 0.002 | 4.6E-08 | -- | -- | 2.2E-07 | 1.1E-04 | 0.6% | 5.2E-08 | -- | -- | 4.1E-07 | 2.0E-04 | 0.6% | 8.6E-08 | -- | -- | 1.0E-06 | 5.0E-04 | 0.6% |
| Amino-Dinitrotoluene | 0.00226 | NA | 0.00006 | 9.9E-08 | -- | -- | 4.6E-07 | 7.7E-03 | 40.8% | 1.1E-07 | -- | -- | 8.7E-07 | 1.5E-02 | 40.8% | 1.8E-07 | -- | -- | 2.1E-06 | 3.6E-02 | 40.8% |
| RDX | 0.02466 | 0.11 | 0.003 | 1.1E-06 | 1.2E-07 | 41.2% | 5.0E-06 | 1.7E-03 | 8.9% | 1.2E-06 | 1.3E-07 | 41.2% | 9.5E-06 | 3.2E-03 | 8.9% | 2.0E-06 | 2.2E-07 | 41.2% | 2.3E-05 | 7.8E-03 | 8.9% |
| Antimony | 0.01464 | NA | 0.0004 | 6.4E-07 | -- | -- | 3.0E-06 | 7.4E-03 | 39.6% | 7.2E-07 | -- | -- | 5.6E-06 | 1.4E-02 | 39.6% | 1.2E-06 | -- | -- | 1.4E-05 | 3.5E-02 | 39.6% |
| Arsenic | 0.00221 | 1.5 | 0.0003 | 9.6E-08 | 1.4E-07 | 50.4% | 4.5E-07 | 1.5E-03 | 8.0% | 1.1E-07 | 1.6E-07 | 50.4% | 8.5E-07 | 2.8E-03 | 8.0% | 1.8E-07 | 2.7E-07 | 50.4% | 2.1E-06 | 7.0E-03 | 8.0% |
| | | | | Total ILCR | 2.9E-07 | 100.0% | HI: | 1.9E-02 | 100.0% | Total ILCR: | 3.3E-07 | 100.0% | HI: | 3.6E-02 | 100.0% | otal ILCR | 5.4E-07 | 100.0% | HI: | 8.8E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE WATER - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 15 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 2.6 | 2.6 | 2.6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalat | 0.0395 | 0.033 | 0.025455 | 0.011 | 6.0E-06 | 1.5E-07 | 69.5% | 2.8E-05 | 2.6E-03 | 7.9% | 5.1E-06 | 1.3E-07 | 69.5% | 3.9E-05 | 3.6E-03 | 7.9% | 4.3E-06 | 1.1E-07 | 69.5% | 5.0E-05 | 4.5E-03 | 7.9% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | 0.0037 | NA | 0.0002 | 1.8E-08 | -- | -- | 8.5E-08 | 4.2E-04 | 1.3% | 1.5E-08 | -- | -- | 1.2E-07 | 5.9E-04 | 1.3% | 1.3E-08 | -- | -- | 1.5E-07 | 7.5E-04 | 1.3% |
| Amino-Dinitrotoluene | 0.00226 | 0.0037 | NA | 0.000036 | 3.9E-08 | -- | -- | 1.8E-07 | 5.0E-03 | 15.4% | 3.2E-08 | -- | -- | 2.5E-07 | 7.0E-03 | 15.4% | 2.7E-08 | -- | -- | 3.2E-07 | 8.9E-03 | 15.4% |
| RDX | 0.02466 | 0.0015 | 0.11 | 0.003 | 1.7E-07 | 1.9E-08 | 8.5% | 8.0E-07 | 2.7E-04 | 0.8% | 1.4E-07 | 1.6E-08 | 8.5% | 1.1E-06 | 3.7E-04 | 0.8% | 1.2E-07 | 1.3E-08 | 8.5% | 1.4E-06 | 4.7E-04 | 0.8% |
| Antimony | 0.01464 | 0.003 | NA | 0.00004 | 2.0E-07 | -- | -- | 9.5E-07 | 2.4E-02 | 73.0% | 1.7E-07 | -- | -- | 1.3E-06 | 3.3E-02 | 73.0% | 1.4E-07 | -- | -- | 1.7E-06 | 4.2E-02 | 73.0% |
| Arsenic | 0.00221 | 0.003 | 1.578947 | 0.000285 | 3.1E-08 | 4.8E-08 | 21.9% | 1.4E-07 | 5.0E-04 | 1.5% | 2.6E-08 | 4.1E-08 | 21.9% | 2.0E-07 | 7.0E-04 | 1.5% | 2.2E-08 | 3.4E-08 | 21.9% | 2.5E-07 | 8.9E-04 | 1.5% |
| | | | | | Total ILCR: | 2.2E-07 | 100.0% | HI: | 3.2E-02 | 100.0% | Total ILCR: | 1.9E-07 | 100.0% | HI: | 4.5E-02 | 100.0% | otal ILC | 1.6E-07 | 100.0% | HI: | 5.7E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE WATER - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 15 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 2.6 | 2.6 | 2.6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalat | 0.0395 | 0.033 | 0.025455 | 0.011 | 5.7E-06 | 1.4E-07 | 69.5% | 2.7E-05 | 2.4E-03 | 7.9% | 4.1E-06 | 1.0E-07 | 69.5% | 3.2E-05 | 2.9E-03 | 7.9% | 3.7E-06 | 9.4E-08 | 69.5% | 4.3E-05 | 3.9E-03 | 7.9% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | 0.0037 | NA | 0.0002 | 1.7E-08 | -- | -- | 8.0E-08 | 4.0E-04 | 1.3% | 1.2E-08 | -- | -- | 9.6E-08 | 4.8E-04 | 1.3% | 1.1E-08 | -- | -- | 1.3E-07 | 6.5E-04 | 1.3% |
| Amino-Dinitrotoluene | 0.00226 | 0.0037 | NA | 0.000036 | 3.6E-08 | -- | -- | 1.7E-07 | 4.7E-03 | 15.4% | 2.6E-08 | -- | -- | 2.1E-07 | 5.7E-03 | 15.4% | 2.4E-08 | -- | -- | 2.8E-07 | 7.7E-03 | 15.4% |
| RDX | 0.02466 | 0.0015 | 0.11 | 0.003 | 1.6E-07 | 1.8E-08 | 8.5% | 7.5E-07 | 2.5E-04 | 0.8% | 1.2E-07 | 1.3E-08 | 8.5% | 9.1E-07 | 3.0E-04 | 0.8% | 1.1E-07 | 1.2E-08 | 8.5% | 1.2E-06 | 4.1E-04 | 0.8% |
| Antimony | 0.01464 | 0.003 | NA | 0.00004 | 1.9E-07 | -- | -- | 8.9E-07 | 2.2E-02 | 73.0% | 1.4E-07 | -- | -- | 1.1E-06 | 2.7E-02 | 73.0% | 1.2E-07 | -- | -- | 1.5E-06 | 3.6E-02 | 73.0% |
| Arsenic | 0.00221 | 0.003 | 1.578947 | 0.000285 | 2.9E-08 | 4.6E-08 | 21.9% | 1.3E-07 | 4.7E-04 | 1.5% | 2.1E-08 | 3.3E-08 | 21.9% | 1.6E-07 | 5.7E-04 | 1.5% | 1.9E-08 | 3.0E-08 | 21.9% | 2.2E-07 | 7.7E-04 | 1.5% |
| | | | | | Total ILCR: | 2.1E-07 | 100.0% | HI: | 3.1E-02 | 100.0% | Total ILCR: | 1.5E-07 | 100.0% | HI: | 3.7E-02 | 100.0% | otal ILC | 1.4E-07 | 100.0% | HI: | 5.0E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SEDIMENT - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | 200 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | NA | 1 | 6.9E-04 | -- | -- | 3.2E-03 | 3.2E-03 | 8.4% | 7.8E-04 | -- | -- | 6.1E-03 | 6.1E-03 | 8.4% | 2.6E-03 | -- | -- | 3.0E-02 | 3.0E-02 | 8.4% |
| Antimony | 14.27 | NA | 0.0004 | 4.8E-07 | -- | -- | 2.2E-06 | 5.6E-03 | 14.7% | 5.4E-07 | -- | -- | 4.2E-06 | 1.1E-02 | 14.7% | 1.8E-06 | -- | -- | 2.1E-05 | 5.2E-02 | 14.7% |
| Arsenic | 11.68 | 1.5 | 0.0003 | 3.9E-07 | 5.9E-07 | 100.0% | 1.8E-06 | 6.1E-03 | 16.0% | 4.4E-07 | 6.7E-07 | 100.0% | 3.5E-06 | 1.2E-02 | 16.0% | 1.5E-06 | 2.2E-06 | 100.0% | 1.7E-05 | 5.7E-02 | 16.0% |
| Cadmium (soil) | 1.44 | NA | 0.001 | 4.8E-08 | -- | -- | 2.3E-07 | 2.3E-04 | 0.6% | 5.5E-08 | -- | -- | 4.3E-07 | 4.3E-04 | 0.6% | 1.8E-07 | -- | -- | 2.1E-06 | 2.1E-03 | 0.6% |
| Chromium | 34.33 | NA | 0.003 | 1.2E-06 | -- | -- | 5.4E-06 | 1.8E-03 | 4.7% | 1.3E-06 | -- | -- | 1.0E-05 | 3.4E-03 | 4.7% | 4.3E-06 | -- | -- | 5.0E-05 | 1.7E-02 | 4.7% |
| Iron | 32592.85 | NA | 0.3 | 1.1E-03 | -- | -- | 5.1E-03 | 1.7E-02 | 44.8% | 1.2E-03 | -- | -- | 9.7E-03 | 3.2E-02 | 44.8% | 4.1E-03 | -- | -- | 4.8E-02 | 1.6E-01 | 44.8% |
| Manganese | 250.39 | NA | 0.02 | 8.4E-06 | -- | -- | 3.9E-05 | 2.0E-03 | 5.2% | 9.5E-06 | -- | -- | 7.4E-05 | 3.7E-03 | 5.2% | 3.1E-05 | -- | -- | 3.7E-04 | 1.8E-02 | 5.2% |
| Thallium | 0.44 | NA | 0.00007 | 1.5E-08 | -- | -- | 6.9E-08 | 9.8E-04 | 2.6% | 1.7E-08 | -- | -- | 1.3E-07 | 1.9E-03 | 2.6% | 5.5E-08 | -- | -- | 6.4E-07 | 9.2E-03 | 2.6% |
| Vanadium | 51.15 | NA | 0.007 | 1.7E-06 | -- | -- | 8.0E-06 | 1.1E-03 | 3.0% | 1.9E-06 | -- | -- | 1.5E-05 | 2.2E-03 | 3.0% | 6.4E-06 | -- | -- | 7.5E-05 | 1.1E-02 | 3.0% |
| | | | | Total ILCR: | 5.9E-07 | 100.0% | HI: | 3.8E-02 | 100.0% | Total ILCR: | 6.7E-07 | 100.0% | HI: | 7.2E-02 | 100.0% | otal ILCR | 2.2E-06 | 100.0% | HI: | 3.5E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SEDIMENT - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 50 | 50 | 100 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | NA | 1 | 3.4E-04 | -- | -- | 1.6E-03 | 1.6E-03 | 8.4% | 3.9E-04 | -- | -- | 3.0E-03 | 3.0E-03 | 8.4% | 1.3E-03 | -- | -- | 1.5E-02 | 1.5E-02 | 8.4% |
| Antimony | 14.27 | NA | 0.0004 | 2.4E-07 | -- | -- | 1.1E-06 | 2.8E-03 | 14.7% | 2.7E-07 | -- | -- | 2.1E-06 | 5.3E-03 | 14.7% | 8.9E-07 | -- | -- | 1.0E-05 | 2.6E-02 | 14.7% |
| Arsenic | 11.68 | 1.5 | 0.0003 | 2.0E-07 | 2.9E-07 | 100.0% | 9.1E-07 | 3.0E-03 | 16.0% | 2.2E-07 | 3.3E-07 | 100.0% | 1.7E-06 | 5.8E-03 | 16.0% | 7.3E-07 | 1.1E-06 | 100.0% | 8.5E-06 | 2.8E-02 | 16.0% |
| Cadmium (soil) | 1.44 | NA | 0.001 | 2.4E-08 | -- | -- | 1.1E-07 | 1.1E-04 | 0.6% | 2.7E-08 | -- | -- | 2.1E-07 | 2.1E-04 | 0.6% | 9.0E-08 | -- | -- | 1.1E-06 | 1.1E-03 | 0.6% |
| Chromium | 34.33 | NA | 0.003 | 5.8E-07 | -- | -- | 2.7E-06 | 9.0E-04 | 4.7% | 6.5E-07 | -- | -- | 5.1E-06 | 1.7E-03 | 4.7% | 2.1E-06 | -- | -- | 2.5E-05 | 8.4E-03 | 4.7% |
| Iron | 32592.85 | NA | 0.3 | 5.5E-04 | -- | -- | 2.6E-03 | 8.5E-03 | 44.8% | 6.2E-04 | -- | -- | 4.8E-03 | 1.6E-02 | 44.8% | 2.0E-03 | -- | -- | 2.4E-02 | 7.9E-02 | 44.8% |
| Manganese | 250.39 | NA | 0.02 | 4.2E-06 | -- | -- | 2.0E-05 | 9.8E-04 | 5.2% | 4.8E-06 | -- | -- | 3.7E-05 | 1.9E-03 | 5.2% | 1.6E-05 | -- | -- | 1.8E-04 | 9.1E-03 | 5.2% |
| Thallium | 0.44 | NA | 0.00007 | 7.4E-09 | -- | -- | 3.4E-08 | 4.9E-04 | 2.6% | 8.4E-09 | -- | -- | 6.5E-08 | 9.3E-04 | 2.6% | 2.8E-08 | -- | -- | 3.2E-07 | 4.6E-03 | 2.6% |
| Vanadium | 51.15 | NA | 0.007 | 8.6E-07 | -- | -- | 4.0E-06 | 5.7E-04 | 3.0% | 9.7E-07 | -- | -- | 7.6E-06 | 1.1E-03 | 3.0% | 3.2E-06 | -- | -- | 3.7E-05 | 5.3E-03 | 3.0% |
| | | | | Total ILCR: | 2.9E-07 | 100.0% | HI: | 1.9E-02 | 100.0% | Total ILCR: | 3.3E-07 | 100.0% | HI: | 3.6E-02 | 100.0% | otal ILCR | 1.1E-06 | 100.0% | HI: | 1.8E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SEDIMENT - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | 0.01 | NA | 0.2 | 3.6E-04 | -- | -- | 1.7E-03 | 8.5E-03 | 3.5% | 3.1E-04 | -- | -- | 2.4E-03 | 1.2E-02 | 3.5% | 2.6E-04 | -- | -- | 3.0E-03 | 1.5E-02 | 3.5% |
| Antimony | 14.27 | 0.01 | NA | 0.00004 | 2.5E-07 | -- | -- | 1.2E-06 | 3.0E-02 | 12.1% | 2.1E-07 | -- | -- | 1.7E-06 | 4.1E-02 | 12.1% | 1.8E-07 | -- | -- | 2.1E-06 | 5.2E-02 | 12.1% |
| Arsenic | 11.68 | 0.032 | 1.578947368 | 0.000285 | 6.6E-07 | 1.0E-06 | 100.0% | 3.1E-06 | 1.1E-02 | 4.4% | 5.6E-07 | 8.8E-07 | 100.0% | 4.3E-06 | 1.5E-02 | 4.4% | 4.7E-07 | 7.4E-07 | 100.0% | 5.5E-06 | 1.9E-02 | 4.4% |
| Cadmium (soil) | 1.44 | 0.01 | NA | 0.00005 | 2.6E-08 | -- | -- | 1.2E-07 | 2.4E-03 | 1.0% | 2.2E-08 | -- | -- | 1.7E-07 | 3.3E-03 | 1.0% | 1.8E-08 | -- | -- | 2.1E-07 | 4.2E-03 | 1.0% |
| Chromium | 34.33 | 0.01 | NA | 0.00003 | 6.1E-07 | -- | -- | 2.8E-06 | 9.5E-02 | 38.7% | 5.1E-07 | -- | -- | 4.0E-06 | 1.3E-01 | 38.7% | 4.3E-07 | -- | -- | 5.0E-06 | 1.7E-01 | 38.7% |
| Iron | 32592.85 | 0.01 | NA | 0.06 | 5.8E-04 | -- | -- | 2.7E-03 | 4.5E-02 | 18.4% | 4.9E-04 | -- | -- | 3.8E-03 | 6.3E-02 | 18.4% | 4.1E-04 | -- | -- | 4.8E-03 | 8.0E-02 | 18.4% |
| Manganese | 250.39 | 0.01 | NA | 0.001 | 4.5E-06 | -- | -- | 2.1E-05 | 2.1E-02 | 8.5% | 3.7E-06 | -- | -- | 2.9E-05 | 2.9E-02 | 8.5% | 3.1E-06 | -- | -- | 3.7E-05 | 3.7E-02 | 8.5% |
| Thallium | 0.44 | 0.01 | NA | 0.000014 | 7.8E-09 | -- | -- | 3.7E-08 | 2.6E-03 | 1.1% | 6.6E-09 | -- | -- | 5.1E-08 | 3.7E-03 | 1.1% | 5.5E-09 | -- | -- | 6.4E-08 | 4.6E-03 | 1.1% |
| Vanadium | 51.15 | 0.01 | NA | 0.00014 | 9.1E-07 | -- | -- | 4.2E-06 | 3.0E-02 | 12.4% | 7.6E-07 | -- | -- | 5.9E-06 | 4.2E-02 | 12.4% | 6.4E-07 | -- | -- | 7.5E-06 | 5.4E-02 | 12.4% |
| | | | | | Total ILCR: | 1.0E-06 | 100.0% | HI: | 2.5E-01 | 100.0% | Total ILCR: | 8.8E-07 | 100.0% | HI: | 3.4E-01 | 100.0% | otal ILC | 7.4E-07 | 100.0% | HI: | 4.3E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SEDIMENT - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 0.2 | 0.2 | 0.2 | |
| ABS | Absorption fraction | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | 0.01 | NA | 0.2 | 6.9E-05 | -- | -- | 3.2E-04 | 1.6E-03 | 3.5% | 5.0E-05 | -- | -- | 3.9E-04 | 1.9E-03 | 3.5% | 4.5E-05 | -- | -- | 5.2E-04 | 2.6E-03 | 3.5% |
| Antimony | 14.27 | 0.01 | NA | 0.00004 | 4.8E-08 | -- | -- | 2.2E-07 | 5.6E-03 | 12.1% | 3.5E-08 | -- | -- | 2.7E-07 | 6.7E-03 | 12.1% | 3.1E-08 | -- | -- | 3.6E-07 | 9.1E-03 | 12.1% |
| Arsenic | 11.68 | 0.032 | 1.578947368 | 0.000285 | 1.3E-07 | 2.0E-07 | 100.0% | 5.9E-07 | 2.1E-03 | 4.4% | 9.1E-08 | 1.4E-07 | 100.0% | 7.1E-07 | 2.5E-03 | 4.4% | 8.2E-08 | 1.3E-07 | 100.0% | 9.5E-07 | 3.3E-03 | 4.4% |
| Cadmium (soil) | 1.44 | 0.01 | NA | 0.00005 | 4.8E-09 | -- | -- | 2.3E-08 | 4.5E-04 | 1.0% | 3.5E-09 | -- | -- | 2.7E-08 | 5.4E-04 | 1.0% | 3.1E-09 | -- | -- | 3.7E-08 | 7.3E-04 | 1.0% |
| Chromium | 34.33 | 0.01 | NA | 0.00003 | 1.2E-07 | -- | -- | 5.4E-07 | 1.8E-02 | 38.7% | 8.3E-08 | -- | -- | 6.5E-07 | 2.2E-02 | 38.7% | 7.5E-08 | -- | -- | 8.8E-07 | 2.9E-02 | 38.7% |
| Iron | 32592.85 | 0.01 | NA | 0.06 | 1.1E-04 | -- | -- | 5.1E-04 | 8.5E-03 | 18.4% | 7.9E-05 | -- | -- | 6.2E-04 | 1.0E-02 | 18.4% | 7.1E-05 | -- | -- | 8.3E-04 | 1.4E-02 | 18.4% |
| Manganese | 250.39 | 0.01 | NA | 0.001 | 8.4E-07 | -- | -- | 3.9E-06 | 3.9E-03 | 8.5% | 6.1E-07 | -- | -- | 4.7E-06 | 4.7E-03 | 8.5% | 5.5E-07 | -- | -- | 6.4E-06 | 6.4E-03 | 8.5% |
| Thallium | 0.44 | 0.01 | NA | 0.000014 | 1.5E-09 | -- | -- | 6.9E-09 | 4.9E-04 | 1.1% | 1.1E-09 | -- | -- | 8.3E-09 | 5.9E-04 | 1.1% | 9.6E-10 | -- | -- | 1.1E-08 | 8.0E-04 | 1.1% |
| Vanadium | 51.15 | 0.01 | NA | 0.00014 | 1.7E-07 | -- | -- | 8.0E-07 | 5.7E-03 | 12.4% | 1.2E-07 | -- | -- | 9.7E-07 | 6.9E-03 | 12.4% | 1.1E-07 | -- | -- | 1.3E-06 | 9.3E-03 | 12.4% |
| | | | | | Total ILCR: | 2.0E-07 | 100.0% | HI: | 4.6E-02 | 100.0% | Total ILCR: | 1.4E-07 | 100.0% | HI: | 5.6E-02 | 100.0% | otal ILCR | 1.3E-07 | 100.0% | HI: | 7.5E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | 200 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 350 | 350 | 350 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib otal ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(b)fluoranthene | 0.40533 | 0.73 | NA | 1.2E-07 | 8.7E-08 | 4.1% | 5.6E-07 | -- | -- | 1.4E-07 | 9.9E-08 | 4.1% | 1.1E-06 | -- | -- | 4.4E-07 | 3.2E-07 | 4.1% | 5.2E-06 | -- | -- |
| Benzo(a)pyrene | 0.14 | 7.3 | NA | 4.1E-08 | 3.0E-07 | 14.0% | 1.9E-07 | -- | -- | 4.7E-08 | 3.4E-07 | 14.0% | 3.6E-07 | -- | -- | 1.5E-07 | 1.1E-06 | 14.0% | 1.8E-06 | -- | -- |
| Benzo(a)anthracene | 0.2 | 0.73 | NA | 5.9E-08 | 4.3E-08 | 2.0% | 2.7E-07 | -- | -- | 6.7E-08 | 4.9E-08 | 2.0% | 5.2E-07 | -- | -- | 2.2E-07 | 1.6E-07 | 2.0% | 2.6E-06 | -- | -- |
| Chrysene | 0.26 | 0.0073 | NA | 7.6E-08 | 5.6E-10 | 0.0% | 3.6E-07 | -- | -- | 8.7E-08 | 6.3E-10 | 0.0% | 6.7E-07 | -- | -- | 2.8E-07 | 2.1E-09 | 0.0% | 3.3E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.22 | 0.073 | NA | 6.5E-08 | 4.7E-09 | 0.2% | 3.0E-07 | -- | -- | 7.3E-08 | 5.4E-09 | 0.2% | 5.7E-07 | -- | -- | 2.4E-07 | 1.8E-08 | 0.2% | 2.8E-06 | -- | -- |
| Indeno(1,2,3-cd)pyre | 0.13 | 0.73 | NA | 3.8E-08 | 2.8E-08 | 1.3% | 1.8E-07 | -- | -- | 4.3E-08 | 3.2E-08 | 1.3% | 3.4E-07 | -- | -- | 1.4E-07 | 1.0E-07 | 1.3% | 1.7E-06 | -- | -- |
| Dieldrin | 0.01024 | 16 | 0.00005 | 3.0E-09 | 4.8E-08 | 2.2% | 1.4E-08 | 2.8E-04 | 0.2% | 3.4E-09 | 5.5E-08 | 2.2% | 2.7E-08 | 5.3E-04 | 0.2% | 1.1E-08 | 1.8E-07 | 2.2% | 1.3E-07 | 2.6E-03 | 0.2% |
| Aluminum | 10394.44 | NA | 1 | 3.1E-03 | -- | -- | 1.4E-02 | 1.4E-02 | 10.1% | 3.5E-03 | -- | -- | 2.7E-02 | 2.7E-02 | 10.1% | 1.1E-02 | -- | -- | 1.3E-01 | 1.3E-01 | 10.1% |
| Arsenic | 3.71 | 1.5 | 0.0003 | 1.1E-06 | 1.6E-06 | 76.2% | 5.1E-06 | 1.7E-02 | 12.0% | 1.2E-06 | 1.9E-06 | 76.2% | 9.6E-06 | 3.2E-02 | 12.0% | 4.1E-06 | 6.1E-06 | 76.2% | 4.7E-05 | 1.6E-01 | 12.0% |
| Cadmium (soil) | 7.74 | NA | 0.001 | 2.3E-06 | -- | -- | 1.1E-05 | 1.1E-02 | 7.5% | 2.6E-06 | -- | -- | 2.0E-05 | 2.0E-02 | 7.5% | 8.5E-06 | -- | -- | 9.9E-05 | 9.9E-02 | 7.5% |
| Chromium | 11.89 | NA | 0.003 | 3.5E-06 | -- | -- | 1.6E-05 | 5.4E-03 | 3.8% | 4.0E-06 | -- | -- | 3.1E-05 | 1.0E-02 | 3.8% | 1.3E-05 | -- | -- | 1.5E-04 | 5.1E-02 | 3.8% |
| Iron | 10008.45 | NA | 0.3 | 2.9E-03 | -- | -- | 1.4E-02 | 4.6E-02 | 32.3% | 3.3E-03 | -- | -- | 2.6E-02 | 8.6E-02 | 32.3% | 1.1E-02 | -- | -- | 1.3E-01 | 4.3E-01 | 32.3% |
| Manganese | 250.11 | NA | 0.02 | 7.3E-05 | -- | -- | 3.4E-04 | 1.7E-02 | 12.1% | 8.3E-05 | -- | -- | 6.5E-04 | 3.2E-02 | 12.1% | 2.7E-04 | -- | -- | 3.2E-03 | 1.6E-01 | 12.1% |
| Mercury | 1.11 | NA | 0.0001 | 3.3E-07 | -- | -- | 1.5E-06 | 1.5E-02 | 10.7% | 3.7E-07 | -- | -- | 2.9E-06 | 2.9E-02 | 10.7% | 1.2E-06 | -- | -- | 1.4E-05 | 1.4E-01 | 10.7% |
| Thallium | 0.55 | NA | 0.00007 | 1.6E-07 | -- | -- | 7.5E-07 | 1.1E-02 | 7.6% | 1.8E-07 | -- | -- | 1.4E-06 | 2.0E-02 | 7.6% | 6.0E-07 | -- | -- | 7.0E-06 | 1.0E-01 | 7.6% |
| Zinc | 1144.05 | NA | 0.3 | 3.4E-04 | -- | -- | 1.6E-03 | 5.2E-03 | 3.7% | 3.8E-04 | -- | -- | 3.0E-03 | 9.9E-03 | 3.7% | 1.3E-03 | -- | -- | 1.5E-02 | 4.9E-02 | 3.7% |
| | | | | Total ILCR: | 2.1E-06 | 100.0% | HI: | 1.4E-01 | 100.0% | Total ILCR: | 2.4E-06 | 100.0% | HI: | 2.7E-01 | 100.0% | otal ILC | 8.0E-06 | 100.0% | HI: | 1.3E+00 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 21
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 50 | 50 | 100 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 234 | 234 | 234 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(b)fluoranthene | 0.40533 | 0.73 | NA | 4.0E-08 | 2.9E-08 | 4.1% | 1.9E-07 | -- | -- | 4.5E-08 | 3.3E-08 | 4.1% | 3.5E-07 | -- | -- | 1.5E-07 | 1.1E-07 | 4.1% | 1.7E-06 | -- | -- |
| Benzo(a)pyrene | 0.14 | 7.3 | NA | 1.4E-08 | 1.0E-07 | 14.0% | 6.4E-08 | -- | -- | 1.6E-08 | 1.1E-07 | 14.0% | 1.2E-07 | -- | -- | 5.1E-08 | 3.7E-07 | 14.0% | 6.0E-07 | -- | -- |
| Benzo(a)anthracene | 0.2 | 0.73 | NA | 2.0E-08 | 1.4E-08 | 2.0% | 9.2E-08 | -- | -- | 2.2E-08 | 1.6E-08 | 2.0% | 1.7E-07 | -- | -- | 7.3E-08 | 5.3E-08 | 2.0% | 8.5E-07 | -- | -- |
| Chrysene | 0.26 | 0.0073 | NA | 2.6E-08 | 1.9E-10 | 0.0% | 1.2E-07 | -- | -- | 2.9E-08 | 2.1E-10 | 0.0% | 2.3E-07 | -- | -- | 9.5E-08 | 7.0E-10 | 0.0% | 1.1E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.22 | 0.073 | NA | 2.2E-08 | 1.6E-09 | 0.2% | 1.0E-07 | -- | -- | 2.5E-08 | 1.8E-09 | 0.2% | 1.9E-07 | -- | -- | 8.1E-08 | 5.9E-09 | 0.2% | 9.4E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0.73 | NA | 1.3E-08 | 9.3E-09 | 1.3% | 6.0E-08 | -- | -- | 1.4E-08 | 1.1E-08 | 1.3% | 1.1E-07 | -- | -- | 4.8E-08 | 3.5E-08 | 1.3% | 5.6E-07 | -- | -- |
| Dieldrin | 0.01024 | 16 | 0.00005 | 1.0E-09 | 1.6E-08 | 2.2% | 4.7E-09 | 9.4E-05 | 0.2% | 1.1E-09 | 1.8E-08 | 2.2% | 8.9E-09 | 1.8E-04 | 0.2% | 3.8E-09 | 6.0E-08 | 2.2% | 4.4E-08 | 8.8E-04 | 0.2% |
| Aluminum | 10394.44 | NA | 1 | 1.0E-03 | -- | -- | 4.8E-03 | 4.8E-03 | 10.1% | 1.2E-03 | -- | -- | 9.0E-03 | 9.0E-03 | 10.1% | 3.8E-03 | -- | -- | 4.4E-02 | 4.4E-02 | 10.1% |
| Arsenic | 3.71 | 1.5 | 0.0003 | 3.6E-07 | 5.5E-07 | 76.2% | 1.7E-06 | 5.7E-03 | 12.0% | 4.1E-07 | 6.2E-07 | 76.2% | 3.2E-06 | 1.1E-02 | 12.0% | 1.4E-06 | 2.0E-06 | 76.2% | 1.6E-05 | 5.3E-02 | 12.0% |
| Cadmium (soil) | 7.74 | NA | 0.001 | 7.6E-07 | -- | -- | 3.5E-06 | 3.5E-03 | 7.5% | 8.6E-07 | -- | -- | 6.7E-06 | 6.7E-03 | 7.5% | 2.8E-06 | -- | -- | 3.3E-05 | 3.3E-02 | 7.5% |
| Chromium | 11.89 | NA | 0.003 | 1.2E-06 | -- | -- | 5.4E-06 | 1.8E-03 | 3.8% | 1.3E-06 | -- | -- | 1.0E-05 | 3.4E-03 | 3.8% | 4.4E-06 | -- | -- | 5.1E-05 | 1.7E-02 | 3.8% |
| Iron | 10008.45 | NA | 0.3 | 9.8E-04 | -- | -- | 4.6E-03 | 1.5E-02 | 32.3% | 1.1E-03 | -- | -- | 8.7E-03 | 2.9E-02 | 32.3% | 3.7E-03 | -- | -- | 4.3E-02 | 1.4E-01 | 32.3% |
| Manganese | 250.11 | NA | 0.02 | 2.5E-05 | -- | -- | 1.1E-04 | 5.7E-03 | 12.1% | 2.8E-05 | -- | -- | 2.2E-04 | 1.1E-02 | 12.1% | 9.2E-05 | -- | -- | 1.1E-03 | 5.3E-02 | 12.1% |
| Mercury | 1.11 | NA | 0.0001 | 1.1E-07 | -- | -- | 5.1E-07 | 5.1E-03 | 10.7% | 1.2E-07 | -- | -- | 9.6E-07 | 9.6E-03 | 10.7% | 4.1E-07 | -- | -- | 4.7E-06 | 4.7E-02 | 10.7% |
| Thallium | 0.55 | NA | 0.00007 | 5.4E-08 | -- | -- | 2.5E-07 | 3.6E-03 | 7.6% | 6.1E-08 | -- | -- | 4.8E-07 | 6.8E-03 | 7.6% | 2.0E-07 | -- | -- | 2.4E-06 | 3.4E-02 | 7.6% |
| Zinc | 1144.05 | NA | 0.3 | 1.1E-04 | -- | -- | 5.2E-04 | 1.7E-03 | 3.7% | 1.3E-04 | -- | -- | 9.9E-04 | 3.3E-03 | 3.7% | 4.2E-04 | -- | -- | 4.9E-03 | 1.6E-02 | 3.7% |
| | | | | Total ILCR: | 7.2E-07 | 100.0% | HI: | 4.7E-02 | 100.0% | Total ILCR: | 8.1E-07 | 100.0% | HI: | 8.9E-02 | 100.0% | otal ILCR | 2.7E-06 | 100.0% | HI: | 4.4E-01 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*A*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | CS | |
| A | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure Frequency (d/yr) | 350 | 350 | 350 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(b)fluoranthene | 0.40533 | 0.1 | NA | NA | 6.3E-07 | -- | -- | 2.9E-06 | -- | -- | 5.3E-07 | -- | -- | 4.1E-06 | -- | -- | 4.5E-07 | -- | -- | 5.2E-06 | -- | -- |
| Benzo(a)pyrene | 0.14 | 0.1 | NA | NA | 2.2E-07 | -- | -- | 1.0E-06 | -- | -- | 1.8E-07 | -- | -- | 1.4E-06 | -- | -- | 1.5E-07 | -- | -- | 1.8E-06 | -- | -- |
| Benzo(a)anthracene | 0.2 | 0.1 | NA | NA | 3.1E-07 | -- | -- | 1.5E-06 | -- | -- | 2.6E-07 | -- | -- | 2.0E-06 | -- | -- | 2.2E-07 | -- | -- | 2.6E-06 | -- | -- |
| Chrysene | 0.26 | 0.1 | NA | NA | 4.0E-07 | -- | -- | 1.9E-06 | -- | -- | 3.4E-07 | -- | -- | 2.6E-06 | -- | -- | 2.9E-07 | -- | -- | 3.3E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.22 | 0.1 | NA | NA | 3.4E-07 | -- | -- | 1.6E-06 | -- | -- | 2.9E-07 | -- | -- | 2.2E-06 | -- | -- | 2.4E-07 | -- | -- | 2.8E-06 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0.1 | NA | NA | 2.0E-07 | -- | -- | 9.4E-07 | -- | -- | 1.7E-07 | -- | -- | 1.3E-06 | -- | -- | 1.4E-07 | -- | -- | 1.7E-06 | -- | -- |
| Dieldrin | 0.01024 | 0.1 | 32 | 0.000025 | 1.6E-08 | 5.1E-07 | 14.9% | 7.4E-08 | 3.0E-03 | 0.3% | 1.3E-08 | 4.3E-07 | 14.9% | 1.0E-07 | 4.2E-03 | 0.3% | 1.1E-08 | 3.6E-07 | 14.9% | 1.3E-07 | 5.3E-03 | 0.3% |
| Aluminum | 10394.44 | 0.01 | NA | 0.2 | 1.6E-03 | -- | -- | 7.5E-03 | 3.8E-02 | 4.4% | 1.4E-03 | -- | -- | 1.1E-02 | 5.3E-02 | 4.4% | 1.1E-03 | -- | -- | 1.3E-02 | 6.7E-02 | 4.4% |
| Arsenic | 3.71 | 0.032 | 1.5789474 | 0.000285 | 1.8E-06 | 2.9E-06 | 85.1% | 8.6E-06 | 3.0E-02 | 3.5% | 1.6E-06 | 2.5E-06 | 85.1% | 1.2E-05 | 4.2E-02 | 3.5% | 1.3E-06 | 2.1E-06 | 85.1% | 1.5E-05 | 5.3E-02 | 3.5% |
| Cadmium (soil) | 7.74 | 0.01 | NA | 0.00005 | 1.2E-06 | -- | -- | 5.6E-06 | 1.1E-01 | 13.0% | 1.0E-06 | -- | -- | 7.9E-06 | 1.6E-01 | 13.0% | 8.5E-07 | -- | -- | 9.9E-06 | 2.0E-01 | 13.0% |
| Chromium | 11.89 | 0.01 | NA | 0.00003 | 1.8E-06 | -- | -- | 8.6E-06 | 2.9E-01 | 33.2% | 1.6E-06 | -- | -- | 1.2E-05 | 4.0E-01 | 33.2% | 1.3E-06 | -- | -- | 1.5E-05 | 5.1E-01 | 33.2% |
| Iron | 10008.45 | 0.01 | NA | 0.06 | 1.6E-03 | -- | -- | 7.3E-03 | 1.2E-01 | 14.0% | 1.3E-03 | -- | -- | 1.0E-02 | 1.7E-01 | 14.0% | 1.1E-03 | -- | -- | 1.3E-02 | 2.1E-01 | 14.0% |
| Manganese | 250.11 | 0.01 | NA | 0.001 | 3.9E-05 | -- | -- | 1.8E-04 | 1.8E-01 | 20.9% | 3.3E-05 | -- | -- | 2.5E-04 | 2.5E-01 | 20.9% | 2.7E-05 | -- | -- | 3.2E-04 | 3.2E-01 | 20.9% |
| Mercury | 1.11 | 0.01 | NA | 0.000015 | 1.7E-07 | -- | -- | 8.1E-07 | 5.4E-02 | 6.2% | 1.5E-07 | -- | -- | 1.1E-06 | 7.5E-02 | 6.2% | 1.2E-07 | -- | -- | 1.4E-06 | 9.5E-02 | 6.2% |
| Thallium | 0.55 | 0.01 | NA | 0.000014 | 8.6E-08 | -- | -- | 4.0E-07 | 2.9E-02 | 3.3% | 7.2E-08 | -- | -- | 5.6E-07 | 4.0E-02 | 3.3% | 6.0E-08 | -- | -- | 7.1E-07 | 5.0E-02 | 3.3% |
| Zinc | 1144.05 | 0.01 | NA | 0.075 | 1.8E-04 | -- | -- | 8.3E-04 | 1.1E-02 | 1.3% | 1.5E-04 | -- | -- | 1.2E-03 | 1.6E-02 | 1.3% | 1.3E-04 | -- | -- | 1.5E-03 | 2.0E-02 | 1.3% |
| | | | | | Total ILCR: | 3.4E-06 | 100.0% | HI: | 8.7E-01 | 100.0% | Total ILCR: | 2.9E-06 | 100.0% | HI: | 1.2E+00 | 100.0% | otal ILCR | 2.4E-06 | 100.0% | HI: | 1.5E+00 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 21
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*A*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 0.2 | 0.2 | 0.2 | |
| ABS | Absorption fraction | CS | CS | CS | |
| A | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure Frequency (d/yr) | 234 | 234 | 234 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Benzo(b)fluoranthene | 0.40533 | 0.1 | NA | NA | 8.0E-08 | -- | -- | 3.7E-07 | -- | -- | 5.8E-08 | -- | -- | 4.5E-07 | -- | -- | 5.2E-08 | -- | -- | 6.0E-07 | -- | -- |
| Benzo(a)pyrene | 0.14 | 0.1 | NA | NA | 2.7E-08 | -- | -- | 1.3E-07 | -- | -- | 2.0E-08 | -- | -- | 1.5E-07 | -- | -- | 1.8E-08 | -- | -- | 2.1E-07 | -- | -- |
| Benzo(a)anthracene | 0.2 | 0.1 | NA | NA | 3.9E-08 | -- | -- | 1.8E-07 | -- | -- | 2.8E-08 | -- | -- | 2.2E-07 | -- | -- | 2.6E-08 | -- | -- | 3.0E-07 | -- | -- |
| Chrysene | 0.26 | 0.1 | NA | NA | 5.1E-08 | -- | -- | 2.4E-07 | -- | -- | 3.7E-08 | -- | -- | 2.9E-07 | -- | -- | 3.3E-08 | -- | -- | 3.9E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.22 | 0.1 | NA | NA | 4.3E-08 | -- | -- | 2.0E-07 | -- | -- | 3.1E-08 | -- | -- | 2.4E-07 | -- | -- | 2.8E-08 | -- | -- | 3.3E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0.1 | NA | NA | 2.6E-08 | -- | -- | 1.2E-07 | -- | -- | 1.8E-08 | -- | -- | 1.4E-07 | -- | -- | 1.7E-08 | -- | -- | 1.9E-07 | -- | -- |
| Dieldrin | 0.01024 | 0.1 | 32 | 0.000025 | 2.0E-09 | 6.4E-08 | 14.9% | 9.4E-09 | 3.8E-04 | 0.3% | 1.5E-09 | 4.7E-08 | 14.9% | 1.1E-08 | 4.5E-04 | 0.3% | 1.3E-09 | 4.2E-08 | 14.9% | 1.5E-08 | 6.1E-04 | 0.3% |
| Aluminum | 10394.44 | 0.01 | NA | 0.2 | 2.0E-04 | -- | -- | 9.5E-04 | 4.8E-03 | 4.4% | 1.5E-04 | -- | -- | 1.1E-03 | 5.7E-03 | 4.4% | 1.3E-04 | -- | -- | 1.6E-03 | 7.8E-03 | 4.4% |
| Arsenic | 3.71 | 0.032 | 1.5789474 | 0.000285 | 2.3E-07 | 3.7E-07 | 85.1% | 1.1E-06 | 3.8E-03 | 3.5% | 1.7E-07 | 2.7E-07 | 85.1% | 1.3E-06 | 4.6E-03 | 3.5% | 1.5E-07 | 2.4E-07 | 85.1% | 1.8E-06 | 6.2E-03 | 3.5% |
| Cadmium (soil) | 7.74 | 0.01 | NA | 0.00005 | 1.5E-07 | -- | -- | 7.1E-07 | 1.4E-02 | 13.0% | 1.1E-07 | -- | -- | 8.6E-07 | 1.7E-02 | 13.0% | 9.9E-08 | -- | -- | 1.2E-06 | 2.3E-02 | 13.0% |
| Chromium | 11.89 | 0.01 | NA | 0.00003 | 2.3E-07 | -- | -- | 1.1E-06 | 3.6E-02 | 33.2% | 1.7E-07 | -- | -- | 1.3E-06 | 4.4E-02 | 33.2% | 1.5E-07 | -- | -- | 1.8E-06 | 5.9E-02 | 33.2% |
| Iron | 10008.45 | 0.01 | NA | 0.06 | 2.0E-04 | -- | -- | 9.2E-04 | 1.5E-02 | 14.0% | 1.4E-04 | -- | -- | 1.1E-03 | 1.8E-02 | 14.0% | 1.3E-04 | -- | -- | 1.5E-03 | 2.5E-02 | 14.0% |
| Manganese | 250.11 | 0.01 | NA | 0.001 | 4.9E-06 | -- | -- | 2.3E-05 | 2.3E-02 | 20.9% | 3.6E-06 | -- | -- | 2.8E-05 | 2.8E-02 | 20.9% | 3.2E-06 | -- | -- | 3.7E-05 | 3.7E-02 | 20.9% |
| Mercury | 1.11 | 0.01 | NA | 0.000015 | 2.2E-08 | -- | -- | 1.0E-07 | 6.8E-03 | 6.2% | 1.6E-08 | -- | -- | 1.2E-07 | 8.2E-03 | 6.2% | 1.4E-08 | -- | -- | 1.7E-07 | 1.1E-02 | 6.2% |
| Thallium | 0.55 | 0.01 | NA | 0.000014 | 1.1E-08 | -- | -- | 5.0E-08 | 3.6E-03 | 3.3% | 7.8E-09 | -- | -- | 6.1E-08 | 4.3E-03 | 3.3% | 7.0E-09 | -- | -- | 8.2E-08 | 5.9E-03 | 3.3% |
| Zinc | 1144.05 | 0.01 | NA | 0.075 | 2.2E-05 | -- | -- | 1.0E-04 | 1.4E-03 | 1.3% | 1.6E-05 | -- | -- | 1.3E-04 | 1.7E-03 | 1.3% | 1.5E-05 | -- | -- | 1.7E-04 | 2.3E-03 | 1.3% |
| | | | | | Total ILCR: | 4.3E-07 | 100.0% | HI: | 1.1E-01 | 100.0% | Total ILCR: | 3.1E-07 | 100.0% | HI: | 1.3E-01 | 100.0% | otal ILCR | 2.8E-07 | 100.0% | HI: | 1.8E-01 | 100.0% |

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Trichloroethene | 0.002 | 0.011 | 0.006 | 4.7E-08 | 5.2E-10 | 0.4% | 1.6E-07 | 2.6E-05 | 0.1% | 3.8E-08 | 4.2E-10 | 0.4% | 3.0E-07 | 4.9E-05 | 0.1% | 6.3E-08 | 6.9E-10 | 0.4% | 7.3E-07 | 1.2E-04 | 0.1% |
| Heptachlor | 0.000023 | 4.5 | 0.0005 | 5.4E-10 | 2.4E-09 | 1.7% | 1.8E-09 | 3.6E-06 | 0.0% | 4.4E-10 | 2.0E-09 | 1.7% | 3.4E-09 | 6.8E-06 | 0.0% | 7.2E-10 | 3.2E-09 | 1.7% | 8.4E-09 | 1.7E-05 | 0.0% |
| Arsenic | 0.00394 | 1.5 | 0.0003 | 9.3E-08 | 1.4E-07 | 97.9% | 3.1E-07 | 1.0E-03 | 5.3% | 7.5E-08 | 1.1E-07 | 97.9% | 5.8E-07 | 1.9E-03 | 5.3% | 1.2E-07 | 1.9E-07 | 97.9% | 1.4E-06 | 4.8E-03 | 5.3% |
| Cadmium | 0.05186 | NA | 0.0005 | 1.2E-06 | -- | -- | 4.1E-06 | 8.1E-03 | 41.5% | 9.9E-07 | -- | -- | 7.7E-06 | 1.5E-02 | 41.5% | 1.6E-06 | -- | -- | 1.9E-05 | 3.8E-02 | 41.5% |
| Iron | 0.99882 | NA | 0.3 | 2.3E-05 | -- | -- | 7.8E-05 | 2.6E-04 | 1.3% | 1.9E-05 | -- | -- | 1.5E-04 | 4.9E-04 | 1.3% | 3.1E-05 | -- | -- | 3.6E-04 | 1.2E-03 | 1.3% |
| Manganese | 1.96892 | NA | 0.02 | 4.6E-05 | -- | -- | 1.5E-04 | 7.7E-03 | 39.4% | 3.7E-05 | -- | -- | 2.9E-04 | 1.5E-02 | 39.4% | 6.2E-05 | -- | -- | 7.2E-04 | 3.6E-02 | 39.4% |
| Zinc | 9.27709 | NA | 0.3 | 2.2E-04 | -- | -- | 7.3E-04 | 2.4E-03 | 12.4% | 1.8E-04 | -- | -- | 1.4E-03 | 4.6E-03 | 12.4% | 2.9E-04 | -- | -- | 3.4E-03 | 1.1E-02 | 12.4% |
| | | | | Total ILCR: | 1.4E-07 | 100.0% | HI: | 2.0E-02 | 100.0% | Total ILCR: | 1.1E-07 | 100.0% | HI: | 3.7E-02 | 100.0% | Total ILCR: | 1.9E-07 | 100.0% | HI: | 9.1E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 21
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | *Oral cancer slope factor (1/(mg/kg/d))* | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | *Adult* | | | | | | *Older Child* | | | | | | *Young Child* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Trichloroethene | 0.002 | 0.011 | 0.006 | 4.7E-08 | 5.2E-10 | 0.4% | 1.6E-07 | 2.6E-05 | 0.1% | 3.8E-08 | 4.2E-10 | 0.4% | 3.0E-07 | 4.9E-05 | 0.1% | 6.3E-08 | 6.9E-10 | 0.4% | 7.3E-07 | 1.2E-04 | 0.1% |
| Heptachlor | 0.000023 | 4.5 | 0.0005 | 5.4E-10 | 2.4E-09 | 1.7% | 1.8E-09 | 3.6E-06 | 0.0% | 4.4E-10 | 2.0E-09 | 1.7% | 3.4E-09 | 6.8E-06 | 0.0% | 7.2E-10 | 3.2E-09 | 1.7% | 8.4E-09 | 1.7E-05 | 0.0% |
| Arsenic | 0.00394 | 1.5 | 0.0003 | 9.3E-08 | 1.4E-07 | 97.9% | 3.1E-07 | 1.0E-03 | 5.3% | 7.5E-08 | 1.1E-07 | 97.9% | 5.8E-07 | 1.9E-03 | 5.3% | 1.2E-07 | 1.9E-07 | 97.9% | 1.4E-06 | 4.8E-03 | 5.3% |
| Cadmium | 0.05186 | NA | 0.0005 | 1.2E-06 | -- | -- | 4.1E-06 | 8.1E-03 | 41.5% | 9.9E-07 | -- | -- | 7.7E-06 | 1.5E-02 | 41.5% | 1.6E-06 | -- | -- | 1.9E-05 | 3.8E-02 | 41.5% |
| Iron | 0.99882 | NA | 0.3 | 2.3E-05 | -- | -- | 7.8E-05 | 2.6E-04 | 1.3% | 1.9E-05 | -- | -- | 1.5E-04 | 4.9E-04 | 1.3% | 3.1E-05 | -- | -- | 3.6E-04 | 1.2E-03 | 1.3% |
| Manganese | 1.96892 | NA | 0.02 | 4.6E-05 | -- | -- | 1.5E-04 | 7.7E-03 | 39.4% | 3.7E-05 | -- | -- | 2.9E-04 | 1.5E-02 | 39.4% | 6.2E-05 | -- | -- | 7.2E-04 | 3.6E-02 | 39.4% |
| Zinc | 9.27709 | NA | 0.3 | 2.2E-04 | -- | -- | 7.3E-04 | 2.4E-03 | 12.4% | 1.8E-04 | -- | -- | 1.4E-03 | 4.6E-03 | 12.4% | 2.9E-04 | -- | -- | 3.4E-03 | 1.1E-02 | 12.4% |
| | | | | Total ILCR: | 1.4E-07 | 100.0% | HI: | 2.0E-02 | 100.0% | Total ILCR: | 1.1E-07 | 100.0% | HI: | 3.7E-02 | 100.0% | otal ILCR | 1.9E-07 | 100.0% | HI: | 9.1E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Trichloroethene | 0.002 | 0.016 | 0.014 | 0.0048 | 8.0E-08 | 1.1E-09 | 2.1% | 2.7E-07 | 5.5E-05 | 0.1% | 4.8E-08 | 6.6E-10 | 2.1% | 3.7E-07 | 7.8E-05 | 0.1% | 4.0E-08 | 5.5E-10 | 2.1% | 4.7E-07 | 9.8E-05 | 0.1% |
| Heptachlor | 0.000023 | 0.011 | 9.000 | 0.00025 | 6.3E-10 | 5.7E-09 | 10.7% | 2.1E-09 | 8.4E-06 | 0.0% | 3.8E-10 | 3.4E-09 | 10.7% | 2.9E-09 | 1.2E-05 | 0.0% | 3.2E-10 | 2.9E-09 | 10.7% | 3.7E-09 | 1.5E-05 | 0.0% |
| Arsenic | 0.00394 | 0.003 | 1.579 | 0.000285 | 2.9E-08 | 4.6E-08 | 87.3% | 9.8E-08 | 3.4E-04 | 0.3% | 1.8E-08 | 2.8E-08 | 87.3% | 1.4E-07 | 4.8E-04 | 0.3% | 1.5E-08 | 2.3E-08 | 87.3% | 1.7E-07 | 6.1E-04 | 0.3% |
| Cadmium | 0.05186 | 0.003 | NA | 0.000025 | 3.9E-07 | -- | -- | 1.3E-06 | 5.2E-02 | 49.4% | 2.3E-07 | -- | -- | 1.8E-06 | 7.2E-02 | 49.4% | 2.0E-07 | -- | -- | 2.3E-06 | 9.1E-02 | 49.4% |
| Iron | 0.99882 | 0.003 | NA | 0.06 | 7.5E-06 | -- | -- | 2.5E-05 | 4.1E-04 | 0.4% | 4.5E-06 | -- | -- | 3.5E-05 | 5.8E-04 | 0.4% | 3.8E-06 | -- | -- | 4.4E-05 | 7.3E-04 | 0.4% |
| Manganese | 1.96892 | 0.003 | NA | 0.001 | 1.5E-05 | -- | -- | 4.9E-05 | 4.9E-02 | 46.9% | 8.8E-06 | -- | -- | 6.9E-05 | 6.9E-02 | 46.9% | 7.4E-06 | -- | -- | 8.7E-05 | 8.7E-02 | 46.9% |
| Zinc | 9.27709 | 0.003 | NA | 0.075 | 6.9E-05 | -- | -- | 2.3E-04 | 3.1E-03 | 2.9% | 4.2E-05 | -- | -- | 3.2E-04 | 4.3E-03 | 2.9% | 3.5E-05 | -- | -- | 4.1E-04 | 5.4E-03 | 2.9% |
| | | | | | Total ILCR: | 5.3E-08 | 100.0% | HI: | 1.0E-01 | 100.0% | Total ILCR: | 3.2E-08 | 100.0% | HI: | 1.5E-01 | 100.0% | Total ILCR: | 2.7E-08 | 100.0% | HI: | 1.8E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 21
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Trichloroethene | 0.002 | 0.016 | 0.014 | 0.0048 | 7.5E-08 | 1.0E-09 | 2.1% | 2.5E-07 | 5.2E-05 | 0.1% | 3.9E-08 | 5.3E-10 | 2.1% | 3.0E-07 | 6.3E-05 | 0.1% | 3.5E-08 | 4.8E-10 | 2.1% | 4.1E-07 | 8.5E-05 | 0.1% |
| Heptachlor | 0.000023 | 0.011 | 9.000 | 0.00025 | 5.9E-10 | 5.3E-09 | 10.7% | 2.0E-09 | 7.9E-06 | 0.0% | 3.1E-10 | 2.8E-09 | 10.7% | 2.4E-09 | 9.6E-06 | 0.0% | 2.8E-10 | 2.5E-09 | 10.7% | 3.2E-09 | 1.3E-05 | 0.0% |
| Arsenic | 0.00394 | 0.003 | 1.579 | 0.000285 | 2.8E-08 | 4.4E-08 | 87.3% | 9.3E-08 | 3.2E-04 | 0.3% | 1.4E-08 | 2.3E-08 | 87.3% | 1.1E-07 | 3.9E-04 | 0.3% | 1.3E-08 | 2.0E-08 | 87.3% | 1.5E-07 | 5.3E-04 | 0.3% |
| Cadmium | 0.05186 | 0.003 | NA | 0.000025 | 3.7E-07 | -- | -- | 1.2E-06 | 4.9E-02 | 49.4% | 1.9E-07 | -- | -- | 1.5E-06 | 5.9E-02 | 49.4% | 1.7E-07 | -- | -- | 2.0E-06 | 7.9E-02 | 49.4% |
| Iron | 0.99882 | 0.003 | NA | 0.06 | 7.0E-06 | -- | -- | 2.3E-05 | 3.9E-04 | 0.4% | 3.6E-06 | -- | -- | 2.8E-05 | 4.7E-04 | 0.4% | 3.3E-06 | -- | -- | 3.8E-05 | 6.4E-04 | 0.4% |
| Manganese | 1.96892 | 0.003 | NA | 0.001 | 1.4E-05 | -- | -- | 4.6E-05 | 4.6E-02 | 46.9% | 7.2E-06 | -- | -- | 5.6E-05 | 5.6E-02 | 46.9% | 6.5E-06 | -- | -- | 7.5E-05 | 7.5E-02 | 46.9% |
| Zinc | 9.27709 | 0.003 | NA | 0.075 | 6.5E-05 | -- | -- | 2.2E-04 | 2.9E-03 | 2.9% | 3.4E-05 | -- | -- | 2.6E-04 | 3.5E-03 | 2.9% | 3.0E-05 | -- | -- | 3.5E-04 | 4.7E-03 | 2.9% |
| | | | | | Total ILCR: | 5.0E-08 | 100.0% | HI: | 9.9E-02 | 100.0% | Total ILCR: | 2.6E-08 | 100.0% | HI: | 1.2E-01 | 100.0% | otal ILCR | 2.3E-08 | 100.0% | HI: | 1.6E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 21 WELL 21GW03
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Trichloroethene | 0.002 | 0.011 | 0.006 | 4.7E-08 | 5.2E-10 | 100.0% | 1.6E-07 | 2.6E-05 | 0.1% | 3.8E-08 | 4.2E-10 | 100.0% | 3.0E-07 | 4.9E-05 | 0.1% | 6.3E-08 | 6.9E-10 | 100.0% | 7.3E-07 | 1.2E-04 | 0.1% |
| Cadmium | 0.0825 | NA | 0.0005 | 1.9E-06 | -- | -- | 6.5E-06 | 1.3E-02 | 43.8% | 1.6E-06 | -- | -- | 1.2E-05 | 2.4E-02 | 43.8% | 2.6E-06 | -- | -- | 3.0E-05 | 6.0E-02 | 43.8% |
| Iron | 1.58 | NA | 0.3 | 3.7E-05 | -- | -- | 1.2E-04 | 4.1E-04 | 1.4% | 3.0E-05 | -- | -- | 2.3E-04 | 7.8E-04 | 1.4% | 4.9E-05 | -- | -- | 5.8E-04 | 1.9E-03 | 1.4% |
| Manganese | 3.13 | NA | 0.02 | 7.4E-05 | -- | -- | 2.5E-04 | 1.2E-02 | 41.6% | 6.0E-05 | -- | -- | 4.6E-04 | 2.3E-02 | 41.6% | 9.8E-05 | -- | -- | 1.1E-03 | 5.7E-02 | 41.6% |
| Zinc | 14.8 | NA | 0.3 | 3.5E-04 | -- | -- | 1.2E-03 | 3.9E-03 | 13.1% | 2.8E-04 | -- | -- | 2.2E-03 | 7.3E-03 | 13.1% | 4.6E-04 | -- | -- | 5.4E-03 | 1.8E-02 | 13.1% |
| | | | | Total ILCR: | 5.2E-10 | 100.0% | HI: | 2.9E-02 | 100.0% | Total ILCR: | 4.2E-10 | 100.0% | HI: | 5.6E-02 | 100.0% | Total ILCR: | 6.9E-10 | 100.0% | HI: | 1.4E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 21 WELL 21GW03
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Trichloroethene | 0.002 | 0.011 | 0.006 | 4.7E-08 | 5.2E-10 | 100.0% | 1.6E-07 | 2.6E-05 | 0.1% | 3.8E-08 | 4.2E-10 | 100.0% | 3.0E-07 | 4.9E-05 | 0.1% | 6.3E-08 | 6.9E-10 | 100.0% | 7.3E-07 | 1.2E-04 | 0.1% |
| Cadmium | 0.0825 | NA | 0.0005 | 1.9E-06 | -- | -- | 6.5E-06 | 1.3E-02 | 43.8% | 1.6E-06 | -- | -- | 1.2E-05 | 2.4E-02 | 43.8% | 2.6E-06 | -- | -- | 3.0E-05 | 6.0E-02 | 43.8% |
| Iron | 1.58 | NA | 0.3 | 3.7E-05 | -- | -- | 1.2E-04 | 4.1E-04 | 1.4% | 3.0E-05 | -- | -- | 2.3E-04 | 7.8E-04 | 1.4% | 4.9E-05 | -- | -- | 5.8E-04 | 1.9E-03 | 1.4% |
| Manganese | 3.13 | NA | 0.02 | 7.4E-05 | -- | -- | 2.5E-04 | 1.2E-02 | 41.6% | 6.0E-05 | -- | -- | 4.6E-04 | 2.3E-02 | 41.6% | 9.8E-05 | -- | -- | 1.1E-03 | 5.7E-02 | 41.6% |
| Zinc | 14.8 | NA | 0.3 | 3.5E-04 | -- | -- | 1.2E-03 | 3.9E-03 | 13.1% | 2.8E-04 | -- | -- | 2.2E-03 | 7.3E-03 | 13.1% | 4.6E-04 | -- | -- | 5.4E-03 | 1.8E-02 | 13.1% |
| | | | | Total ILCR: | 5.2E-10 | 100.0% | HI: | 2.9E-02 | 100.0% | Total ILCR: | 4.2E-10 | 100.0% | HI: | 5.6E-02 | 100.0% | otal ILCR | 6.9E-10 | 100.0% | HI: | 1.4E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 21 WELL 21GW03
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2 | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Trichloroethene | 0.002 | 0.016 | 0.014 | 0.0048 | 8.0E-08 | 1.1E-09 | 100.0% | 2.7E-07 | 5.5E-05 | 0.0% | 4.8E-08 | 6.6E-10 | 100.0% | 3.7E-07 | 7.8E-05 | 0.0% | 4.0E-08 | 5.5E-10 | 100.0% | 4.7E-07 | 9.8E-05 | 0.0% |
| Cadmium | 0.0825 | 0.003 | NA | 0.000025 | 6.2E-07 | -- | -- | 2.1E-06 | 8.2E-02 | 49.6% | 3.7E-07 | -- | -- | 2.9E-06 | 1.2E-01 | 49.6% | 3.1E-07 | -- | -- | 3.6E-06 | 1.5E-01 | 49.6% |
| Iron | 1.58 | 0.003 | NA | 0.06 | 1.2E-05 | -- | -- | 3.9E-05 | 6.6E-04 | 0.4% | 7.1E-06 | -- | -- | 5.5E-05 | 9.2E-04 | 0.4% | 6.0E-06 | -- | -- | 6.9E-05 | 1.2E-03 | 0.4% |
| Manganese | 3.13 | 0.003 | NA | 0.001 | 2.3E-05 | -- | -- | 7.8E-05 | 7.8E-02 | 47.0% | 1.4E-05 | -- | -- | 1.1E-04 | 1.1E-01 | 47.0% | 1.2E-05 | -- | -- | 1.4E-04 | 1.4E-01 | 47.0% |
| Zinc | 14.8 | 0.003 | NA | 0.075 | 1.1E-04 | -- | -- | 3.7E-04 | 4.9E-03 | 3.0% | 6.6E-05 | -- | -- | 5.2E-04 | 6.9E-03 | 3.0% | 5.6E-05 | -- | -- | 6.5E-04 | 8.7E-03 | 3.0% |
| | | | | | Total ILCR: | 1.1E-09 | 100.0% | HI: | 1.7E-01 | 100.0% | Total ILCR: | 6.6E-10 | 100.0% | HI: | 2.3E-01 | 100.0% | Total ILCR: | 5.5E-10 | 100.0% | HI: | 2.9E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 21 WELL 21GW03
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Trichloroethene | 0.002 | 0.016 | 0.014 | 0.0048 | 7.5E-08 | 1.0E-09 | 100.0% | 2.5E-07 | 5.2E-05 | 0.0% | 3.9E-08 | 5.3E-10 | 100.0% | 3.0E-07 | 6.3E-05 | 0.0% | 3.5E-08 | 4.8E-10 | 100.0% | 4.1E-07 | 8.5E-05 | 0.0% |
| Cadmium | 0.0825 | 0.003 | NA | 0.000025 | 5.8E-07 | -- | -- | 1.9E-06 | 7.7E-02 | 49.6% | 3.0E-07 | -- | -- | 2.3E-06 | 9.3E-02 | 49.6% | 2.7E-07 | -- | -- | 3.2E-06 | 1.3E-01 | 49.6% |
| Iron | 1.58 | 0.003 | NA | 0.06 | 1.1E-05 | -- | -- | 3.7E-05 | 6.2E-04 | 0.4% | 5.8E-06 | -- | -- | 4.5E-05 | 7.5E-04 | 0.4% | 5.2E-06 | -- | -- | 6.0E-05 | 1.0E-03 | 0.4% |
| Manganese | 3.13 | 0.003 | NA | 0.001 | 2.2E-05 | -- | -- | 7.4E-05 | 7.4E-02 | 47.0% | 1.1E-05 | -- | -- | 8.9E-05 | 8.9E-02 | 47.0% | 1.0E-05 | -- | -- | 1.2E-04 | 1.2E-01 | 47.0% |
| Zinc | 14.8 | 0.003 | NA | 0.075 | 1.0E-04 | -- | -- | 3.5E-04 | 4.6E-03 | 3.0% | 5.4E-05 | -- | -- | 4.2E-04 | 5.6E-03 | 3.0% | 4.9E-05 | -- | -- | 5.7E-04 | 7.5E-03 | 3.0% |
| | | | | | Total ILCR: | 1.0E-09 | 100.0% | HI: | 1.6E-01 | 100.0% | Total ILCR: | 5.3E-10 | 100.0% | HI: | 1.9E-01 | 100.0% | otal ILCR | 4.8E-10 | 100.0% | HI. | 2.5E-01 | 100.0% |

NOTES:
*NA - Toxicity criterion not available.*
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE WATER - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*ET*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/hour) | 0.05 | 0.05 | 0.05 | |
| ET | Exposure Time (hours/day) | 2.6 | 2.6 | 2.6 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalate | 0.0395 | 0.014 | 0.02 | 1.7E-06 | 2.4E-08 | 8.4% | 8.0E-06 | 4.0E-04 | 2.1% | 2.0E-06 | 2.7E-08 | 8.4% | 1.5E-05 | 7.6E-04 | 2.1% | 3.2E-06 | 4.5E-08 | 8.4% | 3.8E-05 | 1.9E-03 | 2.1% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | NA | 0.002 | 4.6E-08 | -- | -- | 2.2E-07 | 1.1E-04 | 0.6% | 5.2E-08 | -- | -- | 4.1E-07 | 2.0E-04 | 0.6% | 8.6E-08 | -- | -- | 1.0E-06 | 5.0E-04 | 0.6% |
| Amino-Dinitrotoluene | 0.00226 | NA | 0.00006 | 9.9E-08 | -- | -- | 4.6E-07 | 7.7E-03 | 40.8% | 1.1E-07 | -- | -- | 8.7E-07 | 1.5E-02 | 40.8% | 1.8E-07 | -- | -- | 2.1E-06 | 3.6E-02 | 40.8% |
| RDX | 0.02466 | 0.11 | 0.003 | 1.1E-06 | 1.2E-07 | 41.2% | 5.0E-06 | 1.7E-03 | 8.9% | 1.2E-06 | 1.3E-07 | 41.2% | 9.5E-06 | 3.2E-03 | 8.9% | 2.0E-06 | 2.2E-07 | 41.2% | 2.3E-05 | 7.8E-03 | 8.9% |
| Antimony | 0.01464 | NA | 0.0004 | 6.4E-07 | -- | -- | 3.0E-06 | 7.4E-03 | 39.6% | 7.2E-07 | -- | -- | 5.6E-06 | 1.4E-02 | 39.6% | 1.2E-06 | -- | -- | 1.4E-05 | 3.5E-02 | 39.6% |
| Arsenic | 0.00221 | 1.5 | 0.0003 | 9.6E-08 | 1.4E-07 | 50.4% | 4.5E-07 | 1.5E-03 | 8.0% | 1.1E-07 | 1.6E-07 | 50.4% | 8.5E-07 | 2.8E-03 | 8.0% | 1.8E-07 | 2.7E-07 | 50.4% | 2.1E-06 | 7.0E-03 | 8.0% |
| | | | | Total ILCR | 2.9E-07 | 100.0% | HI: | 1.9E-02 | 100.0% | Total ILCR: | 3.3E-07 | 100.0% | HI: | 3.6E-02 | 100.0% | otal ILCR | 5.4E-07 | 100.0% | HI: | 8.8E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE WATER - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*ET*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/hour) | 0.05 | 0.05 | 0.05 | |
| ET | Exposure Time (hours/day) | 2.6 | 2.6 | 2.6 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalate | 0.0395 | 0.014 | 0.02 | 1.7E-06 | 2.4E-08 | 8.4% | 8.0E-06 | 4.0E-04 | 2.1% | 2.0E-06 | 2.7E-08 | 8.4% | 1.5E-05 | 7.6E-04 | 2.1% | 3.2E-06 | 4.5E-08 | 8.4% | 3.8E-05 | 1.9E-03 | 2.1% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | NA | 0.002 | 4.6E-08 | -- | -- | 2.2E-07 | 1.1E-04 | 0.6% | 5.2E-08 | -- | -- | 4.1E-07 | 2.0E-04 | 0.6% | 8.6E-08 | -- | -- | 1.0E-06 | 5.0E-04 | 0.6% |
| Amino-Dinitrotoluene | 0.00226 | NA | 0.00006 | 9.9E-08 | -- | -- | 4.6E-07 | 7.7E-03 | 40.8% | 1.1E-07 | -- | -- | 8.7E-07 | 1.5E-02 | 40.8% | 1.8E-07 | -- | -- | 2.1E-06 | 3.6E-02 | 40.8% |
| RDX | 0.02466 | 0.11 | 0.003 | 1.1E-06 | 1.2E-07 | 41.2% | 5.0E-06 | 1.7E-03 | 8.9% | 1.2E-06 | 1.3E-07 | 41.2% | 9.5E-06 | 3.2E-03 | 8.9% | 2.0E-06 | 2.2E-07 | 41.2% | 2.3E-05 | 7.8E-03 | 8.9% |
| Antimony | 0.01464 | NA | 0.0004 | 6.4E-07 | -- | -- | 3.0E-06 | 7.4E-03 | 39.6% | 7.2E-07 | -- | -- | 5.6E-06 | 1.4E-02 | 39.6% | 1.2E-06 | -- | -- | 1.4E-05 | 3.5E-02 | 39.6% |
| Arsenic | 0.00221 | 1.5 | 0.0003 | 9.6E-08 | 1.4E-07 | 50.4% | 4.5E-07 | 1.5E-03 | 8.0% | 1.1E-07 | 1.6E-07 | 50.4% | 8.5E-07 | 2.8E-03 | 8.0% | 1.8E-07 | 2.7E-07 | 50.4% | 2.1E-06 | 7.0E-03 | 8.0% |
| | | | | Total ILCR | 2.9E-07 | 100.0% | HI: | 1.9E-02 | 100.0% | Total ILCR: | 3.3E-07 | 100.0% | HI: | 3.6E-02 | 100.0% | otal ILCR | 5.4E-07 | 100.0% | HI: | 8.8E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE WATER - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 15 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 2.6 | 2.6 | 2.6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalat | 0.0395 | 0.033 | 0.025 | 0.011 | 6.0E-06 | 1.5E-07 | 69.5% | 2.8E-05 | 2.6E-03 | 7.9% | 5.1E-06 | 1.3E-07 | 69.5% | 3.9E-05 | 3.6E-03 | 7.9% | 4.3E-06 | 1.1E-07 | 69.5% | 5.0E-05 | 4.5E-03 | 7.9% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | 0.0037 | NA | 0.0002 | 1.8E-08 | -- | -- | 8.5E-08 | 4.2E-04 | 1.3% | 1.5E-08 | -- | -- | 1.2E-07 | 5.9E-04 | 1.3% | 1.3E-08 | -- | -- | 1.5E-07 | 7.5E-04 | 1.3% |
| Amino-Dinitrotoluene | 0.00226 | 0.0037 | NA | 0.000036 | 3.9E-08 | -- | -- | 1.8E-07 | 5.0E-03 | 15.4% | 3.2E-08 | -- | -- | 2.5E-07 | 7.0E-03 | 15.4% | 2.7E-08 | -- | -- | 3.2E-07 | 8.9E-03 | 15.4% |
| RDX | 0.02466 | 0.0015 | 0.110 | 0.003 | 1.7E-07 | 1.9E-08 | 8.5% | 8.0E-07 | 2.7E-04 | 0.8% | 1.4E-07 | 1.6E-08 | 8.5% | 1.1E-06 | 3.7E-04 | 0.8% | 1.2E-07 | 1.3E-08 | 8.5% | 1.4E-06 | 4.7E-04 | 0.8% |
| Antimony | 0.01464 | 0.003 | NA | 0.00004 | 2.0E-07 | -- | -- | 9.5E-07 | 2.4E-02 | 73.0% | 1.7E-07 | -- | -- | 1.3E-06 | 3.3E-02 | 73.0% | 1.4E-07 | -- | -- | 1.7E-06 | 4.2E-02 | 73.0% |
| Arsenic | 0.00221 | 0.003 | 1.579 | 0.000285 | 3.1E-08 | 4.8E-08 | 21.9% | 1.4E-07 | 5.0E-04 | 1.5% | 2.6E-08 | 4.1E-08 | 21.9% | 2.0E-07 | 7.0E-04 | 1.5% | 2.2E-08 | 3.4E-08 | 21.9% | 2.5E-07 | 8.9E-04 | 1.5% |
| | | | | | Total ILCR: | 2.2E-07 | 100.0% | HI: | 3.2E-02 | 100.0% | Total ILCR: | 1.9E-07 | 100.0% | HI: | 4.5E-02 | 100.0% | otal ILC | 1.6E-07 | 100.0% | HI: | 5.7E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE WATER - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 15 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 2.6 | 2.6 | 2.6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalat | 0.0395 | 0.033 | 0.025455 | 0.011 | 5.7E-06 | 1.4E-07 | 69.5% | 2.7E-05 | 2.4E-03 | 7.9% | 4.1E-06 | 1.0E-07 | 69.5% | 3.2E-05 | 2.9E-03 | 7.9% | 3.7E-06 | 9.4E-08 | 69.5% | 4.3E-05 | 3.9E-03 | 7.9% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | 0.0037 | NA | 0.0002 | 1.7E-08 | -- | -- | 8.0E-08 | 4.0E-04 | 1.3% | 1.2E-08 | -- | -- | 9.6E-08 | 4.8E-04 | 1.3% | 1.1E-08 | -- | -- | 1.3E-07 | 6.5E-04 | 1.3% |
| Amino-Dinitrotoluene | 0.00226 | 0.0037 | NA | 0.000036 | 3.6E-08 | -- | -- | 1.7E-07 | 4.7E-03 | 15.4% | 2.6E-08 | -- | -- | 2.1E-07 | 5.7E-03 | 15.4% | 2.4E-08 | -- | -- | 2.8E-07 | 7.7E-03 | 15.4% |
| RDX | 0.02466 | 0.0015 | 0.11 | 0.003 | 1.6E-07 | 1.8E-08 | 8.5% | 7.5E-07 | 2.5E-04 | 0.8% | 1.2E-07 | 1.3E-08 | 8.5% | 9.1E-07 | 3.0E-04 | 0.8% | 1.1E-07 | 1.2E-08 | 8.5% | 1.2E-06 | 4.1E-04 | 0.8% |
| Antimony | 0.01464 | 0.003 | NA | 0.00004 | 1.9E-07 | -- | -- | 8.9E-07 | 2.2E-02 | 73.0% | 1.4E-07 | -- | -- | 1.1E-06 | 2.7E-02 | 73.0% | 1.2E-07 | -- | -- | 1.5E-06 | 3.6E-02 | 73.0% |
| Arsenic | 0.00221 | 0.003 | 1.578947 | 0.000285 | 2.9E-08 | 4.6E-08 | 21.9% | 1.3E-07 | 4.7E-04 | 1.5% | 2.1E-08 | 3.3E-08 | 21.9% | 1.6E-07 | 5.7E-04 | 1.5% | 1.9E-08 | 3.0E-08 | 21.9% | 2.2E-07 | 7.7E-04 | 1.5% |
| | | | | | Total ILCR: | 2.1E-07 | 100.0% | HI: | 3.1E-02 | 100.0% | Total ILCR: | 1.5E-07 | 100.0% | HI: | 3.7E-02 | 100.0% | otal ILC | 1.4E-07 | 100.0% | HI: | 5.0E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SEDIMENT - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | 200 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | NA | 1 | 6.9E-04 | -- | -- | 3.2E-03 | 3.2E-03 | 8.4% | 7.8E-04 | -- | -- | 6.1E-03 | 6.1E-03 | 8.4% | 2.6E-03 | -- | -- | 3.0E-02 | 3.0E 02 | 8.4% |
| Antimony | 14.27 | NA | 0.0004 | 4.8E-07 | -- | -- | 2.2E-06 | 5.6E-03 | 14.7% | 5.4E-07 | -- | -- | 4.2E-06 | 1.1E-02 | 14.7% | 1.8E-06 | -- | -- | 2.1E-05 | 5.2E-02 | 14.7% |
| Arsenic | 11.68 | 1.5 | 0.0003 | 3.9E-07 | 5.9E-07 | 100.0% | 1.8E-06 | 6.1E-03 | 16.0% | 4.4E-07 | 6.7E-07 | 100.0% | 3.5E-06 | 1.2E-02 | 16.0% | 1.5E-06 | 2.2E-06 | 100.0% | 1.7E-05 | 5.7E-02 | 16.0% |
| Cadmium | 1.44 | NA | 0.001 | 4.8E-08 | -- | -- | 2.3E-07 | 2.3E-04 | 0.6% | 5.5E-08 | -- | -- | 4.3E-07 | 4.3E-04 | 0.6% | 1.8E-07 | -- | -- | 2.1E-06 | 2.1E-03 | 0.6% |
| Chromium | 34.33 | NA | 0.003 | 1.2E-06 | -- | -- | 5.4E-06 | 1.8E-03 | 4.7% | 1.3E-06 | -- | -- | 1.0E-05 | 3.4E-03 | 4.7% | 4.3E-06 | -- | -- | 5.0E-05 | 1.7E-02 | 4.7% |
| Iron | 32592.85 | NA | 0.3 | 1.1E-03 | -- | -- | 5.1E-03 | 1.7E-02 | 44.8% | 1.2E-03 | -- | -- | 9.7E-03 | 3.2E-02 | 44.8% | 4.1E-03 | -- | -- | 4.8E-02 | 1.6E-01 | 44.8% |
| Manganese | 250.39 | NA | 0.02 | 8.4E-06 | -- | -- | 3.9E-05 | 2.0E-03 | 5.2% | 9.5E-06 | -- | -- | 7.4E-05 | 3.7E-03 | 5.2% | 3.1E-05 | -- | -- | 3.7E-04 | 1.8E-02 | 5.2% |
| Thallium | 0.44 | NA | 0.00007 | 1.5E-08 | -- | -- | 6.9E-08 | 9.8E-04 | 2.6% | 1.7E-08 | -- | -- | 1.3E-07 | 1.9E-03 | 2.6% | 5.5E-08 | -- | -- | 6.4E-07 | 9.2E-03 | 2.6% |
| Vanadium | 51.15 | NA | 0.007 | 1.7E-06 | -- | -- | 8.0E-06 | 1.1E-03 | 3.0% | 1.9E-06 | -- | -- | 1.5E-05 | 2.2E-03 | 3.0% | 6.4E-06 | -- | -- | 7.5E-05 | 1.1E-02 | 3.0% |
| | | | | Total ILCR: | 5.9E-07 | 100.0% | HI: | 3.8E-02 | 100.0% | Total ILCR: | 6.7E-07 | 100.0% | HI: | 7.2E-02 | 100.0% | otal ILCR | 2.2E-06 | 100.0% | HI: | 3.5E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SEDIMENT - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | *Incremental lifetime cancer risk* | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 50 | 50 | 100 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | NA | 1 | 3.4E-04 | -- | -- | 1.6E-03 | 1.6E-03 | 8.4% | 3.9E-04 | -- | -- | 3.0E-03 | 3.0E-03 | 8.4% | 1.3E-03 | -- | -- | 1.5E-02 | 1.5E-02 | 8.4% |
| Antimony | 14.27 | NA | 0.0004 | 2.4E-07 | -- | -- | 1.1E-06 | 2.8E-03 | 14.7% | 2.7E-07 | -- | -- | 2.1E-06 | 5.3E-03 | 14.7% | 8.9E-07 | -- | -- | 1.0E-05 | 2.6E-02 | 14.7% |
| Arsenic | 11.68 | 1.5 | 0.0003 | 2.0E-07 | 2.9E-07 | 100.0% | 9.1E-07 | 3.0E-03 | 16.0% | 2.2E-07 | 3.3E-07 | 100.0% | 1.7E-06 | 5.8E-03 | 16.0% | 7.3E-07 | 1.1E-06 | 100.0% | 8.5E-06 | 2.8E-02 | 16.0% |
| Cadmium | 1.44 | NA | 0.001 | 2.4E-08 | -- | -- | 1.1E-07 | 1.1E-04 | 0.6% | 2.7E-08 | -- | -- | 2.1E-07 | 2.1E-04 | 0.6% | 9.0E-08 | -- | -- | 1.1E-06 | 1.1E-03 | 0.6% |
| *Chromium* | 34.33 | NA | 0.003 | 5.8E-07 | -- | -- | 2.7E-06 | 9.0E-04 | 4.7% | 6.5E-07 | -- | -- | 5.1E-06 | 1.7E-03 | 4.7% | 2.1E-06 | -- | -- | 2.5E-05 | 8.4E-03 | 4.7% |
| Iron | 32592.85 | NA | 0.3 | 5.5E-04 | -- | -- | 2.6E-03 | 8.5E-03 | 44.8% | 6.2E-04 | -- | -- | 4.8E-03 | 1.6E-02 | 44.8% | 2.0E-03 | -- | -- | 2.4E-02 | 7.9E-02 | 44.8% |
| Manganese | 250.39 | NA | 0.02 | 4.2E-06 | -- | -- | 2.0E-05 | 9.8E-04 | 5.2% | 4.8E-06 | -- | -- | 3.7E-05 | 1.9E-03 | 5.2% | 1.6E-05 | -- | -- | 1.8E-04 | 9.1E-03 | 5.2% |
| Thallium | 0.44 | NA | 0.00007 | 7.4E-09 | -- | -- | 3.4E-08 | 4.9E-04 | 2.6% | 8.4E-09 | -- | -- | 6.5E-08 | 9.3E-04 | 2.6% | 2.8E-08 | -- | -- | 3.2E-07 | 4.6E-03 | 2.6% |
| Vanadium | 51.15 | NA | 0.007 | 8.6E-07 | -- | -- | 4.0E-06 | 5.7E-04 | 3.0% | 9.7E-07 | -- | -- | 7.6E-06 | 1.1E-03 | 3.0% | 3.2E-06 | -- | -- | 3.7E-05 | 5.3E-03 | 3.0% |
| | | | | Total ILCR: | 2.9E-07 | 100.0% | HI: | 1.9E-02 | 100.0% | Total ILCR: | 3.3E-07 | 100.0% | HI: | 3.6E-02 | 100.0% | otal ILCR | 1.1E-06 | 100.0% | HI: | 1.8E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SEDIMENT - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | 0.01 | NA | 0.2 | 3.6E-04 | -- | -- | 1.7E-03 | 8.5E-03 | 3.5% | 3.1E-04 | -- | -- | 2.4E-03 | 1.2E-02 | 3.5% | 2.6E-04 | -- | -- | 3.0E-03 | 1.5E-02 | 3.5% |
| Antimony | 14.27 | 0.01 | NA | 0.00004 | 2.5E-07 | -- | -- | 1.2E-06 | 3.0E-02 | 12.1% | 2.1E-07 | -- | -- | 1.7E-06 | 4.1E-02 | 12.1% | 1.8E-07 | -- | -- | 2.1E-06 | 5.2E-02 | 12.1% |
| Arsenic | 11.68 | 0.032 | 1.578947368 | 0.000285 | 6.6E-07 | 1.0E-06 | 100.0% | 3.1E-06 | 1.1E-02 | 4.4% | 5.6E-07 | 8.8E-07 | 100.0% | 4.3E-06 | 1.5E-02 | 4.4% | 4.7E-07 | 7.4E-07 | 100.0% | 5.5E-06 | 1.9E-02 | 4.4% |
| Cadmium | 1.44 | 0.01 | NA | 0.00005 | 2.6E-08 | -- | -- | 1.2E-07 | 2.4E-03 | 1.0% | 2.2E-08 | -- | -- | 1.7E-07 | 3.3E-03 | 1.0% | 1.8E-08 | -- | -- | 2.1E-07 | 4.2E-03 | 1.0% |
| Chromium | 34.33 | 0.01 | NA | 0.00003 | 6.1E-07 | -- | -- | 2.8E-06 | 9.5E-02 | 38.7% | 5.1E-07 | -- | -- | 4.0E-06 | 1.3E-01 | 38.7% | 4.3E-07 | -- | -- | 5.0E-06 | 1.7E-01 | 38.7% |
| Iron | 32592.85 | 0.01 | NA | 0.06 | 5.8E-04 | -- | -- | 2.7E-03 | 4.5E-02 | 18.4% | 4.9E-04 | -- | -- | 3.8E-03 | 6.3E-02 | 18.4% | 4.1E-04 | -- | -- | 4.8E-03 | 8.0E-02 | 18.4% |
| Manganese | 250.39 | 0.01 | NA | 0.001 | 4.5E-06 | -- | -- | 2.1E-05 | 2.1E-02 | 8.5% | 3.7E-06 | -- | -- | 2.9E-05 | 2.9E-02 | 8.5% | 3.1E-06 | -- | -- | 3.7E-05 | 3.7E-02 | 8.5% |
| Thallium | 0.44 | 0.01 | NA | 0.000014 | 7.8E-09 | -- | -- | 3.7E-08 | 2.6E-03 | 1.1% | 6.6E-09 | -- | -- | 5.1E-08 | 3.7E-03 | 1.1% | 5.5E-09 | -- | -- | 6.4E-08 | 4.6E-03 | 1.1% |
| Vanadium | 51.15 | 0.01 | NA | 0.00014 | 9.1E-07 | -- | -- | 4.2E-06 | 3.0E-02 | 12.4% | 7.6E-07 | -- | -- | 5.9E-06 | 4.2E-02 | 12.4% | 6.4E-07 | -- | -- | 7.5E-06 | 5.4E-02 | 12.4% |
| | | | | | Total ILCR: | 1.0E-06 | 100.0% | HI: | 2.5E-01 | 100.0% | Total ILCR: | 8.8E-07 | 100.0% | HI: | 3.4E-01 | 100.0% | otal ILCR | 7.4E-07 | 100.0% | HI: | 4.3E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SEDIMENT - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 0.2 | 0.2 | 0.2 | |
| ABS | Absorption fraction | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | 0.01 | NA | 0.2 | 6.9E-05 | -- | -- | 3.2E-04 | 1.6E-03 | 3.5% | 5.0E-05 | -- | -- | 3.9E-04 | 1.9E-03 | 3.5% | 4.5E-05 | -- | -- | 5.2E-04 | 2.6E-03 | 3.5% |
| Antimony | 14.27 | 0.01 | NA | 0.00004 | 4.8E-08 | -- | -- | 2.2E-07 | 5.6E-03 | 12.1% | 3.5E-08 | -- | -- | 2.7E-07 | 6.7E-03 | 12.1% | 3.1E-08 | -- | -- | 3.6E-07 | 9.1E-03 | 12.1% |
| Arsenic | 11.68 | 0.032 | 1.578947368 | 0.000285 | 1.3E-07 | 2.0E-07 | 100.0% | 5.9E-07 | 2.1E-03 | 4.4% | 9.1E-08 | 1.4E-07 | 100.0% | 7.1E-07 | 2.5E-03 | 4.4% | 8.2E-08 | 1.3E-07 | 100.0% | 9.5E-07 | 3.3E-03 | 4.4% |
| Cadmium | 1.44 | 0.01 | NA | 0.00005 | 4.8E-09 | -- | -- | 2.3E-08 | 4.5E-04 | 1.0% | 3.5E-09 | -- | -- | 2.7E-08 | 5.4E-04 | 1.0% | 3.1E-09 | -- | -- | 3.7E-08 | 7.3E-04 | 1.0% |
| Chromium | 34.33 | 0.01 | NA | 0.00003 | 1.2E-07 | -- | -- | 5.4E-07 | 1.8E-02 | 38.7% | 8.3E-08 | -- | -- | 6.5E-07 | 2.2E-02 | 38.7% | 7.5E-08 | -- | -- | 8.8E-07 | 2.9E-02 | 38.7% |
| Iron | 32592.85 | 0.01 | NA | 0.06 | 1.1E-04 | -- | -- | 5.1E-04 | 8.5E-03 | 18.4% | 7.9E-05 | -- | -- | 6.2E-04 | 1.0E-02 | 18.4% | 7.1E-05 | -- | -- | 8.3E-04 | 1.4E-02 | 18.4% |
| Manganese | 250.39 | 0.01 | NA | 0.001 | 8.4E-07 | -- | -- | 3.9E-06 | 3.9E-03 | 8.5% | 6.1E-07 | -- | -- | 4.7E-06 | 4.7E-03 | 8.5% | 5.5E-07 | -- | -- | 6.4E-06 | 6.4E-03 | 8.5% |
| Thallium | 0.44 | 0.01 | NA | 0.000014 | 1.5E-09 | -- | -- | 6.9E-09 | 4.9E-04 | 1.1% | 1.1E-09 | -- | -- | 8.3E-09 | 5.9E-04 | 1.1% | 9.6E-10 | -- | -- | 1.1E-08 | 8.0E-04 | 1.1% |
| Vanadium | 51.15 | 0.01 | NA | 0.00014 | 1.7E-07 | -- | -- | 8.0E-07 | 5.7E-03 | 12.4% | 1.2E-07 | -- | -- | 9.7E-07 | 6.9E-03 | 12.4% | 1.1E-07 | -- | -- | 1.3E-06 | 9.3E-03 | 12.4% |
| | | | | | Total ILCR: | 2.0E-07 | 100.0% | HI: | 4.6E-02 | 100.0% | Total ILCR: | 1.4E-07 | 100.0% | HI: | 5.6E-02 | 100.0% | otal ILCR | 1.3E-07 | 100.0% | HI: | 7.5E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | 200 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 350 | 350 | 350 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| n-Nitroso-di-n-propylamine | 0.25 | 7 | NA | 7.3E-08 | 5.1E-07 | 12.2% | 3.4E-07 | -- | -- | 8.3E-08 | 5.8E-07 | 12.2% | 6.5E-07 | -- | -- | 2.7E-07 | 1.9E-06 | 12.2% | 3.2E-06 | -- | -- |
| Benzo(a)pyrene | 0.11 | 7.3 | NA | 3.2E-08 | 2.4E-07 | 5.6% | 1.5E-07 | -- | -- | 3.7E-08 | 2.7E-07 | 5.6% | 2.9E-07 | -- | -- | 1.2E-07 | 8.8E-07 | 5.6% | 1.4E-06 | -- | -- |
| Benzo(a)anthracene | 0.1 | 0.73 | NA | 2.9E-08 | 2.1E-08 | 0.5% | 1.4E-07 | -- | -- | 3.3E-08 | 2.4E-08 | 0.5% | 2.6E-07 | -- | -- | 1.1E-07 | 8.0E-08 | 0.5% | 1.3E-06 | -- | -- |
| Chrysene | 0.2 | 0.0073 | NA | 5.9E-08 | 4.3E-10 | 0.0% | 2.7E-07 | -- | -- | 6.7E-08 | 4.9E-10 | 0.0% | 5.2E-07 | -- | -- | 2.2E-07 | 1.6E-09 | 0.0% | 2.5E-06 | -- | -- |
| Benzo(b)fluoranthene | 0.25285 | 0.73 | NA | 7.4E-08 | 5.4E-08 | 1.3% | 3.5E-07 | -- | -- | 8.4E-08 | 6.2E-08 | 1.3% | 6.6E-07 | -- | -- | 2.8E-07 | 2.0E-07 | 1.3% | 3.2E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.13 | 0.073 | NA | 3.8E-08 | 2.8E-09 | 0.1% | 1.8E-07 | -- | -- | 4.3E-08 | 3.2E-09 | 0.1% | 3.4E-07 | -- | -- | 1.4E-07 | 1.0E-08 | 0.1% | 1.7E-06 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0.73 | NA | 4.7E-08 | 3.4E-08 | 0.8% | 2.2E-07 | -- | -- | 5.3E-08 | 3.9E-08 | 0.8% | 4.1E-07 | -- | -- | 1.8E-07 | 1.3E-07 | 0.8% | 2.0E-06 | -- | -- |
| Aluminum | 12046.95 | NA | 1 | 3.5E-03 | -- | -- | 1.7E-02 | 1.7E-02 | 9.3% | 4.0E-03 | -- | -- | 3.1E-02 | 3.1E-02 | 9.3% | 1.3E-02 | -- | -- | 1.5E-01 | 1.5E-01 | 9.3% |
| Arsenic | 7.64 | 1.5 | 0.0003 | 2.2E-06 | 3.4E-06 | 79.6% | 1.0E-05 | 3.5E-02 | 19.7% | 2.5E-06 | 3.8E-06 | 79.6% | 2.0E-05 | 6.6E-02 | 19.7% | 8.4E-06 | 1.3E-05 | 79.6% | 9.8E-05 | 3.3E-01 | 19.7% |
| Cadmium (soil) | 1.48 | NA | 0.001 | 4.3E-07 | -- | -- | 2.0E-06 | 2.0E-03 | 1.1% | 4.9E-07 | -- | -- | 3.8E-06 | 3.8E-03 | 1.1% | 1.6E-06 | -- | -- | 1.9E-05 | 1.9E-02 | 1.1% |
| Chromium | 19.37 | NA | 0.003 | 5.7E-06 | -- | -- | 2.7E-05 | 8.8E-03 | 5.0% | 6.5E-06 | -- | -- | 5.0E-05 | 1.7E-02 | 5.0% | 2.1E-05 | -- | -- | 2.5E-04 | 8.3E-02 | 5.0% |
| Copper | 180.65 | NA | 0.04 | 5.3E-05 | -- | -- | 2.5E-04 | 6.2E-03 | 3.5% | 6.0E-05 | -- | -- | 4.7E-04 | 1.2E-02 | 3.5% | 2.0E-04 | -- | -- | 2.3E-03 | 5.8E-02 | 3.5% |
| Iron | 22276.88 | NA | 0.3 | 6.5E-03 | -- | -- | 3.1E-02 | 1.0E-01 | 57.3% | 7.4E-03 | -- | -- | 5.8E-02 | 1.9E-01 | 57.3% | 2.4E-02 | -- | -- | 2.8E-01 | 9.5E-01 | 57.3% |
| Lead | 240.69 | NA | NA | 7.1E-05 | -- | -- | 3.3E-04 | -- | -- | 8.0E-05 | -- | -- | 6.2E-04 | -- | -- | 2.6E-04 | -- | -- | 3.1E-03 | -- | -- |
| Manganese | 105.93 | NA | 0.02 | 3.1E-05 | -- | -- | 1.5E-04 | 7.3E-03 | 4.1% | 3.5E-05 | -- | -- | 2.7E-04 | 1.4E-02 | 4.1% | 1.2E-04 | -- | -- | 1.4E-03 | 6.8E-02 | 4.1% |
| | | | | Total ILCR: | 4.2E-06 | 100.0% | HI: | 1.8E-01 | 100.0% | Total ILCR: | 4.8E-06 | 100.0% | HI: | 3.4E-01 | 100.0% | otal ILCR | 1.6E-05 | 100.0% | HI: | 1.7E+00 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE SOIL - SITE 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 50 | 50 | 100 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 234 | 234 | 234 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| n-Nitroso-di-n-propylamine | 0.25 | 7 | NA | 2.5E-08 | 1.7E-07 | 12.2% | 1.1E-07 | -- | -- | 2.8E-08 | 1.9E-07 | 12.2% | 2.2E-07 | -- | -- | 9.2E-08 | 6.4E-07 | 12.2% | 1.1E-06 | -- | -- |
| Benzo(a)pyrene | 0.11 | 7.3 | NA | 1.1E-08 | 7.9E-08 | 5.6% | 5.0E-08 | -- | -- | 1.2E-08 | 8.9E-08 | 5.6% | 9.5E-08 | -- | -- | 4.0E-08 | 2.9E-07 | 5.6% | 4.7E-07 | -- | -- |
| Benzo(a)anthracene | 0.1 | 0.73 | NA | 9.8E-09 | 7.2E-09 | 0.5% | 4.6E-08 | -- | -- | 1.1E-08 | 8.1E-09 | 0.5% | 8.7E-08 | -- | -- | 3.7E-08 | 2.7E-08 | 0.5% | 4.3E-07 | -- | -- |
| Chrysene | 0.2 | 0.0073 | NA | 2.0E-08 | 1.4E-10 | 0.0% | 9.2E-08 | -- | -- | 2.2E-08 | 1.6E-10 | 0.0% | 1.7E-07 | -- | -- | 7.3E-08 | 5.3E-10 | 0.0% | 8.5E-07 | -- | -- |
| Benzo(b)fluoranthene | 0.25285 | 0.73 | NA | 2.5E-08 | 1.8E-08 | 1.3% | 1.2E-07 | -- | -- | 2.8E-08 | 2.1E-08 | 1.3% | 2.2E-07 | -- | -- | 9.3E-08 | 6.8E-08 | 1.3% | 1.1E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.13 | 0.073 | NA | 1.3E-08 | 9.3E-10 | 0.1% | 6.0E-08 | -- | -- | 1.4E-08 | 1.1E-09 | 0.1% | 1.1E-07 | -- | -- | 4.8E-08 | 3.5E-09 | 0.1% | 5.6E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0.73 | NA | 1.6E-08 | 1.1E-08 | 0.8% | 7.3E-08 | -- | -- | 1.8E-08 | 1.3E-08 | 0.8% | 1.4E-07 | -- | -- | 5.9E-08 | 4.3E-08 | 0.8% | 6.8E-07 | -- | -- |
| Aluminum | 12046.95 | NA | 1 | 1.2E-03 | -- | -- | 5.5E-03 | 5.5E-03 | 9.3% | 1.3E-03 | -- | -- | 1.0E-02 | 1.0E-02 | 9.3% | 4.4E-03 | -- | -- | 5.1E-02 | 5.1E-02 | 9.3% |
| Arsenic | 7.64 | 1.5 | 0.0003 | 7.5E-07 | 1.1E-06 | 79.6% | 3.5E-06 | 1.2E-02 | 19.7% | 8.5E-07 | 1.3E-06 | 79.6% | 6.6E-06 | 2.2E-02 | 19.7% | 2.8E-06 | 4.2E-06 | 79.6% | 3.3E-05 | 1.1E-01 | 19.7% |
| Cadmium (soil) | 1.48 | NA | 0.001 | 1.5E-07 | -- | -- | 6.6E-07 | 6.6E-04 | 1.1% | 1.6E-07 | -- | -- | 1.3E-06 | 1.3E-03 | 1.1% | 5.4E-07 | -- | -- | 6.3E-06 | 6.3E-03 | 1.1% |
| Chromium | 19.37 | NA | 0.003 | 1.9E-06 | -- | -- | 8.9E-06 | 3.0E-03 | 5.0% | 2.2E-06 | -- | -- | 1.7E-05 | 5.6E-03 | 5.0% | 7.1E-06 | -- | -- | 8.3E-05 | 2.8E-02 | 5.0% |
| Copper | 180.65 | NA | 0.04 | 1.8E-05 | -- | -- | 8.3E-05 | 2.1E-03 | 3.5% | 2.0E-05 | -- | -- | 1.6E-04 | 3.9E-03 | 3.5% | 6.6E-05 | -- | -- | 7.7E-04 | 1.9E-02 | 3.5% |
| Iron | 22276.88 | NA | 0.3 | 2.2E-03 | -- | -- | 1.0E-02 | 3.4E-02 | 57.3% | 2.5E-03 | -- | -- | 1.9E-02 | 6.4E-02 | 57.3% | 8.2E-03 | -- | -- | 9.5E-02 | 3.2E-01 | 57.3% |
| Lead | 240.69 | NA | NA | 2.4E-05 | -- | -- | 1.1E-04 | -- | -- | 2.7E-05 | -- | -- | 2.1E-04 | -- | -- | 8.8E-05 | -- | -- | 1.0E-03 | -- | -- |
| Manganese | 105.93 | NA | 0.02 | 1.0E-05 | -- | -- | 4.9E-05 | 2.4E-03 | 4.1% | 1.2E-05 | -- | -- | 9.2E-05 | 4.6E-03 | 4.1% | 3.9E-05 | -- | -- | 4.5E-04 | 2.3E-02 | 4.1% |
| | | | | Total ILCR: | 1.4E-06 | 100.0% | HI: | 5.9E-02 | 100.0% | Total ILCR: | 1.6E-06 | 100.0% | HI: | 1.1E-01 | 100.0% | otal ILCR | 5.3E-06 | 100.0% | HI: | 5.5E-01 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*A*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | CS | |
| A | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure Frequency (d/yr) | 350 | 350 | 350 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| n-Nitroso-di-n-propylamine | 0.25 | 0.1 | 14 | NA | 3.9E-07 | 5.4E-06 | 47.6% | 1.8E-06 | -- | -- | 3.3E-07 | 4.6E-06 | 47.6% | 2.5E-06 | -- | -- | 2.7E-07 | 3.8E-06 | 47.6% | 3.2E-06 | -- | -- |
| Benzo(a)pyrene | 0.11 | 0.1 | NA | NA | 1.7E-07 | -- | -- | 8.0E-07 | -- | -- | 1.4E-07 | -- | -- | 1.1E-06 | -- | -- | 1.2E-07 | -- | -- | 1.4E-06 | -- | -- |
| Benzo(a)anthracene | 0.1 | 0.1 | NA | NA | 1.6E-07 | -- | -- | 7.3E-07 | -- | -- | 1.3E-07 | -- | -- | 1.0E-06 | -- | -- | 1.1E-07 | -- | -- | 1.3E-06 | -- | -- |
| Chrysene | 0.2 | 0.1 | NA | NA | 3.1E-07 | -- | -- | 1.5E-06 | -- | -- | 2.6E-07 | -- | -- | 2.0E-06 | -- | -- | 2.2E-07 | -- | -- | 2.6E-06 | -- | -- |
| Benzo(b)fluoranthene | 0.25285 | 0.1 | NA | NA | 3.9E-07 | -- | -- | 1.8E-06 | -- | -- | 3.3E-07 | -- | -- | 2.6E-06 | -- | -- | 2.8E-07 | -- | -- | 3.2E-06 | -- | -- |
| Benzo(k)fluoranthene | 0.13 | 0.1 | NA | NA | 2.0E-07 | -- | -- | 9.4E-07 | -- | -- | 1.7E-07 | -- | -- | 1.3E-06 | -- | -- | 1.4E-07 | -- | -- | 1.7E-06 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0.1 | NA | NA | 2.5E-07 | -- | -- | 1.2E-06 | -- | -- | 2.1E-07 | -- | -- | 1.6E-06 | -- | -- | 1.8E-07 | -- | -- | 2.1E-06 | -- | -- |
| Aluminum | 12046.95 | 0.01 | NA | 0.2 | 1.9E-03 | -- | -- | 8.7E-03 | 4.4E-02 | 4.6% | 1.6E-03 | -- | -- | 1.2E-02 | 6.1E-02 | 4.6% | 1.3E-03 | -- | -- | 1.5E-02 | 7.7E-02 | 4.6% |
| Arsenic | 7.64 | 0.032 | 1.5789474 | 0.000285 | 3.8E-06 | 6.0E-06 | 52.4% | 1.6E-05 | 6.2E-02 | 6.6% | 3.2E-06 | 5.0E-06 | 52.4% | 2.5E-05 | 8.7E-02 | 6.6% | 2.7E-06 | 4.2E-06 | 52.4% | 3.1E-05 | 1.1E-01 | 6.6% |
| Cadmium (soil) | 1.48 | 0.01 | NA | 0.00005 | 2.3E-07 | -- | -- | 1.1E-06 | 2.1E-02 | 2.3% | 1.9E-07 | -- | -- | 1.5E-06 | 3.0E-02 | 2.3% | 1.6E-07 | -- | -- | 1.9E-06 | 3.8E-02 | 2.3% |
| Chromium | 19.37 | 0.01 | NA | 0.00003 | 3.0E-06 | -- | -- | 1.4E-05 | 4.7E-01 | 49.4% | 2.5E-06 | -- | -- | 2.0E-05 | 6.6E-01 | 49.4% | 2.1E-06 | -- | -- | 2.5E-05 | 8.3E-01 | 49.4% |
| Copper | 180.65 | 0.01 | NA | 0.024 | 2.8E-05 | -- | -- | 1.3E-04 | 5.5E-03 | 0.6% | 2.4E-05 | -- | -- | 1.8E-04 | 7.7E-03 | 0.6% | 2.0E-05 | -- | -- | 2.3E-04 | 9.7E-03 | 0.6% |
| Iron | 22276.88 | 0.01 | NA | 0.06 | 3.5E-03 | -- | -- | 1.6E-02 | 2.7E-01 | 28.4% | 2.9E-03 | -- | -- | 2.3E-02 | 3.8E-01 | 28.4% | 2.4E-03 | -- | -- | 2.9E-02 | 4.8E-01 | 28.4% |
| Lead | 240.69 | 0.01 | NA | NA | 3.7E-05 | -- | -- | 1.7E-04 | -- | -- | 3.1E-05 | -- | -- | 2.4E-04 | -- | -- | 2.6E-05 | -- | -- | 3.1E-04 | -- | -- |
| Manganese | 105.93 | 0.01 | NA | 0.001 | 1.6E-05 | -- | -- | 7.7E-05 | 7.7E-02 | 8.1% | 1.4E-05 | -- | -- | 1.1E-04 | 1.1E-01 | 8.1% | 1.2E-05 | -- | -- | 1.4E-04 | 1.4E-01 | 8.1% |
| | | | | | Total ILCR: | 1.1E-05 | 100.0% | HI: | 9.5E-01 | 100.0% | Total ILCR: | 9.6E-06 | 100.0% | HI: | 1.3E+00 | 100.0% | otal ILCR | 8.1E-06 | 100.0% | HI: | 1.7E+00 | 100.0% |

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE SOIL - SITE 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*A*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 0.2 | 0.2 | 0.2 | |
| ABS | Absorption fraction | CS | CS | CS | |
| A | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure Frequency (d/yr) | 234 | 234 | 234 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| n-Nitroso-di-n-propylamine | 0.25 | 0.1 | 14 | NA | 4.9E-08 | 6.9E-07 | 47.6% | 2.3E-07 | -- | -- | 3.6E-08 | 5.0E-07 | 47.6% | 2.8E-07 | -- | -- | 3.2E-08 | 4.5E-07 | 47.6% | 3.7E-07 | -- | -- |
| Benzo(a)pyrene | 0.11 | 0.1 | NA | NA | 2.2E-08 | -- | -- | 1.0E-07 | -- | -- | 1.6E-08 | -- | -- | 1.2E-07 | -- | -- | 1.4E-08 | -- | -- | 1.6E-07 | -- | -- |
| Benzo(a)anthracene | 0.1 | 0.1 | NA | NA | 2.0E-08 | -- | -- | 9.2E-08 | -- | -- | 1.4E-08 | -- | -- | 1.1E-07 | -- | -- | 1.3E-08 | -- | -- | 1.5E-07 | -- | -- |
| Chrysene | 0.2 | 0.1 | NA | NA | 3.9E-08 | -- | -- | 1.8E-07 | -- | -- | 2.8E-08 | -- | -- | 2.2E-07 | -- | -- | 2.6E-08 | -- | -- | 3.0E-07 | -- | -- |
| Benzo(b)fluoranthene | 0.25285 | 0.1 | NA | NA | 5.0E-08 | -- | -- | 2.3E-07 | -- | -- | 3.6E-08 | -- | -- | 2.8E-07 | -- | -- | 3.2E-08 | -- | -- | 3.8E-07 | -- | -- |
| Benzo(k)fluoranthene | 0.13 | 0.1 | NA | NA | 2.6E-08 | -- | -- | 1.2E-07 | -- | -- | 1.8E-08 | -- | -- | 1.4E-07 | -- | -- | 1.7E-08 | -- | -- | 1.9E-07 | -- | -- |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0.1 | NA | NA | 3.1E-08 | -- | -- | 1.5E-07 | -- | -- | 2.3E-08 | -- | -- | 1.8E-07 | -- | -- | 2.0E-08 | -- | -- | 2.4E-07 | -- | -- |
| Aluminum | 12046.95 | 0.01 | NA | 0.2 | 2.4E-04 | -- | -- | 1.1E-03 | 5.5E-03 | 4.6% | 1.7E-04 | -- | -- | 1.3E-03 | 6.7E-03 | 4.6% | 1.5E-04 | -- | -- | 1.8E-03 | 9.0E-03 | 4.6% |
| Arsenic | 7.64 | 0.032 | 1.5789474 | 0.000285 | 4.8E-07 | 7.6E-07 | 52.4% | 2.2E-06 | 7.9E-03 | 6.6% | 3.5E-07 | 5.5E-07 | 52.4% | 2.7E-06 | 9.5E-03 | 6.6% | 3.1E-07 | 4.9E-07 | 52.4% | 3.6E-06 | 1.3E-02 | 6.6% |
| Cadmium (soil) | 1.48 | 0.01 | NA | 0.00005 | 2.9E-08 | -- | -- | 1.4E-07 | 2.7E-03 | 2.3% | 2.1E-08 | -- | -- | 1.6E-07 | 3.3E-03 | 2.3% | 1.9E-08 | -- | -- | 2.2E-07 | 4.4E-03 | 2.3% |
| Chromium | 19.37 | 0.01 | NA | 0.00003 | 3.8E-07 | -- | -- | 1.8E-06 | 5.9E-02 | 49.4% | 2.8E-07 | -- | -- | 2.1E-06 | 7.1E-02 | 49.4% | 2.5E-07 | -- | -- | 2.9E-06 | 9.6E-02 | 49.4% |
| Copper | 180.65 | 0.01 | NA | 0.024 | 3.5E-06 | -- | -- | 1.7E-05 | 6.9E-04 | 0.6% | 2.6E-06 | -- | -- | 2.0E-05 | 8.3E-04 | 0.6% | 2.3E-06 | -- | -- | 2.7E-05 | 1.1E-03 | 0.6% |
| Iron | 22276.88 | 0.01 | NA | 0.06 | 4.4E-04 | -- | -- | 2.0E-03 | 3.4E-02 | 28.4% | 3.2E-04 | -- | -- | 2.5E-03 | 4.1E-02 | 28.4% | 2.8E-04 | -- | -- | 3.3E-03 | 5.5E-02 | 28.4% |
| Lead | 240.69 | 0.01 | NA | NA | 4.7E-06 | -- | -- | 2.2E-05 | -- | -- | 3.4E-06 | -- | -- | 2.7E-05 | -- | -- | 3.1E-06 | -- | -- | 3.6E-05 | -- | -- |
| Manganese | 105.93 | 0.01 | NA | 0.001 | 2.1E-06 | -- | -- | 9.7E-06 | 9.7E-03 | 8.1% | 1.5E-06 | -- | -- | 1.2E-05 | 1.2E-02 | 8.1% | 1.4E-06 | -- | -- | 1.6E-05 | 1.6E-02 | 8.1% |
| | | | | | Total ILCR: | 1.4E-06 | 100.0% | HI: | 1.2E-01 | 100.0% | Total ILCR: | 1.0E-06 | 100.0% | HI: | 1.4E-01 | 100.0% | otal ILCR | 9.4E-07 | 100.0% | HI: | 1.9E-01 | 100.0% |

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Acetone | 0.05206 | NA | 0.1 | 1.2E-06 | -- | -- | 4.1E-06 | 4.1E-05 | 0.2% | 9.9E-07 | -- | -- | 7.7E-06 | 7.7E-05 | 0.2% | 1.6E-06 | -- | -- | 1.9E-05 | 1.9E-04 | 0.2% |
| 1,1-Dichloroethene | 0.85713 | 0.6 | 0.009 | 2.0E-05 | 1.2E-05 | 96.4% | 6.7E-05 | 7.5E-03 | 30.2% | 1.6E-05 | 9.8E-06 | 96.4% | 1.3E-04 | 1.4E-02 | 30.2% | 2.7E-05 | 1.6E-05 | 96.4% | 3.1E-04 | 3.5E-02 | 30.2% |
| 1,2-Dichloroethene (total) | 0.16155 | NA | 0.009 | 3.8E-06 | -- | -- | 1.3E-05 | 1.4E-03 | 5.7% | 3.1E-06 | -- | -- | 2.4E-05 | 2.7E-03 | 5.7% | 5.1E-06 | -- | -- | 5.9E-05 | 6.6E-03 | 5.7% |
| Chloroform | 0.019 | 0.0061 | 0.01 | 4.5E-07 | 2.7E-09 | 0.0% | 1.5E-06 | 1.5E-04 | 0.6% | 3.6E-07 | 2.2E-09 | 0.0% | 2.8E-06 | 2.8E-04 | 0.6% | 5.9E-07 | 3.6E-09 | 0.0% | 6.9E-06 | 6.9E-04 | 0.6% |
| 1,2-Dichloroethane | 0.028 | 0.091 | 0.03 | 6.6E-07 | 6.0E-08 | 0.5% | 2.2E-06 | 7.3E-05 | 0.3% | 5.3E-07 | 4.9E-08 | 0.5% | 4.1E-06 | 1.4E-04 | 0.3% | 8.8E-07 | 8.0E-08 | 0.5% | 1.0E-05 | 3.4E-04 | 0.3% |
| 1,1,1-Trichloroethane | 0.76594 | NA | 0.02 | 1.8E-05 | -- | -- | 6.0E-05 | 3.0E-03 | 12.2% | 1.5E-05 | -- | -- | 1.1E-04 | 5.7E-03 | 12.2% | 2.4E-05 | -- | -- | 2.8E-04 | 1.4E-02 | 12.2% |
| Trichloroethene | 0.5119 | 0.011 | 0.006 | 1.2E-05 | 1.3E-07 | 1.1% | 4.0E-05 | 6.7E-03 | 27.1% | 9.7E-06 | 1.1E-07 | 1.1% | 7.6E-05 | 1.3E-02 | 27.1% | 1.6E-05 | 1.8E-07 | 1.1% | 1.9E-04 | 3.1E-02 | 27.1% |
| Benzo(a)anthracene | 0.001 | 0.73 | NA | 2.3E-08 | 1.7E-08 | 0.1% | 7.8E-08 | -- | -- | 1.9E-08 | 1.4E-08 | 0.1% | 1.5E-07 | -- | -- | 3.1E-08 | 2.3E-08 | 0.1% | 3.7E-07 | -- | -- |
| Chrysene | 0.001 | 0.0073 | NA | 2.3E-08 | 1.7E-10 | 0.0% | 7.8E-08 | -- | -- | 1.9E-08 | 1.4E-10 | 0.0% | 1.5E-07 | -- | -- | 3.1E-08 | 2.3E-10 | 0.0% | 3.7E-07 | -- | -- |
| Aldrin | 0.00008 | 17 | 0.00003 | 1.9E-09 | 3.2E-08 | 0.3% | 6.3E-09 | 2.1E-04 | 0.8% | 1.5E-09 | 2.6E-08 | 0.3% | 1.2E-08 | 3.9E-04 | 0.8% | 2.5E-09 | 4.3E-08 | 0.3% | 2.9E-08 | 9.7E-04 | 0.8% |
| RDX | 0.04939 | 0.11 | 0.003 | 1.2E-06 | 1.3E-07 | 1.0% | 3.9E-06 | 1.3E-03 | 5.2% | 9.4E-07 | 1.0E-07 | 1.0% | 7.3E-06 | 2.4E-03 | 5.2% | 1.5E-06 | 1.7E-07 | 1.0% | 1.8E-05 | 6.0E-03 | 5.2% |
| Arsenic | 0.00221 | 1.5 | 0.0003 | 5.2E-08 | 7.8E-08 | 0.6% | 1.7E-07 | 5.8E-04 | 2.3% | 4.2E-08 | 6.3E-08 | 0.6% | 3.3E-07 | 1.1E-03 | 2.3% | 6.9E-08 | 1.0E-07 | 0.6% | 8.1E-07 | 2.7E-03 | 2.3% |
| Barium | 0.21221 | NA | 0.07 | 5.0E-06 | -- | -- | 1.7E-05 | 2.4E-04 | 1.0% | 4.0E-06 | -- | -- | 3.1E-05 | 4.5E-04 | 1.0% | 6.6E-06 | -- | -- | 7.8E-05 | 1.1E-03 | 1.0% |
| Iron | 7.30702 | NA | 0.3 | 1.7E-04 | -- | -- | 5.7E-04 | 1.9E-03 | 7.7% | 1.4E-04 | -- | -- | 1.1E-03 | 3.6E-03 | 7.7% | 2.3E-04 | -- | -- | 2.7E-03 | 8.9E-03 | 7.7% |
| Manganese | 0.4231 | NA | 0.02 | 9.9E-06 | -- | -- | 3.3E-05 | 1.7E-03 | 6.7% | 8.1E-06 | -- | -- | 6.3E-05 | 3.1E-03 | 6.7% | 1.3E-05 | -- | -- | 1.5E-04 | 7.7E-03 | 6.7% |
| | | | | Total ILCR: | 1.3E-05 | 100.0% | HI: | 2.5E-02 | 100.0% | Total ILCR: | 1.0E-05 | 100.0% | HI: | 4.7E-02 | 100.0% | otal ILCR | 1.7E-05 | 100.0% | HI: | 1.2E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Acetone | 0.05206 | NA | 0.1 | 1.2E-06 | -- | -- | 4.1E-06 | 4.1E-05 | 0.2% | 9.9E-07 | -- | -- | 7.7E-06 | 7.7E-05 | 0.2% | 1.6E-06 | -- | -- | 1.9E-05 | 1.9E-04 | 0.2% |
| 1,1-Dichloroethene | 0.85713 | 0.6 | 0.009 | 2.0E-05 | 1.2E-05 | 96.4% | 6.7E-05 | 7.5E-03 | 30.2% | 1.6E-05 | 9.8E-06 | 96.4% | 1.3E-04 | 1.4E-02 | 30.2% | 2.7E-05 | 1.6E-05 | 96.4% | 3.1E-04 | 3.5E-02 | 30.2% |
| 1,2-Dichloroethene (total | 0.16155 | NA | 0.009 | 3.8E-06 | -- | -- | 1.3E-05 | 1.4E-03 | 5.7% | 3.1E-06 | -- | -- | 2.4E-05 | 2.7E-03 | 5.7% | 5.1E-06 | -- | -- | 5.9E-05 | 6.6E-03 | 5.7% |
| Chloroform | 0.019 | 0.0061 | 0.01 | 4.5E-07 | 2.7E-09 | 0.0% | 1.5E-06 | 1.5E-04 | 0.6% | 3.6E-07 | 2.2E-09 | 0.0% | 2.8E-06 | 2.8E-04 | 0.6% | 5.9E-07 | 3.6E-09 | 0.0% | 6.9E-06 | 6.9E-04 | 0.6% |
| 1,2-Dichloroethane | 0.028 | 0.091 | 0.03 | 6.6E-07 | 6.0E-08 | 0.5% | 2.2E-06 | 7.3E-05 | 0.3% | 5.3E-07 | 4.9E-08 | 0.5% | 4.1E-06 | 1.4E-04 | 0.3% | 8.8E-07 | 8.0E-08 | 0.5% | 1.0E-05 | 3.4E-04 | 0.3% |
| 1,1,1-Trichloroethane | 0.76594 | NA | 0.02 | 1.8E-05 | -- | -- | 6.0E-05 | 3.0E-03 | 12.2% | 1.5E-05 | -- | -- | 1.1E-04 | 5.7E-03 | 12.2% | 2.4E-05 | -- | -- | 2.8E-04 | 1.4E-02 | 12.2% |
| Trichloroethene | 0.5119 | 0.011 | 0.006 | 1.2E-05 | 1.3E-07 | 1.1% | 4.0E-05 | 6.7E-03 | 27.1% | 9.7E-06 | 1.1E-07 | 1.1% | 7.6E-05 | 1.3E-02 | 27.1% | 1.6E-05 | 1.8E-07 | 1.1% | 1.9E-04 | 3.1E-02 | 27.1% |
| Benzo(a)anthracene | 0.001 | 0.73 | NA | 2.3E-08 | 1.7E-08 | 0.1% | 7.8E-08 | -- | -- | 1.9E-08 | 1.4E-08 | 0.1% | 1.5E-07 | -- | -- | 3.1E-08 | 2.3E-08 | 0.1% | 3.7E-07 | -- | -- |
| Chrysene | 0.001 | 0.0073 | NA | 2.3E-08 | 1.7E-10 | 0.0% | 7.8E-08 | -- | -- | 1.9E-08 | 1.4E-10 | 0.0% | 1.5E-07 | -- | -- | 3.1E-08 | 2.3E-10 | 0.0% | 3.7E-07 | -- | -- |
| Aldrin | 0.00008 | 17 | 0.00003 | 1.9E-09 | 3.2E-08 | 0.3% | 6.3E-09 | 2.1E-04 | 0.8% | 1.5E-09 | 2.6E-08 | 0.3% | 1.2E-08 | 3.9E-04 | 0.8% | 2.5E-09 | 4.3E-08 | 0.3% | 2.9E-08 | 9.7E-04 | 0.8% |
| RDX | 0.04939 | 0.11 | 0.003 | 1.2E-06 | 1.3E-07 | 1.0% | 3.9E-06 | 1.3E-03 | 5.2% | 9.4E-07 | 1.0E-07 | 1.0% | 7.3E-06 | 2.4E-03 | 5.2% | 1.5E-06 | 1.7E-07 | 1.0% | 1.8E-05 | 6.0E-03 | 5.2% |
| Arsenic | 0.00221 | 1.5 | 0.0003 | 5.2E-08 | 7.8E-08 | 0.6% | 1.7E-07 | 5.8E-04 | 2.3% | 4.2E-08 | 6.3E-08 | 0.6% | 3.3E-07 | 1.1E-03 | 2.3% | 6.9E-08 | 1.0E-07 | 0.6% | 8.1E-07 | 2.7E-03 | 2.3% |
| Barium | 0.21221 | NA | 0.07 | 5.0E-06 | -- | -- | 1.7E-05 | 2.4E-04 | 1.0% | 4.0E-06 | -- | -- | 3.1E-05 | 4.5E-04 | 1.0% | 6.6E-06 | -- | -- | 7.8E-05 | 1.1E-03 | 1.0% |
| Iron | 7.30702 | NA | 0.3 | 1.7E-04 | -- | -- | 5.7E-04 | 1.9E-03 | 7.7% | 1.4E-04 | -- | -- | 1.1E-03 | 3.6E-03 | 7.7% | 2.3E-04 | -- | -- | 2.7E-03 | 8.9E-03 | 7.7% |
| Manganese | 0.4231 | NA | 0.02 | 9.9E-06 | -- | -- | 3.3E-05 | 1.7E-03 | 6.7% | 8.1E-06 | -- | -- | 6.3E-05 | 3.1E-03 | 6.7% | 1.3E-05 | -- | -- | 1.5E-04 | 7.7E-03 | 6.7% |
| | | | | Total ILCR: | 1.3E-05 | 100.0% | HI: | 2.5E-02 | 100.0% | Total ILCR: | 1.0E-05 | 100.0% | HI: | 4.7E-02 | 100.0% | otal ILC | 1.7E-05 | 100.0% | HI: | 1.2E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2 | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d | RfDd (mg/kg/d | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Acetone | 0.05206 | 0.0015 | NA | 0.08 | 1.9E-07 | -- | -- | 6.5E-07 | 8.1E-06 | 0.0% | 1.2E-07 | -- | -- | 9.1E-07 | 1.1E-05 | 0.0% | 9.8E-08 | -- | -- | 1.1E-06 | 1.4E-05 | 0.0% |
| 1,1-Dichloroethene | 0.85713 | 0.016 | 0.6 | 0.009 | 3.4E-05 | 2.0E-05 | 98.2% | 1.1E-04 | 1.3E-02 | 25.4% | 2.0E-05 | 1.2E-05 | 98.2% | 1.6E-04 | 1.8E-02 | 25.4% | 1.7E-05 | 1.0E-05 | 98.2% | 2.0E-04 | 2.2E-02 | 25.4% |
| 1,2-Dichloroethene (total | 0.16155 | 0.01 | NA | 0.0072 | 4.0E-06 | -- | -- | 1.3E-05 | 1.9E-03 | 3.7% | 2.4E-06 | -- | -- | 1.9E-05 | 2.6E-03 | 3.7% | 2.0E-06 | -- | -- | 2.4E-05 | 3.3E-03 | 3.7% |
| Chloroform | 0.019 | 0.0089 | 0.0061 | 0.01 | 4.2E-07 | 2.6E-09 | 0.0% | 1.4E-06 | 1.4E-04 | 0.3% | 2.5E-07 | 1.5E-09 | 0.0% | 2.0E-06 | 2.0E-04 | 0.3% | 2.1E-07 | 1.3E-09 | 0.0% | 2.5E-06 | 2.5E-04 | 0.3% |
| 1,2-Dichloroethane | 0.028 | 0.0053 | 0.11375 | 0.024 | 3.7E-07 | 4.2E-08 | 0.2% | 1.2E-06 | 5.1E-05 | 0.1% | 2.2E-07 | 2.5E-08 | 0.2% | 1.7E-06 | 7.2E-05 | 0.1% | 1.9E-07 | 2.1E-08 | 0.2% | 2.2E-06 | 9.1E-05 | 0.1% |
| 1,1,1-Trichloroethane | 0.76594 | 0.017 | NA | 0.016 | 3.2E-05 | -- | -- | 1.1E-04 | 6.8E-03 | 13.6% | 1.9E-05 | -- | -- | 1.5E-04 | 9.5E-03 | 13.6% | 1.6E-05 | -- | -- | 1.9E-04 | 1.2E-02 | 13.6% |
| Trichloroethene | 0.5119 | 0.016 | 0.01375 | 0.0048 | 2.0E-05 | 2.8E-07 | 1.3% | 6.8E-05 | 1.4E-02 | 28.5% | 1.2E-05 | 1.7E-07 | 1.3% | 9.5E-05 | 2.0E-02 | 28.5% | 1.0E-05 | 1.4E-07 | 1.3% | 1.2E-04 | 2.5E-02 | 28.5% |
| Benzo(a)anthracene | 0.001 | 0.81 | NA | NA | 2.0E-06 | -- | -- | 6.7E-06 | -- | -- | 1.2E-06 | -- | -- | 9.4E-06 | -- | -- | 1.0E-06 | -- | -- | 1.2E-05 | -- | -- |
| Chrysene | 0.001 | 0.81 | NA | NA | 2.0E-06 | -- | -- | 6.7E-06 | -- | -- | 1.2E-06 | -- | -- | 9.4E-06 | -- | -- | 1.0E-06 | -- | -- | 1.2E-05 | -- | -- |
| Aldrin | 0.00008 | 0.0016 | 34 | 1.5E-05 | 3.2E-10 | 1.1E-08 | 0.1% | 1.1E-09 | 7.1E-05 | 0.1% | 1.9E-10 | 6.5E-09 | 0.1% | 1.5E-09 | 9.9E-05 | 0.1% | 1.6E-10 | 5.5E-09 | 0.1% | 1.9E-09 | 1.3E-04 | 0.1% |
| RDX | 0.04939 | 0.0015 | 0.11 | 0.003 | 1.8E-07 | 2.0E-08 | 0.1% | 6.1E-07 | 2.0E-04 | 0.4% | 1.1E-07 | 1.2E-08 | 0.1% | 8.6E-07 | 2.9E-04 | 0.4% | 9.3E-08 | 1.0E-08 | 0.1% | 1.1E-06 | 3.6E-04 | 0.4% |
| Arsenic | 0.00221 | 0.003 | 1.578947 | 0.00029 | 1.7E-08 | 2.6E-08 | 0.1% | 5.5E-08 | 1.9E-04 | 0.4% | 9.9E-09 | 1.6E-08 | 0.1% | 7.7E-08 | 2.7E-04 | 0.4% | 8.3E-09 | 1.3E-08 | 0.1% | 9.7E-08 | 3.4E-04 | 0.4% |
| Barium | 0.21221 | 0.003 | NA | 0.07 | 1.6E-06 | -- | -- | 5.3E-06 | 7.5E-05 | 0.2% | 9.5E-07 | -- | -- | 7.4E-06 | 1.1E-04 | 0.2% | 8.0E-07 | -- | -- | 9.3E-06 | 1.3E-04 | 0.2% |
| Iron | 7.30702 | 0.003 | NA | 0.06 | 5.5E-05 | -- | -- | 1.8E-04 | 3.0E-03 | 6.1% | 3.3E-05 | -- | -- | 2.5E-04 | 4.2E-03 | 6.1% | 2.8E-05 | -- | -- | 3.2E-04 | 5.4E-03 | 6.1% |
| Manganese | 0.4231 | 0.003 | NA | 0.001 | 3.2E-06 | -- | -- | 1.1E-05 | 1.1E-02 | 21.2% | 1.9E-06 | -- | -- | 1.5E-05 | 1.5E-02 | 21.2% | 1.6E-06 | -- | -- | 1.9E-05 | 1.9E-02 | 21.2% |
| | | | | | Total ILCR: | 2.1E-05 | 100.0% | HI: | 5.0E-02 | 100.0% | Total ILCR: | 1.3E-05 | 100.0% | HI: | 7.0E-02 | 100.0% | otal ILC | 1.1E-05 | 100.0% | HI: | 8.8E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Acetone | 0.05206 | 0.0015 | NA | 0.08 | 1.8E-07 | -- | -- | 6.1E-07 | 7.6E-06 | 0.0% | 9.5E-08 | -- | -- | 7.4E-07 | 9.2E-06 | 0.0% | 8.5E-08 | -- | -- | 1.0E-06 | 1.2E-05 | 0.0% |
| 1,1-Dichloroethene | 0.85713 | 0.016 | 0.6 | 0.009 | 3.2E-05 | 1.9E-05 | 98.2% | 1.1E-04 | 1.2E-02 | 25.4% | 1.7E-05 | 1.0E-05 | 98.2% | 1.3E-04 | 1.4E-02 | 25.4% | 1.5E-05 | 9.0E-06 | 98.2% | 1.7E-04 | 1.9E-02 | 25.4% |
| 1,2-Dichloroethene (total) | 0.16155 | 0.01 | NA | 0.0072 | 3.8E-06 | -- | -- | 1.3E-05 | 1.8E-03 | 3.7% | 2.0E-06 | -- | -- | 1.5E-05 | 2.1E-03 | 3.7% | 1.8E-06 | -- | -- | 2.1E-05 | 2.9E-03 | 3.7% |
| Chloroform | 0.019 | 0.0089 | 0.0061 | 0.01 | 4.0E-07 | 2.4E-09 | 0.0% | 1.3E-06 | 1.3E-04 | 0.3% | 2.1E-07 | 1.3E-09 | 0.0% | 1.6E-06 | 1.6E-04 | 0.3% | 1.8E-07 | 1.1E-09 | 0.0% | 2.2E-06 | 2.2E-04 | 0.3% |
| 1,2-Dichloroethane | 0.028 | 0.0053 | 0.11375 | 0.024 | 3.5E-07 | 4.0E-08 | 0.2% | 1.2E-06 | 4.8E-05 | 0.1% | 1.8E-07 | 2.0E-08 | 0.2% | 1.4E-06 | 5.8E-05 | 0.1% | 1.6E-07 | 1.8E-08 | 0.2% | 1.9E-06 | 7.9E-05 | 0.1% |
| 1,1,1-Trichloroethane | 0.76594 | 0.017 | NA | 0.016 | 3.1E-05 | -- | -- | 1.0E-04 | 6.4E-03 | 13.6% | 1.6E-05 | -- | -- | 1.2E-04 | 7.7E-03 | 13.6% | 1.4E-05 | -- | -- | 1.7E-04 | 1.0E-02 | 13.6% |
| Trichloroethene | 0.5119 | 0.016 | 0.01375 | 0.0048 | 1.9E-05 | 2.6E-07 | 1.3% | 6.4E-05 | 1.3E-02 | 28.5% | 9.9E-06 | 1.4E-07 | 1.3% | 7.7E-05 | 1.6E-02 | 28.5% | 9.0E-06 | 1.2E-07 | 1.3% | 1.0E-04 | 2.2E-02 | 28.5% |
| Benzo(a)anthracene | 0.001 | 0.81 | NA | NA | 1.9E-06 | -- | -- | 6.3E-06 | -- | -- | 9.8E-07 | -- | -- | 7.6E-06 | -- | -- | 8.9E-07 | -- | -- | 1.0E-05 | -- | -- |
| Chrysene | 0.001 | 0.81 | NA | NA | 1.9E-06 | -- | -- | 6.3E-06 | -- | -- | 9.8E-07 | -- | -- | 7.6E-06 | -- | -- | 8.9E-07 | -- | -- | 1.0E-05 | -- | -- |
| Aldrin | 0.00008 | 0.0016 | 34 | 0.000015 | 3.0E-10 | 1.0E-08 | 0.1% | 1.0E-09 | 6.7E-05 | 0.1% | 1.6E-10 | 5.3E-09 | 0.1% | 1.2E-09 | 8.1E-05 | 0.1% | 1.4E-10 | 4.8E-09 | 0.1% | 1.6E-09 | 1.1E-04 | 0.1% |
| RDX | 0.04939 | 0.0015 | 0.11 | 0.003 | 1.7E-07 | 1.9E-08 | 0.1% | 5.8E-07 | 1.9E-04 | 0.4% | 9.0E-08 | 9.9E-09 | 0.1% | 7.0E-07 | 2.3E-04 | 0.4% | 8.1E-08 | 8.9E-09 | 0.1% | 9.4E-07 | 3.1E-04 | 0.4% |
| Arsenic | 0.00221 | 0.003 | 1.5789474 | 0.000285 | 1.6E-08 | 2.5E-08 | 0.1% | 5.2E-08 | 1.8E-04 | 0.4% | 8.0E-09 | 1.3E-08 | 0.1% | 6.3E-08 | 2.2E-04 | 0.4% | 7.2E-09 | 1.1E-08 | 0.1% | 8.5E-08 | 3.0E-04 | 0.4% |
| Barium | 0.21221 | 0.003 | NA | 0.07 | 1.5E-06 | -- | -- | 5.0E-06 | 7.1E-05 | 0.2% | 7.7E-07 | -- | -- | 6.0E-06 | 8.6E-05 | 0.2% | 7.0E-07 | -- | -- | 8.1E-06 | 1.2E-04 | 0.2% |
| Iron | 7.30702 | 0.003 | NA | 0.06 | 5.1E-05 | -- | -- | 1.7E-04 | 2.9E-03 | 6.1% | 2.7E-05 | -- | -- | 2.1E-04 | 3.4E-03 | 6.1% | 2.4E-05 | -- | -- | 2.8E-04 | 4.7E-03 | 6.1% |
| Manganese | 0.4231 | 0.003 | NA | 0.001 | 3.0E-06 | -- | -- | 9.9E-06 | 9.9E-03 | 21.2% | 1.5E-06 | -- | -- | 1.2E-05 | 1.2E-02 | 21.2% | 1.4E-06 | -- | -- | 1.6E-05 | 1.6E-02 | 21.2% |
| | | | | | Total ILCR: | 2.0E-05 | 100.0% | HI: | 4.7E-02 | 100.0% | Total ILCR: | 1.0E-05 | 100.0% | HI: | 5.7E-02 | 100.0% | otal ILCR | 9.2E-06 | 100.0% | HI: | 7.6E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 22 WELL 22GW04
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Acetone | 0.11 | NA | 0.1 | 2.6E-06 | -- | -- | 8.6E-06 | 8.6E-05 | 0.2% | 2.1E-06 | -- | -- | 1.6E-05 | 1.6E-04 | 0.2% | 3.4E-06 | -- | -- | 4.0E-05 | 4.0E-04 | 0.2% |
| 1,1-Dichloroethene | 1.7 | 0.6 | 0.009 | 4.0E-05 | 2.4E-05 | 97.6% | 1.3E-04 | 1.5E-02 | 34.0% | 3.2E-05 | 1.9E-05 | 97.6% | 2.5E-04 | 2.8E-02 | 34.0% | 5.3E-05 | 3.2E-05 | 97.6% | 6.2E-04 | 6.9E-02 | 34.0% |
| 1,2-Dichloroethene (total | 0.37 | NA | 0.009 | 8.7E-06 | -- | -- | 2.9E-05 | 3.2E-03 | 7.4% | 7.0E-06 | -- | -- | 5.5E-05 | 6.1E-03 | 7.4% | 1.2E-05 | -- | -- | 1.4E-04 | 1.5E-02 | 7.4% |
| 1,1,1-Trichloroethane | 1.7 | NA | 0.02 | 4.0E-05 | -- | -- | 1.3E-04 | 6.7E-03 | 15.3% | 3.2E-05 | -- | -- | 2.5E-04 | 1.3E-02 | 15.3% | 5.3E-05 | -- | -- | 6.2E-04 | 3.1E-02 | 15.3% |
| Trichloroethene | 1.2 | 0.011 | 0.006 | 2.8E-05 | 3.1E-07 | 1.3% | 9.4E-05 | 1.6E-02 | 36.0% | 2.3E-05 | 2.5E-07 | 1.3% | 1.8E-04 | 3.0E-02 | 36.0% | 3.8E-05 | 4.1E-07 | 1.3% | 4.4E-04 | 7.3E-02 | 36.0% |
| RDX | 0.11 | 0.11 | 0.003 | 2.6E-06 | 2.8E-07 | 1.2% | 8.6E-06 | 2.9E-03 | 6.6% | 2.1E-06 | 2.3E-07 | 1.2% | 1.6E-05 | 5.4E-03 | 6.6% | 3.4E-06 | 3.8E-07 | 1.2% | 4.0E-05 | 1.3E-02 | 6.6% |
| Barium | 0.113 | NA | 0.07 | 2.7E-06 | -- | -- | 8.8E-06 | 1.3E-04 | 0.3% | 2.2E-06 | -- | -- | 1.7E-05 | 2.4E-04 | 0.3% | 3.5E-06 | -- | -- | 4.1E-05 | 5.9E-04 | 0.3% |
| Manganese | 0.0164 | NA | 0.02 | 3.9E-07 | -- | -- | 1.3E-06 | 6.4E-05 | 0.1% | 3.1E-07 | -- | -- | 2.4E-06 | 1.2E-04 | 0.1% | 5.1E-07 | -- | -- | 6.0E-06 | 3.0E-04 | 0.1% |
| | | | | Total ILCR: | 2.5E-05 | 100.0% | HI: | 4.3E-02 | 100.0% | Total ILCR: | 2.0E-05 | 100.0% | HI: | 8.2E-02 | 100.0% | otal ILC | 3.3E-05 | 100.0% | HI: | 2.0E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 22 WELL 22GW04
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/d) | 0.05 | 0.05 | 0.05 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 21 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Acetone | 0.11 | NA | 0.1 | 2.6E-06 | -- | -- | 8.6E-06 | 8.6E-05 | 0.2% | 2.1E-06 | -- | -- | 1.6E-05 | 1.6E-04 | 0.2% | 3.4E-06 | -- | -- | 4.0E-05 | 4.0E-04 | 0.2% |
| 1,1-Dichloroethene | 1.7 | 0.6 | 0.009 | 4.0E-05 | 2.4E-05 | 97.6% | 1.3E-04 | 1.5E-02 | 34.0% | 3.2E-05 | 1.9E-05 | 97.6% | 2.5E-04 | 2.8E-02 | 34.0% | 5.3E-05 | 3.2E-05 | 97.6% | 6.2E-04 | 6.9E-02 | 34.0% |
| 1,2-Dichloroethene (total) | 0.37 | NA | 0.009 | 8.7E-06 | -- | -- | 2.9E-05 | 3.2E-03 | 7.4% | 7.0E-06 | -- | -- | 5.5E-05 | 6.1E-03 | 7.4% | 1.2E-05 | -- | -- | 1.4E-04 | 1.5E-02 | 7.4% |
| 1,1,1-Trichloroethane | 1.7 | NA | 0.02 | 4.0E-05 | -- | -- | 1.3E-04 | 6.7E-03 | 15.3% | 3.2E-05 | -- | -- | 2.5E-04 | 1.3E-02 | 15.3% | 5.3E-05 | -- | -- | 6.2E-04 | 3.1E-02 | 15.3% |
| Trichloroethene | 1.2 | 0.011 | 0.006 | 2.8E-05 | 3.1E-07 | 1.3% | 9.4E-05 | 1.6E-02 | 36.0% | 2.3E-05 | 2.5E-07 | 1.3% | 1.8E-04 | 3.0E-02 | 36.0% | 3.8E-05 | 4.1E-07 | 1.3% | 4.4E-04 | 7.3E-02 | 36.0% |
| RDX | 0.11 | 0.11 | 0.003 | 2.6E-06 | 2.8E-07 | 1.2% | 8.6E-06 | 2.9E-03 | 6.6% | 2.1E-06 | 2.3E-07 | 1.2% | 1.6E-05 | 5.4E-03 | 6.6% | 3.4E-06 | 3.8E-07 | 1.2% | 4.0E-05 | 1.3E-02 | 6.6% |
| Barium | 0.113 | NA | 0.07 | 2.7E-06 | -- | -- | 8.8E-06 | 1.3E-04 | 0.3% | 2.2E-06 | -- | -- | 1.7E-05 | 2.4E-04 | 0.3% | 3.5E-06 | -- | -- | 4.1E-05 | 5.9E-04 | 0.3% |
| Manganese | 0.0164 | NA | 0.02 | 3.9E-07 | -- | -- | 1.3E-06 | 6.4E-05 | 0.1% | 3.1E-07 | -- | -- | 2.4E-06 | 1.2E-04 | 0.1% | 5.1E-07 | -- | -- | 6.0E-06 | 3.0E-04 | 0.1% |
| | | | | Total ILCR: | 2.5E-05 | 100.0% | HI: | 4.3E-02 | 100.0% | Total ILCR: | 2.0E-05 | 100.0% | HI: | 8.2E-02 | 100.0% | otal ILCR | 3.3E-05 | 100.0% | HI: | 2.0E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2 | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d | RfDd (mg/kg/d | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Acetone | 0.05206 | 0.0015 | NA | 0.08 | 1.9E-07 | -- | -- | 6.5E-07 | 8.1E-06 | 0.0% | 1.2E-07 | -- | -- | 9.1E-07 | 1.1E-05 | 0.0% | 9.8E-08 | -- | -- | 1.1E-06 | 1.4E-05 | 0.0% |
| 1,1-Dichloroethene | 0.85713 | 0.016 | 0.6 | 0.009 | 3.4E-05 | 2.0E-05 | 98.2% | 1.1E-04 | 1.3E-02 | 25.4% | 2.0E-05 | 1.2E-05 | 98.2% | 1.6E-04 | 1.8E-02 | 25.4% | 1.7E-05 | 1.0E-05 | 98.2% | 2.0E-04 | 2.2E-02 | 25.4% |
| 1,2-Dichloroethene (total | 0.16155 | 0.01 | NA | 0.0072 | 4.0E-06 | -- | -- | 1.3E-05 | 1.9E-03 | 3.7% | 2.4E-06 | -- | -- | 1.9E-05 | 2.6E-03 | 3.7% | 2.0E-06 | -- | -- | 2.4E-05 | 3.3E-03 | 3.7% |
| Chloroform | 0.019 | 0.0089 | 0.0061 | 0.01 | 4.2E-07 | 2.6E-09 | 0.0% | 1.4E-06 | 1.4E-04 | 0.3% | 2.5E-07 | 1.5E-09 | 0.0% | 2.0E-06 | 2.0E-04 | 0.3% | 2.1E-07 | 1.3E-09 | 0.0% | 2.5E-06 | 2.5E-04 | 0.3% |
| 1,2-Dichloroethane | 0.028 | 0.0053 | 0.11375 | 0.024 | 3.7E-07 | 4.2E-08 | 0.2% | 1.2E-06 | 5.1E-05 | 0.1% | 2.2E-07 | 2.5E-08 | 0.2% | 1.7E-06 | 7.2E-05 | 0.1% | 1.9E-07 | 2.1E-08 | 0.2% | 2.2E-06 | 9.1E-05 | 0.1% |
| 1,1,1-Trichloroethane | 0.76594 | 0.017 | NA | 0.016 | 3.2E-05 | -- | -- | 1.1E-04 | 6.8E-03 | 13.6% | 1.9E-05 | -- | -- | 1.5E-04 | 9.5E-03 | 13.6% | 1.6E-05 | -- | -- | 1.9E-04 | 1.2E-02 | 13.6% |
| Trichloroethene | 0.5119 | 0.016 | 0.01375 | 0.0048 | 2.0E-05 | 2.8E-07 | 1.3% | 6.8E-05 | 1.4E-02 | 28.5% | 1.2E-05 | 1.7E-07 | 1.3% | 9.5E-05 | 2.0E-02 | 28.5% | 1.0E-05 | 1.4E-07 | 1.3% | 1.2E-04 | 2.5E-02 | 28.5% |
| Benzo(a)anthracene | 0.001 | 0.81 | NA | NA | 2.0E-06 | -- | -- | 6.7E-06 | -- | -- | 1.2E-06 | -- | -- | 9.4E-06 | -- | -- | 1.0E-06 | -- | -- | 1.2E-05 | -- | -- |
| Chrysene | 0.001 | 0.81 | NA | NA | 2.0E-06 | -- | -- | 6.7E-06 | -- | -- | 1.2E-06 | -- | -- | 9.4E-06 | -- | -- | 1.0E-06 | -- | -- | 1.2E-05 | -- | -- |
| Aldrin | 0.00008 | 0.0016 | 34 | 1.5E-05 | 3.2E-10 | 1.1E-08 | 0.1% | 1.1E-09 | 7.1E-05 | 0.1% | 1.9E-10 | 6.5E-09 | 0.1% | 1.5E-09 | 9.9E-05 | 0.1% | 1.6E-10 | 5.5E-09 | 0.1% | 1.9E-09 | 1.3E-04 | 0.1% |
| RDX | 0.04939 | 0.0015 | 0.11 | 0.003 | 1.8E-07 | 2.0E-08 | 0.1% | 6.1E-07 | 2.0E-04 | 0.4% | 1.1E-07 | 1.2E-08 | 0.1% | 8.6E-07 | 2.9E-04 | 0.4% | 9.3E-08 | 1.0E-08 | 0.1% | 1.1E-06 | 3.6E-04 | 0.4% |
| Arsenic | 0.00221 | 0.003 | 1.578947 | 0.00029 | 1.7E-08 | 2.6E-08 | 0.1% | 5.5E-08 | 1.9E-04 | 0.4% | 9.9E-09 | 1.6E-08 | 0.1% | 7.7E-08 | 2.7E-04 | 0.4% | 8.3E-09 | 1.3E-08 | 0.1% | 9.7E-08 | 3.4E-04 | 0.4% |
| Barium | 0.21221 | 0.003 | NA | 0.07 | 1.6E-06 | -- | -- | 5.3E-06 | 7.5E-05 | 0.2% | 9.5E-07 | -- | -- | 7.4E-06 | 1.1E-04 | 0.2% | 8.0E-07 | -- | -- | 9.3E-06 | 1.3E-04 | 0.2% |
| Iron | 7.30702 | 0.003 | NA | 0.06 | 5.5E-05 | -- | -- | 1.8E-04 | 3.0E-03 | 6.1% | 3.3E-05 | -- | -- | 2.5E-04 | 4.2E-03 | 6.1% | 2.8E-05 | -- | -- | 3.2E-04 | 5.4E-03 | 6.1% |
| Manganese | 0.4231 | 0.003 | NA | 0.001 | 3.2E-06 | -- | -- | 1.1E-05 | 1.1E-02 | 21.2% | 1.9E-06 | -- | -- | 1.5E-05 | 1.5E-02 | 21.2% | 1.6E-06 | -- | -- | 1.9E-05 | 1.9E-02 | 21.2% |
| | | | | | Total ILCR: | 2.1E-05 | 100.0% | HI: | 5.0E-02 | 100.0% | Total ILCR: | 1.3E-05 | 100.0% | HI: | 7.0E-02 | 100.0% | otal ILC | 1.1E-05 | 100.0% | HI: | 8.8E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT AND OLDER CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH GROUNDWATER IN BENEFICIAL USE SCENARIO - SITE 22 WELL 22GW04
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,000 | 3,188 | 1,745 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 21 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 1 | 1 | 1 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 7665 | 3,285 | 2,190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Acetone | 0.11 | 0.0015 | NA | 0.08 | 3.9E-07 | -- | -- | 1.3E-06 | 1.6E-05 | 0.0% | 2.0E-07 | -- | -- | 1.6E-06 | 1.9E-05 | 0.0% | 1.8E-07 | -- | -- | 2.1E-06 | 2.6E-05 | 0.0% |
| 1,1-Dichloroethene | 1.7 | 0.016 | 0.6 | 0.009 | 6.4E-05 | 3.8E-05 | 98.3% | 2.1E-04 | 2.4E-02 | 32.0% | 3.3E-05 | 2.0E-05 | 98.3% | 2.6E-04 | 2.9E-02 | 32.0% | 3.0E-05 | 1.8E-05 | 98.3% | 3.5E-04 | 3.9E-02 | 32.0% |
| 1,2-Dichloroethene (total | 0.37 | 0.01 | NA | 0.0072 | 8.7E-06 | -- | -- | 2.9E-05 | 4.0E-03 | 5.4% | 4.5E-06 | -- | -- | 3.5E-05 | 4.9E-03 | 5.4% | 4.0E-06 | -- | -- | 4.7E-05 | 6.6E-03 | 5.4% |
| 1,1,1-Trichloroethane | 1.7 | 0.017 | NA | 0.016 | 6.8E-05 | -- | -- | 2.3E-04 | 1.4E-02 | 19.1% | 3.5E-05 | -- | -- | 2.7E-04 | 1.7E-02 | 19.1% | 3.2E-05 | -- | -- | 3.7E-04 | 2.3E-02 | 19.1% |
| Trichloroethene | 1.2 | 0.016 | 0.01375 | 0.0048 | 4.5E-05 | 6.2E-07 | 1.6% | 1.5E-04 | 3.1E-02 | 42.3% | 2.3E-05 | 3.2E-07 | 1.6% | 1.8E-04 | 3.8E-02 | 42.3% | 2.1E-05 | 2.9E-07 | 1.6% | 2.4E-04 | 5.1E-02 | 42.3% |
| RDX | 0.11 | 0.0015 | 0.11 | 0.003 | 3.9E-07 | 4.3E-08 | 0.1% | 1.3E-06 | 4.3E-04 | 0.6% | 2.0E-07 | 2.2E-08 | 0.1% | 1.6E-06 | 5.2E-04 | 0.6% | 1.8E-07 | 2.0E-08 | 0.1% | 2.1E-06 | 7.0E-04 | 0.6% |
| Barium | 0.113 | 0.003 | NA | 0.07 | 8.0E-07 | -- | -- | 2.7E-06 | 3.8E-05 | 0.1% | 4.1E-07 | -- | -- | 3.2E-06 | 4.6E-05 | 0.1% | 3.7E-07 | -- | -- | 4.3E-06 | 6.2E-05 | 0.1% |
| Manganese | 0.0164 | 0.003 | NA | 0.001 | 1.2E-07 | -- | -- | 3.9E-07 | 3.9E-04 | 0.5% | 6.0E-08 | -- | -- | 4.6E-07 | 4.6E-04 | 0.5% | 5.4E-08 | -- | -- | 6.3E-07 | 6.3E-04 | 0.5% |
| | | | | | Total ILCR: | 3.9E-05 | 100.0% | HI: | 7.4E-02 | 100.0% | Total ILCR: | 2.0E-05 | 100.0% | HI: | 8.9E-02 | 100.0% | otal ILCR | 1.8E-05 | 100.0% | HI: | 1.2E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE WATER - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*ET*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/hour) | 0.05 | 0.05 | 0.05 | |
| ET | Exposure Time (hours/day) | 2.6 | 2.6 | 2.6 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalate | 0.0395 | 0.014 | 0.02 | 1.7E-06 | 2.4E-08 | 8.4% | 8.0E-06 | 4.0E-04 | 2.1% | 2.0E-06 | 2.7E-08 | 8.4% | 1.5E-05 | 7.6E-04 | 2.1% | 3.2E-06 | 4.5E-08 | 8.4% | 3.8E-05 | 1.9E-03 | 2.1% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | NA | 0.002 | 4.6E-08 | -- | -- | 2.2E-07 | 1.1E-04 | 0.6% | 5.2E-08 | -- | -- | 4.1E-07 | 2.0E-04 | 0.6% | 8.6E-08 | -- | -- | 1.0E-06 | 5.0E-04 | 0.6% |
| Amino-Dinitrotoluene | 0.00226 | NA | 0.00006 | 9.9E-08 | -- | -- | 4.6E-07 | 7.7E-03 | 40.8% | 1.1E-07 | -- | -- | 8.7E-07 | 1.5E-02 | 40.8% | 1.8E-07 | -- | -- | 2.1E-06 | 3.6E-02 | 40.8% |
| RDX | 0.02466 | 0.11 | 0.003 | 1.1E-06 | 1.2E-07 | 41.2% | 5.0E-06 | 1.7E-03 | 8.9% | 1.2E-06 | 1.3E-07 | 41.2% | 9.5E-06 | 3.2E-03 | 8.9% | 2.0E-06 | 2.2E-07 | 41.2% | 2.3E-05 | 7.8E-03 | 8.9% |
| Antimony | 0.01464 | NA | 0.0004 | 6.4E-07 | -- | -- | 3.0E-06 | 7.4E-03 | 39.6% | 7.2E-07 | -- | -- | 5.6E-06 | 1.4E-02 | 39.6% | 1.2E-06 | -- | -- | 1.4E-05 | 3.5E-02 | 39.6% |
| Arsenic | 0.00221 | 1.5 | 0.0003 | 9.6E-08 | 1.4E-07 | 50.4% | 4.5E-07 | 1.5E-03 | 8.0% | 1.1E-07 | 1.6E-07 | 50.4% | 8.5E-07 | 2.8E-03 | 8.0% | 1.8E-07 | 2.7E-07 | 50.4% | 2.1E-06 | 7.0E-03 | 8.0% |
| | | | | Total ILCR | 2.9E-07 | 100.0% | HI: | 1.9E-02 | 100.0% | Total ILCR: | 3.3E-07 | 100.0% | HI: | 3.6E-02 | 100.0% | otal ILCR | 5.4E-07 | 100.0% | HI: | 8.8E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SURFACE WATER - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cw*IR*ET*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| IR | Ingestion Rate (L/hour) | 0.05 | 0.05 | 0.05 | |
| ET | Exposure Time (hours/day) | 2.6 | 2.6 | 2.6 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalate | 0.0395 | 0.014 | 0.02 | 1.7E-06 | 2.4E-08 | 8.4% | 8.0E-06 | 4.0E-04 | 2.1% | 2.0E-06 | 2.7E-08 | 8.4% | 1.5E-05 | 7.6E-04 | 2.1% | 3.2E-06 | 4.5E-08 | 8.4% | 3.8E-05 | 1.9E-03 | 2.1% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | NA | 0.002 | 4.6E-08 | -- | -- | 2.2E-07 | 1.1E-04 | 0.6% | 5.2E-08 | -- | -- | 4.1E-07 | 2.0E-04 | 0.6% | 8.6E-08 | -- | -- | 1.0E-06 | 5.0E-04 | 0.6% |
| Amino-Dinitrotoluene | 0.00226 | NA | 0.00006 | 9.9E-08 | -- | -- | 4.6E-07 | 7.7E-03 | 40.8% | 1.1E-07 | -- | -- | 8.7E-07 | 1.5E-02 | 40.8% | 1.8E-07 | -- | -- | 2.1E-06 | 3.6E-02 | 40.8% |
| RDX | 0.02466 | 0.11 | 0.003 | 1.1E-06 | 1.2E-07 | 41.2% | 5.0E-06 | 1.7E-03 | 8.9% | 1.2E-06 | 1.3E-07 | 41.2% | 9.5E-06 | 3.2E-03 | 8.9% | 2.0E-06 | 2.2E-07 | 41.2% | 2.3E-05 | 7.8E-03 | 8.9% |
| Antimony | 0.01464 | NA | 0.0004 | 6.4E-07 | -- | -- | 3.0E-06 | 7.4E-03 | 39.6% | 7.2E-07 | -- | -- | 5.6E-06 | 1.4E-02 | 39.6% | 1.2E-06 | -- | -- | 1.4E-05 | 3.5E-02 | 39.6% |
| Arsenic | 0.00221 | 1.5 | 0.0003 | 9.6E-08 | 1.4E-07 | 50.4% | 4.5E-07 | 1.5E-03 | 8.0% | 1.1E-07 | 1.6E-07 | 50.4% | 8.5E-07 | 2.8E-03 | 8.0% | 1.8E-07 | 2.7E-07 | 50.4% | 2.1E-06 | 7.0E-03 | 8.0% |
| | | | | Total ILCR | 2.9E-07 | 100.0% | HI: | 1.9E-02 | 100.0% | Total ILCR: | 3.3E-07 | 100.0% | HI: | 3.6E-02 | 100.0% | otal ILCR | 5.4E-07 | 100.0% | HI: | 8.8E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE WATER - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 15 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 2.6 | 2.6 | 2.6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalat | 0.0395 | 0.033 | 0.025455 | 0.011 | 6.0E-06 | 1.5E-07 | 69.5% | 2.8E-05 | 2.6E-03 | 7.9% | 5.1E-06 | 1.3E-07 | 69.5% | 3.9E-05 | 3.6E-03 | 7.9% | 4.3E-06 | 1.1E-07 | 69.5% | 5.0E-05 | 4.5E-03 | 7.9% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | 0.0037 | NA | 0.0002 | 1.8E-08 | -- | -- | 8.5E-08 | 4.2E-04 | 1.3% | 1.5E-08 | -- | -- | 1.2E-07 | 5.9E-04 | 1.3% | 1.3E-08 | -- | -- | 1.5E-07 | 7.5E-04 | 1.3% |
| Amino-Dinitrotoluene | 0.00226 | 0.0037 | NA | 0.000036 | 3.9E-08 | -- | -- | 1.8E-07 | 5.0E-03 | 15.4% | 3.2E-08 | -- | -- | 2.5E-07 | 7.0E-03 | 15.4% | 2.7E-08 | -- | -- | 3.2E-07 | 8.9E-03 | 15.4% |
| RDX | 0.02466 | 0.0015 | 0.11 | 0.003 | 1.7E-07 | 1.9E-08 | 8.5% | 8.0E-07 | 2.7E-04 | 0.8% | 1.4E-07 | 1.6E-08 | 8.5% | 1.1E-06 | 3.7E-04 | 0.8% | 1.2E-07 | 1.3E-08 | 8.5% | 1.4E-06 | 4.7E-04 | 0.8% |
| Antimony | 0.01464 | 0.003 | NA | 0.00004 | 2.0E-07 | -- | -- | 9.5E-07 | 2.4E-02 | 73.0% | 1.7E-07 | -- | -- | 1.3E-06 | 3.3E-02 | 73.0% | 1.4E-07 | -- | -- | 1.7E-06 | 4.2E-02 | 73.0% |
| Arsenic | 0.00221 | 0.003 | 1.578947 | 0.000285 | 3.1E-08 | 4.8E-08 | 21.9% | 1.4E-07 | 5.0E-04 | 1.5% | 2.6E-08 | 4.1E-08 | 21.9% | 2.0E-07 | 7.0E-04 | 1.5% | 2.2E-08 | 3.4E-08 | 21.9% | 2.5E-07 | 8.9E-04 | 1.5% |
| | | | | | Total ILCR: | 2.2E-07 | 100.0% | HI: | 3.2E-02 | 100.0% | Total ILCR: | 1.9E-07 | 100.0% | HI: | 4.5E-02 | 100.0% | otal ILC | 1.6E-07 | 100.0% | HI: | 5.7E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SURFACE WATER - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cw*CF*Kp*SA*EF*ED*ET)/(BW*AT)

ILCR = CDI*CSFo Adj  CSF Adj = CSF/AD
HQ = CDI/RfDo Adj  RfD Adj = RfD*AD

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure duration (yrs) | 15 | 9 | 6 | |
| ET | Exposure time (hrs/day) | 2.6 | 2.6 | 2.6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |
| Cw | Concentration of chemical in water (mg/L) | CS | CS | CS | |
| CF | Conversion factor (L/cm3) | 1.00E-03 | 1.00E-03 | 1.00E-03 | |
| Kp | Dermal permeability coefficient (cm/hour) | CS | CS | CS | |
| AD | Adjustment for Absorbed Dose | CS | CS | CS | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cw (mg/L) | Kp (cm/hour) | CSFd 1/(mg/kg/d | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib otal ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Bis(2-ethylhexyl)phthalat | 0.0395 | 0.033 | 0.025455 | 0.011 | 6.0E-06 | 1.5E-07 | 69.5% | 2.8E-05 | 2.6E-03 | 7.9% | 5.1E-06 | 1.3E-07 | 69.5% | 3.9E-05 | 3.6E-03 | 7.9% | 4.3E-06 | 1.1E-07 | 69.5% | 5.0E-05 | 4.5E-03 | 7.9% |
| 2,4-/2,6-Dinitrotoluene | 0.00106 | 0.0037 | NA | 0.0002 | 1.8E-08 | -- | -- | 8.5E-08 | 4.2E-04 | 1.3% | 1.5E-08 | -- | -- | 1.2E-07 | 5.9E-04 | 1.3% | 1.3E-08 | -- | -- | 1.5E-07 | 7.5E-04 | 1.3% |
| Amino-Dinitrotoluene | 0.00226 | 0.0037 | NA | 0.000036 | 3.9E-08 | -- | -- | 1.8E-07 | 5.0E-03 | 15.4% | 3.2E-08 | -- | -- | 2.5E-07 | 7.0E-03 | 15.4% | 2.7E-08 | -- | -- | 3.2E-07 | 8.9E-03 | 15.4% |
| RDX | 0.02466 | 0.0015 | 0.11 | 0.003 | 1.7E-07 | 1.9E-08 | 8.5% | 8.0E-07 | 2.7E-04 | 0.8% | 1.4E-07 | 1.6E-08 | 8.5% | 1.1E-06 | 3.7E-04 | 0.8% | 1.2E-07 | 1.3E-08 | 8.5% | 1.4E-06 | 4.7E-04 | 0.8% |
| Antimony | 0.01464 | 0.003 | NA | 0.00004 | 2.0E-07 | -- | -- | 9.5E-07 | 2.4E-02 | 73.0% | 1.7E-07 | -- | -- | 1.3E 06 | 3.3E-02 | 73.0% | 1.4E-07 | -- | -- | 1.7E-06 | 4.2E-02 | 73.0% |
| Arsenic | 0.00221 | 0.003 | 1.578947 | 0.000285 | 3.1E-08 | 4.8E-08 | 21.9% | 1.4E-07 | 5.0E-04 | 1.5% | 2.6E-08 | 4.1E-08 | 21.9% | 2.0E-07 | 7.0E-04 | 1.5% | 2.2E-08 | 3.4E-08 | 21.9% | 2.5E-07 | 8.9E-04 | 1.5% |
| | | | | | Total ILCR: | 2.2E-07 | 100.0% | HI: | 3.2E-02 | 100.0% | Total ILCR: | 1.9E-07 | 100.0% | HI: | 4.5E-02 | 100.0% | otal ILC | 1.6E-07 | 100.0% | HI: | 5.7E-02 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SEDIMENT - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | 200 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | NA | 1 | 6.9E-04 | -- | -- | 3.2E-03 | 3.2E-03 | 8.4% | 7.8E-04 | -- | -- | 6.1E-03 | 6.1E-03 | 8.4% | 2.6E-03 | -- | -- | 3.0E-02 | 3.0E-02 | 8.4% |
| Antimony | 14.27 | NA | 0.0004 | 4.8E-07 | -- | -- | 2.2E-06 | 5.6E-03 | 14.7% | 5.4E-07 | -- | -- | 4.2E-06 | 1.1E-02 | 14.7% | 1.8E-06 | -- | -- | 2.1E-05 | 5.2E-02 | 14.7% |
| Arsenic | 11.68 | 1.5 | 0.0003 | 3.9E-07 | 5.9E-07 | 100.0% | 1.8E-06 | 6.1E-03 | 16.0% | 4.4E-07 | 6.7E-07 | 100.0% | 3.5E-06 | 1.2E-02 | 16.0% | 1.5E-06 | 2.2E-06 | 100.0% | 1.7E-05 | 5.7E-02 | 16.0% |
| Cadmium (soil) | 1.44 | NA | 0.001 | 4.8E-08 | -- | -- | 2.3E-07 | 2.3E-04 | 0.6% | 5.5E-08 | -- | -- | 4.3E-07 | 4.3E-04 | 0.6% | 1.8E-07 | -- | -- | 2.1E-06 | 2.1E-03 | 0.6% |
| Chromium | 34.33 | NA | 0.003 | 1.2E-06 | -- | -- | 5.4E-06 | 1.8E-03 | 4.7% | 1.3E-06 | -- | -- | 1.0E-05 | 3.4E-03 | 4.7% | 4.3E-06 | -- | -- | 5.0E-05 | 1.7E-02 | 4.7% |
| Iron | 32592.85 | NA | 0.3 | 1.1E-03 | -- | -- | 5.1E-03 | 1.7E-02 | 44.8% | 1.2E-03 | -- | -- | 9.7E-03 | 3.2E-02 | 44.8% | 4.1E-03 | -- | -- | 4.8E-02 | 1.6E-01 | 44.8% |
| Manganese | 250.39 | NA | 0.02 | 8.4E-06 | -- | -- | 3.9E-05 | 2.0E-03 | 5.2% | 9.5E-06 | -- | -- | 7.4E-05 | 3.7E-03 | 5.2% | 3.1E-05 | -- | -- | 3.7E-04 | 1.8E-02 | 5.2% |
| Thallium | 0.44 | NA | 0.00007 | 1.5E-08 | -- | -- | 6.9E-08 | 9.8E-04 | 2.6% | 1.7E-08 | -- | -- | 1.3E-07 | 1.9E-03 | 2.6% | 5.5E-08 | -- | -- | 6.4E-07 | 9.2E-03 | 2.6% |
| Vanadium | 51.15 | NA | 0.007 | 1.7E-06 | -- | -- | 8.0E-06 | 1.1E-03 | 3.0% | 1.9E-06 | -- | -- | 1.5E-05 | 2.2E-03 | 3.0% | 6.4E-06 | -- | -- | 7.5E-05 | 1.1E-02 | 3.0% |
| | | | | Total ILCR: | 5.9E-07 | 100.0% | HI: | 3.8E-02 | 100.0% | Total ILCR: | 6.7E-07 | 100.0% | HI: | 7.2E-02 | 100.0% | otal ILCR | 2.2E-06 | 100.0% | HI: | 3.5E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SEDIMENT - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| IR | Ingestion Rate (mg/d) | 100 | 100 | 200 | |
| CF | Conversion factor (kg/mg) | 0.000001 | 0.000001 | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | 1 | 1 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25550 | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib HI | CDI (mg/kg/d) | ILCR | % Contrib Total ILC | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | NA | 1 | 6.9E-04 | -- | -- | 3.2E-03 | 3.2E-03 | 8.4% | 7.8E-04 | -- | -- | 6.1E-03 | 6.1E-03 | 8.4% | 2.6E-03 | -- | -- | 3.0E-02 | 3.0E-02 | 8.4% |
| Antimony | 14.27 | NA | 0.0004 | 4.8E-07 | -- | -- | 2.2E-06 | 5.6E-03 | 14.7% | 5.4E-07 | -- | -- | 4.2E-06 | 1.1E-02 | 14.7% | 1.8E-06 | -- | -- | 2.1E-05 | 5.2E-02 | 14.7% |
| Arsenic | 11.68 | 1.5 | 0.0003 | 3.9E-07 | 5.9E-07 | 100.0% | 1.8E-06 | 6.1E-03 | 16.0% | 4.4E-07 | 6.7E-07 | 100.0% | 3.5E-06 | 1.2E-02 | 16.0% | 1.5E-06 | 2.2E-06 | 100.0% | 1.7E-05 | 5.7E-02 | 16.0% |
| Cadmium (soil) | 1.44 | NA | 0.001 | 4.8E-08 | -- | -- | 2.3E-07 | 2.3E-04 | 0.6% | 5.5E-08 | -- | -- | 4.3E-07 | 4.3E-04 | 0.6% | 1.8E-07 | -- | -- | 2.1E-06 | 2.1E-03 | 0.6% |
| Chromium | 34.33 | NA | 0.003 | 1.2E-06 | -- | -- | 5.4E-06 | 1.8E-03 | 4.7% | 1.3E-06 | -- | -- | 1.0E-05 | 3.4E-03 | 4.7% | 4.3E-06 | -- | -- | 5.0E-05 | 1.7E-02 | 4.7% |
| Iron | 32592.85 | NA | 0.3 | 1.1E-03 | -- | -- | 5.1E-03 | 1.7E-02 | 44.8% | 1.2E-03 | -- | -- | 9.7E-03 | 3.2E-02 | 44.8% | 4.1E-03 | -- | -- | 4.8E-02 | 1.6E-01 | 44.8% |
| Manganese | 250.39 | NA | 0.02 | 8.4E-06 | -- | -- | 3.9E-05 | 2.0E-03 | 5.2% | 9.5E-06 | -- | -- | 7.4E-05 | 3.7E-03 | 5.2% | 3.1E-05 | -- | -- | 3.7E-04 | 1.8E-02 | 5.2% |
| Thallium | 0.44 | NA | 0.00007 | 1.5E-08 | -- | -- | 6.9E-08 | 9.8E-04 | 2.6% | 1.7E-08 | -- | -- | 1.3E-07 | 1.9E-03 | 2.6% | 5.5E-08 | -- | -- | 6.4E-07 | 9.2E-03 | 2.6% |
| Vanadium | 51.15 | NA | 0.007 | 1.7E-06 | -- | -- | 8.0E-06 | 1.1E-03 | 3.0% | 1.9E-06 | -- | -- | 1.5E-05 | 2.2E-03 | 3.0% | 6.4E-06 | -- | -- | 7.5E-05 | 1.1E-02 | 3.0% |
| | | | | Total ILCR: | 5.9E-07 | 100.0% | HI: | 3.8E-02 | 100.0% | Total ILCR: | 6.7E-07 | 100.0% | HI: | 7.2E-02 | 100.0% | otal ILCR | 2.2E-06 | 100.0% | HI: | 3.5E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SEDIMENT - SITES 4, 21, AND 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | 0.01 | NA | 0.2 | 3.6E-04 | -- | -- | 1.7E-03 | 8.5E-03 | 3.5% | 3.1E-04 | -- | -- | 2.4E-03 | 1.2E-02 | 3.5% | 2.6E-04 | -- | -- | 3.0E-03 | 1.5E-02 | 3.5% |
| Antimony | 14.27 | 0.01 | NA | 0.00004 | 2.5E-07 | -- | -- | 1.2E-06 | 3.0E-02 | 12.1% | 2.1E-07 | -- | -- | 1.7E-06 | 4.1E-02 | 12.1% | 1.8E-07 | -- | -- | 2.1E-06 | 5.2E-02 | 12.1% |
| Arsenic | 11.68 | 0.032 | 1.578947368 | 0.000285 | 6.6E-07 | 1.0E-06 | 100.0% | 3.1E-06 | 1.1E-02 | 4.4% | 5.6E-07 | 8.8E-07 | 100.0% | 4.3E-06 | 1.5E-02 | 4.4% | 4.7E-07 | 7.4E-07 | 100.0% | 5.5E-06 | 1.9E-02 | 4.4% |
| Cadmium (soil) | 1.44 | 0.01 | NA | 0.00005 | 2.6E-08 | -- | -- | 1.2E-07 | 2.4E-03 | 1.0% | 2.2E-08 | -- | -- | 1.7E-07 | 3.3E-03 | 1.0% | 1.8E-08 | -- | -- | 2.1E-07 | 4.2E-03 | 1.0% |
| Chromium | 34.33 | 0.01 | NA | 0.00003 | 6.1E-07 | -- | -- | 2.8E-06 | 9.5E-02 | 38.7% | 5.1E-07 | -- | -- | 4.0E-06 | 1.3E-01 | 38.7% | 4.3E-07 | -- | -- | 5.0E-06 | 1.7E-01 | 38.7% |
| Iron | 32592.85 | 0.01 | NA | 0.06 | 5.8E-04 | -- | -- | 2.7E-03 | 4.5E-02 | 18.4% | 4.9E-04 | -- | -- | 3.8E-03 | 6.3E-02 | 18.4% | 4.1E-04 | -- | -- | 4.8E-03 | 8.0E-02 | 18.4% |
| Manganese | 250.39 | 0.01 | NA | 0.001 | 4.5E-06 | -- | -- | 2.1E-05 | 2.1E-02 | 8.5% | 3.7E-06 | -- | -- | 2.9E-05 | 2.9E-02 | 8.5% | 3.1E-06 | -- | -- | 3.7E-05 | 3.7E-02 | 8.5% |
| Thallium | 0.44 | 0.01 | NA | 0.000014 | 7.8E-09 | -- | -- | 3.7E-08 | 2.6E-03 | 1.1% | 6.6E-09 | -- | -- | 5.1E-08 | 3.7E-03 | 1.1% | 5.5E-09 | -- | -- | 6.4E-08 | 4.6E-03 | 1.1% |
| Vanadium | 51.15 | 0.01 | NA | 0.00014 | 9.1E-07 | -- | -- | 4.2E-06 | 3.0E-02 | 12.4% | 7.6E-07 | -- | -- | 5.9E-06 | 4.2E-02 | 12.4% | 6.4E-07 | -- | -- | 7.5E-06 | 5.4E-02 | 12.4% |
| | | | | | Total ILCR: | 1.0E-06 | 100.0% | HI: | 2.5E-01 | 100.0% | Total ILCR: | 8.8E-07 | 100.0% | HI: | 3.4E-01 | 100.0% | otal ILCR | 7.4E-07 | 100.0% | HI: | 4.3E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

ADULT, OLDER CHILD, AND YOUNG CHILD RESIDENTS (AGES 1 TO 6 YEARS) - FUTURE SCENARIO
DERMAL CONTACT WITH SEDIMENT - SITES 4, 21, AND 22
CENTRAL TENDENCY
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Adult | Older Child | Young Child | |
|---|---|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | CS | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | CS | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | CS | CS | |
| HQ | Hazard quotient | CS | CS | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | CS | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | CS | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | 1.00E-06 | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | 1 | 1 | |
| ABS | Absorption fraction | CS | CS | CS | |
| SA | Skin surface area available for contact (cm2) | 5,300 | 3,925 | 2,006 | |
| EF | Exposure Frequency (d/yr) | 40 | 40 | 40 | |
| ED | Exposure Duration (yrs) | 15 | 9 | 6 | |
| BW | Body weight (kg) | 70 | 37 | 15 | |
| ATc | Averaging time, carcinogens (d) | 25550 | 25,550 | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 5475 | 3285 | 2190 | |

| | | | | | Adult | | | | | | Older Child | | | | | | Young Child | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | | Carcinogens | | | Noncarcinogens | | |
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib HI | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI | DAD (mg/kg/d) | ILCR | % Contrib Total ILC | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 20470.32 | 0.01 | NA | 0.2 | 3.6E-04 | -- | -- | 1.7E-03 | 8.5E-03 | 3.5% | 3.1E-04 | -- | -- | 2.4E-03 | 1.2E-02 | 3.5% | 2.6E-04 | -- | -- | 3.0E-03 | 1.5E-02 | 3.5% |
| Antimony | 14.27 | 0.01 | NA | 0.00004 | 2.5E-07 | -- | -- | 1.2E-06 | 3.0E-02 | 12.1% | 2.1E-07 | -- | -- | 1.7E-06 | 4.1E-02 | 12.1% | 1.8E-07 | -- | -- | 2.1E-06 | 5.2E-02 | 12.1% |
| Arsenic | 11.68 | 0.032 | 1.578947368 | 0.000285 | 6.6E-07 | 1.0E-06 | 100.0% | 3.1E-06 | 1.1E-02 | 4.4% | 5.6E-07 | 8.8E-07 | 100.0% | 4.3E-06 | 1.5E-02 | 4.4% | 4.7E-07 | 7.4E-07 | 100.0% | 5.5E-06 | 1.9E-02 | 4.4% |
| Cadmium (soil) | 1.44 | 0.01 | NA | 0.00005 | 2.6E-08 | -- | -- | 1.2E-07 | 2.4E-03 | 1.0% | 2.2E-08 | -- | -- | 1.7E-07 | 3.3E-03 | 1.0% | 1.8E-08 | -- | -- | 2.1E-07 | 4.2E-03 | 1.0% |
| Chromium | 34.33 | 0.01 | NA | 0.00003 | 6.1E-07 | -- | -- | 2.8E-06 | 9.5E-02 | 38.7% | 5.1E-07 | -- | -- | 4.0E-06 | 1.3E-01 | 38.7% | 4.3E-07 | -- | -- | 5.0E-06 | 1.7E-01 | 38.7% |
| Iron | 32592.85 | 0.01 | NA | 0.06 | 5.8E-04 | -- | -- | 2.7E-03 | 4.5E-02 | 18.4% | 4.9E-04 | -- | -- | 3.8E-03 | 6.3E-02 | 18.4% | 4.1E-04 | -- | -- | 4.8E-03 | 8.0E-02 | 18.4% |
| Manganese | 250.39 | 0.01 | NA | 0.001 | 4.5E-06 | -- | -- | 2.1E-05 | 2.1E-02 | 8.5% | 3.7E-06 | -- | -- | 2.9E-05 | 2.9E-02 | 8.5% | 3.1E-06 | -- | -- | 3.7E-05 | 3.7E-02 | 8.5% |
| Thallium | 0.44 | 0.01 | NA | 0.000014 | 7.8E-09 | -- | -- | 3.7E-08 | 2.6E-03 | 1.1% | 6.6E-09 | -- | -- | 5.1E-08 | 3.7E-03 | 1.1% | 5.5E-09 | -- | -- | 6.4E-08 | 4.6E-03 | 1.1% |
| Vanadium | 51.15 | 0.01 | NA | 0.00014 | 9.1E-07 | -- | -- | 4.2E-06 | 3.0E-02 | 12.4% | 7.6E-07 | -- | -- | 5.9E-06 | 4.2E-02 | 12.4% | 6.4E-07 | -- | -- | 7.5E-06 | 5.4E-02 | 12.4% |
| | | | | | Total ILCR: | 1.0E-06 | 100.0% | HI: | 2.5E-01 | 100.0% | Total ILCR: | 8.8E-07 | 100.0% | HI: | 3.4E-01 | 100.0% | otal ILCR | 7.4E-07 | 100.0% | HI: | 4.3E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

CONSTRUCTION WORKERS - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SUBSURFACE SOIL - SITE 4
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Construction Worker | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| IR | Ingestion Rate (mg/d) | 480 | |
| CF | Conversion factor (kg/mg) | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 1 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 365 | |

| | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 7929.17 | NA | 1 | 5.3E-04 | -- | -- | 3.7E-02 | 3.7E-02 | 6.9% |
| Arsenic | 6.31 | 1.5 | 0.0003 | 4.2E-07 | 6.4E-07 | 100.0% | 3.0E-05 | 9.9E-02 | 18.4% |
| Chromium | 28.39 | NA | 0.003 | 1.9E-06 | -- | -- | 1.3E-04 | 4.4E-02 | 8.3% |
| Iron | 22814.9 | NA | 0.3 | 1.5E-03 | -- | -- | 1.1E-01 | 3.6E-01 | 66.4% |
| | | | | Total ILCR: | 6.4E-07 | 100.0% | Total HI: | 5.4E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

CONSTRUCTION WORKERS - FUTURE SCENARIO
DERMAL CONTACT WITH SUBSURFACE SOIL - SITE 4
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Construction Worker | |
|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | |
| ABS | Absorption fraction | CS | |
| SA | Skin surface area available for contact (cm2) | 4,300 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 1 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 365 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 7929.17 | 0.01 | NA | 0.2 | 4.8E-05 | -- | -- | 3.3E-03 | 1.7E-02 | 2.8% |
| Arsenic | 6.31 | 0.032 | 1.578947 | 0.000285 | 1.2E-07 | 1.9E-07 | 100.0% | 8.5E-06 | 3.0E-02 | 4.9% |
| Chromium | 28.39 | 0.01 | NA | 0.00003 | 1.7E-07 | -- | -- | 1.2E-05 | 4.0E-01 | 65.9% |
| Iron | 22814.9 | 0.01 | NA | 0.06 | 1.4E-04 | -- | -- | 9.6E-03 | 1.6E-01 | 26.5% |
| | | | | | Total ILCR: | 1.9E-07 | 100.0% | Total HI: | 6.0E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

CONSTRUCTION WORKERS - FUTURE SCENARIO
INHALATION OF FUGITIVE DUSTS EMANATING FROM EXCAVATED SUBSURFACE SOIL - SITE 4
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Ca*RR*ET*EF*ED)/(BW*AT)
Where: Ca = Cs * (1/PEF)

ILCR = CDI*CSFi
HQ = CDI/RfDi

| Parameter | Description | Construction Worker | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFi | Inhalation cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDi | Inhalation reference dose (mg/kg/d) | CS | |
| Ca | Concentration of chemical in air as fugitive dusts (mg/m3) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| PEF | Particulate emission factor (m3/kg) | 1.32E+09 | |
| RR | Respiration rate (m3/hr) | 0.83 | |
| ET | Exposure time (hrs/d) | 8 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 1 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 365 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | Ca (mg/m3) | CSFi 1/(mg/kg/d) | RfDi (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 7929.17 | 6.0069E-06 | NA | 0.001 | 5.6E-09 | -- | -- | 3.9E-07 | 3.9E-04 | 89.3% |
| Arsenic | 6.31 | 4.7803E-09 | 15.1 | NA | 4.4E-12 | 6.7E-11 | 7.6% | 3.1E-10 | -- | -- |
| Chromium | 28.39 | 2.1508E-08 | 41 | 0.00003 | 2.0E-11 | 8.2E-10 | 92.4% | 1.4E-09 | 4.7E-05 | 10.7% |
| Iron | 22814.9 | 1.7284E-05 | NA | NA | 1.6E-08 | -- | -- | 1.1E-06 | -- | -- |
| | | | | | Total ILCR: | 8.9E-10 | 100.0% | Total HI: | 4.4E-04 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

CONSTRUCTION WORKERS - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SUBSURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Construction Worker | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| IR | Ingestion Rate (mg/d) | 480 | |
| CF | Conversion factor (kg/mg) | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 1 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 365 | |

| | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Arsenic | 5.03 | 1.5 | 0.0003 | 3.4E-07 | 5.1E-07 | 100.0% | 2.4E-05 | 7.9E-02 | 24.0% |
| Chromium | 14.47 | NA | 0.003 | 9.7E-07 | -- | -- | 6.8E-05 | 2.3E-02 | 6.9% |
| Iron | 11504.97 | NA | 0.3 | 7.7E-04 | -- | -- | 5.4E-02 | 1.8E-01 | 55.0% |
| Manganese | 195.82 | NA | 0.02 | 1.3E-05 | -- | -- | 9.2E-04 | 4.6E-02 | 14.0% |
| | | | | Total ILCR: | 5.1E-07 | 100.0% | Total HI: | 3.3E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

CONSTRUCTION WORKERS - FUTURE SCENARIO
DERMAL CONTACT WITH SUBSURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Construction Worker | |
|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | |
| ABS | Absorption fraction | CS | |
| SA | Skin surface area available for contact (cm2) | 4,300 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 1 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 365 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Arsenic | 5.03 | 0.032 | 1.578947 | 0.000285 | 9.7E-08 | 1.5E-07 | 100.0% | 6.8E-06 | 2.4E-02 | 6.1% |
| Chromium | 14.47 | 0.01 | NA | 0.00003 | 8.7E-08 | -- | -- | 6.1E-06 | 2.0E-01 | 52.1% |
| Iron | 11504.97 | 0.01 | NA | 0.06 | 6.9E-05 | -- | -- | 4.8E-03 | 8.1E-02 | 20.7% |
| Manganese | 195.82 | 0.01 | NA | 0.001 | 1.2E-06 | -- | -- | 8.2E-05 | 8.2E-02 | 21.1% |
| | | | | | Total ILCR: | 1.5E-07 | 100.0% | Total HI: | 3.9E-01 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

CONSTRUCTION WORKERS - FUTURE SCENARIO
INHALATION OF FUGITIVE DUSTS EMANATING FROM EXCAVATED SUBSURFACE SOIL - SITE 21
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Ca*RR*ET*EF*ED)/(BW*AT)
Where: Ca = Cs * (1/PEF)

ILCR = CDI*CSFi
HQ = CDI/RfDi

| Parameter | Description | Construction Worker | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFi | Inhalation cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDi | Inhalation reference dose (mg/kg/d) | CS | |
| Ca | Concentration of chemical in air as fugitive dusts (mg/m3) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| PEF | Particulate emission factor (m3/kg) | 1.32E+09 | |
| RR | Respiration rate (m3/hr) | 0.83 | |
| ET | Exposure time (hrs/d) | 8 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 1 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 365 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | Ca (mg/m3) | CSFi 1/(mg/kg/d) | RfDi (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Arsenic | 5.03 | 3.8106E-09 | 15.1 | NA | 3.5E-12 | 5.3E-11 | 11.3% | 2.5E-10 | -- | -- |
| Chromium | 14.47 | 1.0962E-08 | 41 | 0.00003 | 1.0E-11 | 4.2E-10 | 88.7% | 7.1E-10 | 2.4E-05 | 3.4% |
| Iron | 11504.97 | 8.7159E-06 | NA | NA | 8.1E-09 | -- | -- | 5.7E-07 | -- | -- |
| Manganese | 195.82 | 1.4835E-07 | NA | 0.0000143 | 1.4E-10 | -- | -- | 9.6E-09 | 6.7E-04 | 96.6% |
| | | | | | Total ILCR: | 4.7E-10 | 100.0% | Total HI: | 7.0E-04 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

CONSTRUCTION WORKERS - FUTURE SCENARIO
ACCIDENTAL INGESTION OF SUBSURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Cs*IR*CF*FI*EF*ED)/(BW*AT)
ILCR = CDI*CSFo
HQ = CDI/RfDo

| Parameter | Description | Construction Worker | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| IR | Ingestion Rate (mg/d) | 480 | |
| CF | Conversion factor (kg/mg) | 0.000001 | |
| FI | Fraction of soil ingested from site | 1 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 1 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 365 | |

| | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | CSFo 1/(mg/kg/d) | RfDo (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 11542.51 | NA | 1 | 7.7E-04 | -- | -- | 5.4E-02 | 5.4E-02 | 4.1% |
| Arsenic | 14.47 | 1.5 | 0.0003 | 9.7E-07 | 1.5E-06 | 100.0% | 6.8E-05 | 2.3E-01 | 17.1% |
| Chromium | 39.85 | NA | 0.003 | 2.7E-06 | -- | -- | 1.9E-04 | 6.2E-02 | 4.7% |
| Iron | 54125.34 | NA | 0.3 | 3.6E-03 | -- | -- | 2.5E-01 | 8.5E-01 | 63.9% |
| Thallium | 1.35 | NA | 0.00007 | 9.1E-08 | -- | -- | 6.3E-06 | 9.1E-02 | 6.8% |
| Vanadium | 66.31 | NA | 0.007 | 4.4E-06 | -- | -- | 3.1E-04 | 4.4E-02 | 3.4% |
| | | | | Total ILCR: | 1.5E-06 | 100.0% | Total HI: | 1.3E+00 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

CONSTRUCTION WORKERS - FUTURE SCENARIO
DERMAL CONTACT WITH SUBSURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

DAD (mg/kg/d)= (Cs*CF*AF*ABS*SA*EF*ED)/(BW*AT)
ILCR = CDI*CSFd
HQ = CDI/RfDd

| Parameter | Description | Construction Worker | |
|---|---|---|---|
| DAD | Dermally absorbed dose (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFo | Oral cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDo | Oral reference dose (mg/kg/d) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| CF | Conversion factor (kg/mg) | 1.00E-06 | |
| AF | Soil to skin adherence factor (mg/cm2-event) | 1 | |
| ABS | Absorption fraction | CS | |
| SA | Skin surface area available for contact (cm2) | 4,300 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 1 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25550 | |
| ATn | Averaging time, noncarcinogens (d) | 365 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | ABS | CSFd 1/(mg/kg/d) | RfDd (mg/kg/d) | DAD (mg/kg/d) | ILCR | % Contrib. Total ILCR | DAD (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 11542.51 | 0.01 | NA | 0.2 | 6.9E-05 | -- | -- | 4.9E-03 | 2.4E-02 | 1.9% |
| Arsenic | 14.47 | 0.032 | 1.5789474 | 0.000285 | 2.8E-07 | 4.4E-07 | 100.0% | 1.9E-05 | 6.8E-02 | 5.4% |
| Chromium | 39.85 | 0.01 | NA | 0.00003 | 2.4E-07 | -- | -- | 1.7E-05 | 5.6E-01 | 44.0% |
| Iron | 54125.34 | 0.01 | NA | 0.06 | 3.3E-04 | -- | -- | 2.3E-02 | 3.8E-01 | 29.9% |
| Thallium | 1.35 | 0.01 | NA | 0.000014 | 8.1E-09 | -- | -- | 5.7E-07 | 4.1E-02 | 3.2% |
| Vanadium | 66.31 | 0.01 | NA | 0.00014 | 4.0E-07 | -- | -- | 2.8E-05 | 2.0E-01 | 15.7% |
| | | | | | Total ILCR: | 4.4E-07 | 100.0% | Total HI: | 1.3E+00 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

CONSTRUCTION WORKERS - FUTURE SCENARIO
INHALATION OF FUGITIVE DUSTS EMANATING FROM EXCAVATED SUBSURFACE SOIL - SITE 22
REASONABLE MAXIMUM EXPOSURE
POTENTIAL CARCINOGENIC AND NONCARCINOGENIC RISKS
NAVAL WEAPONS STATION YORKTOWN - YORKTOWN, VIRGINIA

CDI (mg/kg/d)= (Ca*RR*ET*EF*ED)/(BW*AT)
Where: Ca = Cs * (1/PEF)

ILCR = CDI*CSFi
HQ = CDI/RfDi

| Parameter | Description | Construction Worker | |
|---|---|---|---|
| CDI | Chronic daily intake (mg/kg/d) | CS | (Chemical Specific) |
| ILCR | Incremental lifetime cancer risk | CS | |
| CSFi | Inhalation cancer slope factor (1/(mg/kg/d)) | CS | |
| HQ | Hazard quotient | CS | |
| RfDi | Inhalation reference dose (mg/kg/d) | CS | |
| Ca | Concentration of chemical in air as fugitive dusts (mg/m3) | CS | |
| Cs | Concentration of chemical in soil (mg/kg) | CS | |
| PEF | Particulate emission factor (m3/kg) | 1.32E+09 | |
| RR | Respiration rate (m3/hr) | 0.83 | |
| ET | Exposure time (hrs/d) | 8 | |
| EF | Exposure Frequency (d/yr) | 250 | |
| ED | Exposure Duration (yrs) | 1 | |
| BW | Body weight (kg) | 70 | |
| ATc | Averaging time, carcinogens (d) | 25,550 | |
| ATn | Averaging time, noncarcinogens (d) | 365 | |

| | | | | | Carcinogens | | | Noncarcinogens | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Cs (mg/kg) | Ca (mg/m3) | CSFi 1/(mg/kg/d) | RfDi (mg/kg/d) | CDI (mg/kg/d) | ILCR | % Contrib. Total ILCR | CDI (mg/kg/d) | HQ | % Contrib. HI |
| Aluminum | 11542.51 | 8.7443E-06 | NA | 0.001 | 8.1E-09 | -- | -- | 5.7E-07 | 5.7E-04 | 89.7% |
| Arsenic | 14.47 | 1.0962E-08 | 15.1 | NA | 1.0E-11 | 1.5E-10 | 11.8% | 7.1E-10 | -- | -- |
| Chromium | 39.85 | 3.0189E-08 | 41 | 0.00003 | 2.8E-11 | 1.1E-09 | 88.2% | 2.0E-09 | 6.5E-05 | 10.3% |
| Iron | 54125.34 | 4.1004E-05 | NA | NA | 3.8E-08 | -- | -- | 2.7E-06 | -- | -- |
| Thallium | 1.35 | 1.0227E-09 | NA | NA | 9.5E-13 | -- | -- | 6.6E-11 | -- | -- |
| Vanadium | 66.31 | 5.0235E-08 | NA | NA | 4.7E-11 | -- | -- | 3.3E-09 | -- | -- |
| | | | | | Total ILCR: | 1.3E-09 | 100.0% | Total HI: | 6.3E-04 | 100.0% |

NOTES:
NA - Toxicity criterion not available.
-- Not applicable.

# APPENDIX K
# ECOLOGICAL RISK ASSESSMENT SUPPLEMENTAL INFORMATION

# APPENDIX K.1
# ECOLOGICAL TOXICOLOGICAL PROFILES

# K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

## ACETONE

Acetone is a colorless, volatile liquid that has a sweetish odor (Hawley, 1987). It is considered the least toxic solvent in the industry. Acetone can be naturally occurring or manufactured artificially (Howard, 1991). Acetone is used as a solvent in the production of lubricating oils, and as a chemical intermediate in the manufacturing of chloroform, pharmaceuticals, and pesticides. Acetone also is used to produce paints, varnishes, and lacquers (BEIA, 1989).

Acetone may be released into the environment as stack emissions, fugitive emissions, and in wastewater in its production and use as a chemical intermediate and solvent. In addition to industrial releases, acetone is the product of the photodioxidation of some alkanes and alkenes found in urban air, and in releases from volcanos and forest fires (Howard, 1991).

If released into water, acetone will most likely biodegrade. Acetone will also volatize. As a result of acetone's volatile characteristics, bioconcentration in aquatic organisms and adsorption to sediment should not be significant (Howard, 1991 ).

Released on soil, acetone will volatize with some leaching into soil. Acetone rapidly biodegrades in soils (Howard, 1991).

Because of acetone's ability to volatize, released into the atmosphere is the ultimate fate of acetone. In the atmosphere, acetone will undergo photolysis and react with photochemically produced hydroxyl radicals. The half-life of acetone ranges between 13 and 22 days with the longer half-life occurring in the winter months. This relatively long half-life allows for atmospheric dispersion of acetone. The primary removal process is wash out by rain (Howard, 1991)

## 2-BUTANONE

2-Butanone is used primarily as an industrial solvent. It is mainly used to manufacture gums, resins, nitrocellulose, cements and adhesives. Its production and use has lead to its presence in the atmosphere. In general, the ketones are naturally occurring components of food (BEIA, 1989)

2-Butanone is expected to be fairly mobile in the soil/groundwater system when present at low concentrations or as a separate organic phase (e.g., a significant spill). Portions of MEK associated with the water and air phases of soil have higher mobility than the adsorbed portion. Volatilization from near surface soils may occur. However, vapor concentrations in soil are expected to be very low whenever water is present. Biodegradation of 2-butanone has been demonstrated. Persistence in environments with active microbial populations is not expected (BEIA, 1989).

The primary pathway of concern is the migration of 2-butanone from soil to groundwater. Volatilization is another primary exposure pathway. Bioaccumulation is not considered to be an important exposure pathway. Any pathways related to the uptake by aquatic organisms or domestic animals from surface waters are likely to be less significant other than other sources of exposure due to the low bioaccumulation factor for 2-Butanone (BEIA, 1989b).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

### CARBON DISULFIDE

Carbon disulfide is a natural product of anaerobic biodegradation and is released to the atmosphere from oceans and land masses. It may also be released as emissions and in wastewater during its production and use. Carbon disulfide is used in the production of viscous rayon, cellophane, carbon tetrachloride, and as a solvent and fumigant (Howard, 1991).

If released to soil, carbon disulfide will be primarily lost by volatilization. Carbon disulfide also will rapidly volatilize from water with an estimated 2.6 hr half-life based on a river model. Adsorption to the sediment will not be significant. Carbon disulfide is not expected to significantly bioconcentrate in aquatic organisms (Howard, 1991).

### BUTYLBENZYLPHTHALATE

Butylbenzylphthalate is used exclusively as a plasticizer that is mainly used in polyvinyl-based flooring products and adhesives in the packaging industry. It is approved by the U.S. Food and Drug Administration for use in food contact articles (BEIA, 1989).

The National Toxicology Program conducted a carcinogenesis bioassay with butylbenzylphthalate in mice and rats. Under the conditions of the study, butylbenzylphthalate was not carcinogenic for mice of either sex. Therefore, the USEPA categorized butylbenzylphthalate as a Group C possible human carcinogen. Animal studies have been conducted that indicate that this constituent does not exhibit genotoxicity, teratogenicity, embryotoxicity or reproductive effects (BEIA, 1989). Butylbenzylphthalate has a low order of acute toxicity in experimental animals by various routes of exposure. Long-term administration of butylbenzylphthalate at dietary concentrations of 2000 ppm induced liver and kidney pathology in rats but not in dogs.

Butylbenzylphthalate is expected to be relatively immobile due to strong soil sorption; however, complexation with organic substances may cause it to be mobilized and transported with groundwater. Volatilization is not expected to be significant. It is resistant to chemical degradation but is easily biodegraded.

### DIBENZOFURAN

The environmental fate of dibenzofuran is not known. One could predict that, given its water solubility, dibenzofuran would tend to migrate in surface waters primarily by sediment transport. Also, considering its octanol/water partition coefficient, dibenzofuran would tend to partition into soils and sediments with significant organic content.

### POLYNUCLEAR AROMATIC HYDROCARBONS

The polynuclear aromatic hydrocarbons (PAHs) are a diverse group of compounds consisting of two or more substituted and unsubstituted polycyclic aromatic rings formed by the incomplete combustion of carbonaceous materials (ATSDR, 1990a).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

PAHs also are released to the environment through natural sources such as volcano and forest fire emissions. However, most of the emissions result from anthropogenic sources, largely wood burning for homes. Vehicular emissions are another primary source of PAHs. Hazardous waste sites can be a concentrated source on a local scale. Examples of such sites include former manufactured gas sites (i.e., sources of coal tar) and abandoned wood treatment plants (i.e., sources of creosote) (ATSDR, 1990a).

PAHs are transferred from surface water by volatilization and sorption to settling particles. The compounds are transformed in surface water by photooxidation, chemical oxidation, and microbial metabolism (ATSDR, 1990a).

In soil and sediments, microbial metabolism is the major process for degradation of PAHs (ATSDR, 1990a). Although PAHs accumulate in terrestrial and aquatic plants, many organisms can metabolize and eliminate these compounds. Fish and crustaceans readily assimilate PAHs from contaminated food, whereas mollusks and polychaete worms have limited assimilation (Eisler, 1987a). Biomagnification has not been reported because of the tendency of many aquatic organisms to eliminate these compounds rapidly (Eisler 1987a).

As with fish and many aquatic invertebrates, PAHs are carcinogenic, mutagenic, and cytotoxic to mammals (Eisler, 1987a). Direct application of PAHs has shown to produce tumors in skin and epithelial tissues of mice and rats (USEPA, 1980). Many PAHs are transferred across skin, lungs, and intestines, and may be transferred to fetuses if the mother is exposed. Dietary ingestion of PAHs has been shown to cause mammary cancer, leukemia, lung, and stomach tumors in laboratory mice and rats (Dipple, 1985). Acute and chronic exposure to carcinogenic PAHs is known to result in destruction of bone marrow and lymphoid tissues, negative gametogenic effects, kidney damage, and changes in intestinal and respiratory epithelia (Lee and Grant, 1981). Application of some PAHs to the skin of mammals causes the destruction of sebaceous glands, hyperplasia, hyperkeratosis, and ulceration (USEPA, 1980). Newborn mice exposed to PAHs may die of acute or chronic wasting disease, develop thymomas, and suffer from serious damage to the thymus (USEPA, 1980). PAH compounds have also been associated with oocyte and follicle destruction in mouse ovaries (Ward et al., 1985).

PAH carcinogens generally transform cells by genetic injury. The parent PAH compound is metabolized by the mixed-function oxidase pathway to a reactive intermediate, which can in turn bind with cellular macromolecules which results in cell transformation and induction of tumors (Dipple 1985; Ward et al. 1985).

In addition to the cytotoxic, mutagenic, and carcinogenic effects of PAH exposure to mammals, many carcinogenic PAH compounds also have negative effects on the immune system (Ward et al. 1985). Noncarcinogenic PAH compounds do not have immunosuppressive effects on mammals. Usually, the more carcinogenic a PAH compound is, the more immuno-suppressive it is.

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

### CHLORDANES

Pure chlordane is a mixture composed of primarily cis-chlordane and trans-chlordane. It is a white crystalline solid with a mild, pungent odor. Chlordane is a man-made insecticide, which was used from 1948 to 1988 on food crops (specifically corn) and to control household termites. Consequently, it was intentionally applied to soils both in agricultural and urban settings. Due to its persistence indoors, its use as a termicide was stopped (ATSDR, 1990c).

Chlordane is expected to persist for more than 20 years in some soils. Volatilization appears to be the only major removal mechanism from soil. Leaching to groundwater from soil is not a likely removal mechanism. Adsorption to sediments and volatilization are significant removal mechanisms in water. In air, chlordane will degrade by photolysis and hydroxyl radical reaction. Rainout and dry deposition are not expected to be significant removal mechanisms (ATSDR, 1990c).

Chlordane will bioconcentrate in both marine and freshwater species, as well as bacteria (ATSDR, 1990c).

### DDD, DDE, DDT

Historically, DDT was released to the environment during its formulation and extensive use as a pesticide in agricultural and vector control applications. Its primary metabolites are DDE and DDD. Although DDT was banned for use in this country in 1972, it is still being used in several areas in the world, particularly tropical countries. DDT and its primary metabolites are not known to occur naturally in the environment. However, due to its extensive past use of DDT worldwide and the persistence of DDT and is metabolites, these compounds are virtually ubiquitous and are continually being transformed and redistributed in the environment. DDT and its metabolites have been detected in virtually all media (ATSDR, 1989f).

DDT and its metabolites may be transported among media by the processes of solubilization, adsorption, bioaccumulation or volatilization. DDT, DDE and DDD in the atmosphere are subject to photodegradation or redeposition by rain or dry deposition (ATSDR, 1989f).

DDT and its environmental degradation products preferentially bind to soil and sediment , where they may be subject to photodegradation on the surface and biodegradation in the subsurface. Under certain conditions, DDT may persist for long periods of time or may be converted to DDE, which persists for an even longer duration. Consequently, these compounds are not easily displaced from their site of application, whether by runoff or leaching to groundwater. However, volatilization of DDT and DDE from soil accounts for considerable losses of these compounds. The tendency of DDD to volatilize is approximately three-fold less than that of DDT or DDE (ATSDR, 1989f).

When DDT is released to water, it quickly absorbs to particles and is subject to sedimentation, volatilization, photodegradation and uptake into the food chain. Similar to soil, volatilization accounts for loss of these compounds from water. One study found that DDE volatilizes from seawater 10 to 20 times faster than from freshwater (ATSDR, 1989f).

DDT, DDE and DDD are highly lipid soluble. This lipophilic property, combined with an extremely long half-life, results in bioaccumulation. When present in ambient water, DDT and its metabolites are concentrated in freshwater and marine plankton, insects, mollusks, and other invertebrates and fish. As these organisms become part of the food chain, a progressive accumulation of residues may result in high levels of residues in organisms at the top of the food chain (ATSDR, 1989f).

## ENDOSULFAN II

Endosulfan is a man-made insecticide. Although Endosulfan is no longer produced in the United States, it is still used in chemical formulation. Substantial amounts of endosulfan are imported into the United States. It is used for control of a number of insects on food crops such as grains, tea, fruits, and vegetables and on nonfood crops such as tobacco and cotton. It is also used as a wood preservative (ATSDR, 1993).

Endosulfan is a sold as a mixture of two different forms of the same chemicals (alpha-endosulfan and beta-endosulfan). Endosulfan enters air, water, and soil when it is manufactured or used as a pesticide (ATSDR, 1993).

Endosulfan is likely to hydrolyze in water, especially under alkaline conditions, and may also oxidize. Biodegradation and volitilization may also occur (Howard, 1991). Biodegradation and hydrolysis (under alkaline conditions) are significant fates of endosulfan released into soil. Endosulfan in surface soil also may photolyze. Minimal volatilization and leaching of endosulfan to groundwater is expected. It is bioconcentrated only to low levels and does not biomagnify in terrestrial or aquatic food chains (ATSDR, 1993).

Endosulfan can be transported over long distances in the atmosphere. The half-life of the atmospheric reaction of vapor phase endosulfan with photochemically generated hydroxyl radicals is estimated to be 1.23 hours. Endosulfan released into air also is subject to photolysis (Howard, 1991).

## POLYCHLORINATED BIPHENYLS (PCBs)

The term polychlorinated biphenyls (PCBs) commonly refers to a variety of mixtures of individual biphenyl isomers, each consisting of two joined benzene rings and up to ten chlorine atoms. Mixtures of these isomers are known by their commercial designation of Aroclor. This trade name is followed by a four-digit number; the first two numbers indicate the type of isomer mixture and the last two numbers indicate the approximate weight percent of chlorine in the mixture (USEPA, 1985).

PCBs are man-made chemicals that were used widely in transformers, electrical equipment, and as lubricants (USEPA, 1989). PCBs are inert, thermally and chemically stable compounds with dielectric properties. Because of their persistence and toxicity in the environment, their manufacture was discontinued in the United States in 1977 (USEPA, 1995). However, PCB equipment manufactured before 1977 is currently still being used in the United States and this use is regulated by the Environmental Protection Agency.

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

PCBs are very stable chemically and tend to be persistent in the environment. Persistence and bioaccumulation in living organisms also occurs due to the high lipophilicity of these compounds (ATSDR, 1989g).

PCBs released into water adsorb to sediments and other organic matter. Typically PCB concentrations are greater in the sediment and suspended material than in the water column. Substantial quantities of PCBs in aquatic sediments can act as an environmental reservoir from which PCBs may be released slowly over a long period of time. For PCBs that exist in the dissolved state in water, volatilization becomes the primary fate process. Therefore, the volatilization process is the major removal mechanisms of PCBs from water sources. However, the rate of volatilization is dependent upon PCB adsorption to sediment[2]. PCBs have the capability to bioaccumulate and biomagnify (USEPA, 1985).

PCBs are expected to be highly immobile in the soil due to rapid and strong sorption. Accumulation of PCBs in terrestrial vegetation can occur by uptake from soil through the root and by deposition of atmospheric particulates on aerial plant surfaces. However, the transfer of vapor-phase PCBs from air to aerial plant parts may be the main source of vegetation contamination (ATSDR, 1989g).

PCBs can affect terrestrial wildlife in three primary ways: mortality, adversely affecting reproduction, and changing behavior. Behavioral effects include increased activity, decreased avoidance response, and decreased nesting (USEPA, 1985). A variety of PCB induced toxic effects have been observed in mammals. Minks are particularly sensitive to dietary intake of PCBs (Aulerich, 1985). Anorexia, weight loss, lethargy, enlarged livers, and intestinal discharge of blood have been noted in exposed mink (Eisler, 1986b). Placental and mammary transfer of PCB has been shown to be a direct route of PCBs between mother and young. PCB exposure cause behavioral disorders, especially in the sleep/wake cycles, and in animals that hibernate or aestivate (Sander and Kirpatrick, 1977/ Montz et al., 1982).

PCB toxicity in mammals is highly variable. While some PCBs are extremely toxic, and can produce death and cause reproductive failure in very low levels, others appear to produce few, if any toxic effects (Eisler, 1986). Toxic responses to PCBs are highly specific to each species. Younger mammals appear to be more susceptible to PCB poisoning than adults. Mutagenic, carcinogenic, and teratogenic effects of PCB exposure have been observed, with mutagenic activity appearing to increase with increasing chlorination of the PCB (Eisler, 1986b).

There is a great degree of variability between different bird species in response to PCBs. In sensitive species, normal patterns of growth, behavior, reproduction, and metabolism may be altered. Liver concentrations of PCBs are typically highest in piscivorus birds, followed by birds that feed on other small birds and mammals, birds that feed on worms and insects, and herbivorous or seed eating birds, respectively (NAS, 1979).

Degradation of PCBs in the environment is dependent upon the degree of chlorination. Generally, the more chlorinated the PCB molecule, the persistent it will be in the environment. Factors which determine biodegradability include the amount of chlorination, concentration, type of microbial population, available nutrients, and the temperature (ATSDR, 1989g).

In the atmosphere, PCBs exist almost entirely in the vapor phase. An estimated 87 percent and 100 percent of the PCBs in the atmosphere are present in the vapor phase, and therefore are readily dispersed. The tendency of PCBs to adsorb to airborne particulates will increase as the degree of chlorination increases. The dominant degradation process in the atmosphere is dependent upon the vapor phase reaction of PCBs with hydroxyl radicals. PCBs are physically removed from the atmosphere through wet and dry deposition (ATSDR, 1989g).

## 1,3-DINITROBENZENE

1,3-Dinitrobenzene(1,3-DNB) is a colorless to yellowish crystalline solid at room temperature. It is manufactured primarily by the nitration of nitrobenzene or benzene using a hot mixture of nitric acid and sulfuric acids. EPA has thoroughly reviewed the environmental fate of 1,3-DNB. In water, aromatic nitro compounds are generally resistant to hydrolysis; the chemical structure of 1,3-DNB also suggests that aquatic oxidation is not significant. Photolytic reactions in the environment may be significant, but additional experimental data are required. Volatilization is not a significant environmental fate of 1,3-DNB. Experimental data regarding adsorption to sediment were not located; however, based on mathematical derivations from the octanol-water partition coefficient and the water solubility, the USEPA predicted that more than 99% of the compound will remain in the water column and less than 1% will be in lake sediments. Based on calculations using either the octanol-water coefficient or its water solubility, 1,3-DNB is not expected to bioaccumulate significantly in aquatic organisms (Roberts and Hartley, 1992).

1,3-DNB is primarily used as an intermediate in the synthesis of dyes and is a by-product of munitions production. Biodegradation is the primary removal process affecting the fate 1,3-DNB in aquatic systems. Apparently chronic exposure and adaptation of the microflora greatly increase the rate of biodegradation. Rapid degradation did not occur in natural water sources not previously exposed to the compound. Chemical and physical degradation by hydrolysis, oxidation and UV photolysis play a minor role in the fate of the chemical. Photolysis may possibly play a role in the degradation of airborne 1,3-DNB; however, no direct evidence of this process was located. Particulate binding and bioaccumulation are predicted to be low (Francis, 1992).

## AMINO-DINITROTOLUENE

Amino-dinitrotoluene (amino-DNT) is formed during the production of TNT and also is formed in the bacterial reduction of TNT.

Amino-DNT is susceptible to photolysis in water, but information on hydrolysis and volization were not located. 2-amino-4,6-DNT has a low soil adsorption coefficient which indicates low adsorption to soil and probable migration to groundwater. Biotransformation of DNTs and its metabolites appears to be very slow. Based on a limited number of uptake and metabolism studies, 2-amino-4,6-DNT does not bioaccumulate in plants, either due to metabolism or lack of uptake. No information on bioaccumulation, residue values, or sediment-associated organisms were located. Based on the limited toxicity studies for 2-amino-4,6-DNT, acute effects on invertebrates and fish were not observed and no data on chronic exposures of aquatic organisms were located (Talmage, 1996).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Based on the administration of 2,4,6-trinitrotoluene to mammalian species, the compound appears to be metabolized and excreted in the urine (Talmage, 1996). 2-amino-4,6-dinitrotoluene is excreted primarily as a glucuronide conjugate. Further reduction to 2,4-diamino-6-nitrotoluene and 2,6-diamino-4-nitrotoluene may take place prior to excretion as these metabolites are also found in the urine of mammalian species administered TNT (Talmage, 1996).

### 2,4/2,6-DINITROTOLUENE

2,4-Dinitrotoluene (2,4-DNT) and 2,6-Dinitrotoluene (2,6-DNT) are pale yellow solids and are two of six possible forms of DNT. DNT is made by mixing toluene with nitric acid. The main use of DNTs is to produce flexible polyurethane foams used in the bedding and furniture industry. DNT also is used to produce ammunition and explosives and to make dyes (Roberts and Hartley, 1992).

There is a potential for transport of DNT via surface water and groundwater due to the moderate solubility of DNT and the low $K_{ow}$ value. DNT is not expected to bioaccumulate in animal tissues. Photolysis is considered the major degradation route of DNT released into oxygenated water (Roberts and Hartley, 1992).

Nitroaromatic compounds released to soils are reduced to amino compounds and covalently bounded to soil organic matter (Roberts and Hartley, 1992).

When released into the atmosphere, DNTs are subject to side chain oxidation, decarboxylation, ring oxidation, and/or nitroreduction in air and sunlight. Indirect photolysis also may occur (Roberts and Hartley, 1992).

The expected bioaccumulation of dinitrotoluene in animal tissues is negligible. The low octanol-water partition coefficients do not indicate a concern for biological lipid accumulation. Dinitrotoluenes are expected to be readily up taken by plants (ATSDR, 1989d).

Effects from chronic exposure to DNT include methemoglobinemia, characterized by Heinz body formation and compensatory reticulocytosis; cyanosis; neurotoxicity; and possible excess mortality from ischemic heart disease and residual circulatory system effects. Neurotoxicity is characterized by vertigo, paresthesia, tremors, unconsciousness, and paralysis (IRIS, 1995). Heinz bodies are thought to consist of denatured hemoglobin, possibly sulfhemoglobin, that may form disulfide bonds with red blood cell membranes and thus lead to impaired ion transport resulting in hyperpermeability and hemolysis.

Dinitrotoluene isomers are metabolized initially by liver oxidation. Some metabolites are conjugated with sulfate or glucuronate and subsequently excreted in the urine or bile (Roberts and Hartley, 1992).

### HMX

HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine), a colorless, crystalline solid, is a completely N-nitrated, eight-member heterocyclic ring compound. HMX is used to implode fissionable material to achieve critical mass in nuclear devices and as a component in plastic-bonded explosives, solid-

fuel rocket propellants, and military munitions with such applications as burster chargers. HMX has approximately 130% of the explosive power of trinitrotoluene (TNT). HMX is manufactured in the United States at the Holston Army Ammunition Plant (Alabama) using the continuous Bachman process. This method involves the nitration of hexamine with ammonium nitrate and nitric acid in an acetic acid/acetic anhydride solvent (Maxwell and Opresko, 1996).

HMX released to soil has been shown to partition to groundwater (Maxwell and Opresko, 1996). Contamination of the terrestrial environment is usually indirect, occurring as a result of spills during manufacture, transportation, and storage or the settling of airborne particles from manufacture and incineration on surface soils. However, direct contamination may occur if incompletely incinerated explosive material is dumped into a landfill. Environmental HMX pollution may also result from propellant formulation manufacture. The principal atmospheric emissions from HMX production include nitrogen oxides, sulfur oxides, particulates, and acid mists (Roberts and Hartley, 1992).

Photolysis is the dominant fate process for HMX in the aquatic environment. A concentration of 0.5 ppm HMX is reported to have a half-life of 4 to 5 days when exposed to natural sunlight. Major photolytic transformation products are nitrate, nitrite, and formaldehyde. Photolytic processes are inhibited in waste disposal lagoon water with poor light transmission (Roberts and Hartley, 1992).

Biotransformation was also identified as an important fate process for HMX in the aquatic environment. Aerobic biotransformation of HMX occurs rapidly in HMX waste stream waters, but not in river or lagoon waters. Anaerobic biotransformation occurs very slowly, but is accelerated in the presence of excess organic nutrients. The metabolites resulting from both aerobic and anaerobic transformation are the mono- through tetranitroso derivatives of HMX that are metabolized to 1,1-dimethylhydrazine. Hydrolysis, oxidation, and abiotic reduction are not considered major transformation processes for HMX, nor are volatilization, sediment sorption, and biosorption (Roberts and Hartley, 1992).

**RDX**

RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine), a white crystalline solid, is a completely N-nitrated, six-member heterocyclic ring compound. It has been used extensively as a high-impact explosive in military munitions formulations since World War II. RDX also is used as a rat poison. RDX is usually manufactured by the nitration of hexamethylene tetramine. In the United States, RDX is manufactured mainly at the Holston Army Ammunition Plant (Alabama), which uses the continuous Bachman process. This method involves the nitration of hexamine with ammonium nitrate and nitric acid in an acetic acid-acetic anhydride solvent (Roberts and Hartley, 1992).

When released to the environment, RDX demonstrates moderate to high mobility and can be expected to leach into groundwater where it will persist. RDX can enter the aquatic environment through waste water discharges from the manufacture and loading of RDX, and migration from settling ponds into soil, with subsequent leaching to groundwater. Direct photochemical degradation is the major removal process in translucent waters. Atmospheric releases may occur from incineration of RDX-containing mixtures, with dry or wet deposition as major atmospheric removal processes. Sediment deposits in army ammunition plants may also pose an environmental problem, since seepage into the groundwater may occur (Talmage and Opresko, 1996b).

Experimental studies on the migration of [14C]RDX in soils of various pH, texture, and organic matter typically found in the United States, RDX was associated with a downward movement and a very low leachate level (less than 0.5 ppm, which was the level of detection). Near the surface of the soil, biological degradation to radioactive carbon dioxide was also observed. Bacterial degradation results in reduction to mono-, di-, and trinitroso derivatives, in reduction to a triazine and in hydrolytic cleavage of the triazine. Formaldehyde, methanol, and $CO_2$ are end products. Photolysis rapidly degrades RDX. Volatilization of RDX does not affect its environmental fate significantly. Sediment absorption will not lead to a significant loss in the aquatic environment (Roberts and Hartley, 1992).

## 1,3,5-TRINITROBENZENE

1,3,5-Trinitrobenzene (TNB), a dimorphic crystalline solid, is a Class A explosive that is less sensitive to impact, but more powerful and brisant than 2,4,6-trinitrotoluene (TNT). It also has had limited use in the vulcanization of rubber (Borges, 1991).

TNB is an anthropogenic environmental contaminant. Exposure to TNB can occur through contact with waste water effluent released from facilities that synthesize, produce, or demilitarize munitions, or from the disposal of solid TNT wastes. Limited information is available on the quantity of TNB in the environment (Borges, 1991).

Little is known about the absorption, distribution, metabolism, and excretion of TNB; however, both 1,3-dinitrobenzene and TNT are extensively absorbed following oral exposure and are distributed to the liver, kidney, lung, and spleen. The metabolism and excretion of TNB would likely be similar to that of 1,3-dinitrobenzene and TNT and consist of nitro-reduction, glucuronide conjugation, and excretion primarily in the urine (Borges, 1991).

## 2,4,6-TRINITROTOLUENE

2,4,6-Trinitrotoluene (TNT) is a munitions chemical released to the environment from munitions production and processing facilities and through field use and disposal practices such as open burning. TNT is relatively insensitive to shock and must be exploded by a detonator. Small amounts may be used in industrial explosive applications and as a chemical intermediate in the manufacture of dyestuffs and photographic chemicals (ATSDR, 1995).

Photolysis is the primary transformation process in surface water or surface soil. In sunlit waters, TNT is rapidly transformed by photolysis, resulting in the development of red or pink water which is rich in nitroaromatic compounds. Photolysis would not be an important transformation mechanism in groundwater and below the surface of soils due to its limited partition or sorption to soils or sediments. TNT is biodegraded in water, soil, sediment, and sludge by bacterial and fungal species under both aerobic and anaerobic conditions. Reduction of a nitro group is the first step in transformation. Compounds formed include aminodinitrotoluenes, diaminonitrotoluenes, hydroxyaminodinitrotoluenes, 2,4,6-triaminotoluene, and tetranitroazotoluenes.

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Acute effects studies of TNT on invertebrates and fish reported endpoint mortality ranging from > 4.4 mg/L to > 29 mg/L for invertebrates and 0.8 mg/L to 3.7 mg/L for fish. Chronic studies have shown that *Daphnia magna* showed no signs of effect (decreases in the number of young produced) at a concentration of 103 mg/L (Talmage and Opresko, 1996a).

Studies on the metabolism of TNT by aquatic organisms were not located in the available literature. Calculated and measured log octanol-water partition coefficients (log $K_{ow}$) values of 1.6 to 2.7 indicated a low potential for bioconcentration (ATSDR, 1995).

In mammalian species, TNT is absorbed by inhalation, ingestion, or skin contact. Metabolism is extensive and rapid, with 50 to 70 percent excreted in the urine and the remainder in the feces; the majority of the ingested compound is excreted within 24 hours. Distribution to the tissues is less than one percent . Although no laboratory studies on bioaccumulation were located, rapid metabolism and excretion in mammalian species indicates a low potential for bioaccumulation (Talmage and Opresko, 1996a).

### ALUMINUM

Pure aluminum is a light, ductile metal. Aluminum is one of the most abundant metals in the earth's crust, and it is ubiquitous in air and water, as well as soil. It is an extremely versatile metal with a variety of uses, e.g., packaging materials, several types of containers, kitchen utensils, auto-bodies and components, airplanes and building panels. Certain aluminum compounds are used in paint pigment, insulating materials, abrasives, cosmetics and even food additives. Aluminum sulfate is used in the treatment of drinking water and sewage (Friberg et al., 1986).

The toxicity of aluminum may be divided into three major categories: the effect of aluminum compounds on the gastrointestinal tract; the effect of inhalation of aluminum compounds; and systemic toxicity of aluminum (Klaassen et al., 1986). Aluminum compounds can affect absorption of other elements in the gastrointestinal tract and by that alter intestinal junctions. Aluminum inhibits fluoride absorption and may decrease the absorption of calcium and iron compounds and possibly the absorption of cholesterol. It may alter gastrointestinal tract mobility through inhibition of acetylcholine-induced contractions that may explain why aluminum-containing antacids often produce constipation (Klaassen et al., 1986).

A progressively fatal neurologic syndrome also has been reported in patients on long-term intermittent hemodialysis treatment for chronic renal failure. The disorder, which typically arises after three to seven years of dialysis treatment, may be due to aluminum intoxication (Klaassen et al., 1986).

### ANTIMONY

Antimony is a silvery gray lustrous metal that comes from ores stibinite, dermasite, tertrahedrite, livingstonite, and jamisonite (Sax, 1987). Stibinite is the most common naturally occurring form of antimony. Antimony is used as a hardening alloy for lead, solder, sheet and pipe, semiconductors, production of fireproofing chemicals, ceramics, glassware, pigments, and pyrotechnics (Hawley, 1987).

Antimony occurs as a soluble oxide or as antinomite (+3) salt in most natural waters. It may change to volatile stibinite in a reducing environment. Stibinite is very soluble in water, but is not stable under aerobic conditions. Sediment beds offer a reducing environment allowing for remobilization

of antimony previously removed from solution. The sorption to clays and minerals is the most important mechanisms resulting in the removal of antimony from solution. Insoluble forms of antimony compounds may form when heavy metals in solution react with antimote or antimonate. Bioaccumulation represents a minor fate process for antimony (USEPA, 1985).

Antimony is slowly absorbed from the gastrointestinal tract. The metal accumulates in lung tissue when humans are exposed to antimony dust in an occupational setting. Trivalent antimony is concentrated in red blood cells and the liver. Pentavalent antimony is mostly found in plasma. Both trivalent and pentavalent antimony are excreted in feces and urine. More trivalent antimony is excreted in the urine, where more pentavalent antimony is excreted in the feces (Klaassen et al., 1987).

Studies indicate that antimony trioxide, antimony trichloride, and antimony pentachloride may be mutagenic. Reproduction studies indicated that female workers exposed to antimony dust had an increase in incident of gynecological disorders and late spontaneous abortions. Antimony was found in the breast milk, placental tissue, amniotic tissue, and blood of the umbilical cord in exposed workers. Intraperitoneal administration of antimony in rats supported the finding of the human reproductive effects (USEPA, 1985).

Animal studies support evidence of cardiovascular effects in humans. Changes in electrocardiograms, cardiac edema, myocardial fibrosis, and other signs of myocardial structural damage were observed in humans exposed to either trivalent or pentavalent antimonial compounds (USEPA, 1985).

Studies on rats indicated that antimony trioxide may produce lung and liver tumors (USEPA, 1985).

## ARSENIC

Pure arsenic is a gray-colored metal, but this form is not common in the environment. Arsenic is a naturally occurring element in the earth's crust. Arsenic is usually found combined with one or more other elements such as oxygen, chlorine, and sulfur. Arsenic enters the environment both as the result of natural forces (volcanos and weathering of arsenic-containing rocks) and human activity (metal smelting, glass manufacturing, pesticide production and application, and fossil-fuel burning) (ATSDR, 1989b).

Arsenic in water may undergo either reduction or oxidation, depending on pH, the electrochemical oxidation-reduction potential (Eh), and other ions present. Soluble forms of arsenic tend to be mobile in water, while less soluble species adsorbs to clay or soil particles (ATSDR, 1989b).

Physical processes are important in determining arsenic bioavailability in aquatic environments. Arsenates are readily adsorbed onto sediments than other forms of arsenic. However, adsorption depends on sediment characteristics (Eisler, 1988a). Arsenate (pentavalent) is the predominant arsenic form in oxygenated water and arsenite (trivalent) is the predominant arsenic form in anaerobic condition (USEPA, 1985).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Arsenic is not significantly concentrated in aquatic invertebrates. Whole body concentrations for invertebrates ranged from 3 to 17 for exposure to arsenic trioxide (trivalent) and from 0 to 7 for arsenic pentoxide (pentavalent). Arsenic may be bioconcentrated by organisms at the bottom of the food chain; however, data do not indicate that significant biomagnification occurs (USEPA, 1985).

Trivalent compounds of arsenic are the principal toxic forms. Arsenic's principal mode of toxic action is at the cellular level, where it affects mitochondrial enzymes that are critical in tissue respiration. Ingestion of large doses of arsenic can by acutely fatal. Symptoms include fever, anorexia, cardiac arrhythmia, and eventual cardiovascular failure. Additionally, central nervous system effects, including peripheral neuropathy and sensory loss are usually noted (Klaassen et al., 1986).

Chronic long-term exposure is characterized by liver injury. This is usually reflected as jaundice, and may progress to cirrhosis. Also, peripheral vascular disease has been observed in persons chronically exposed to arsenic (Klaassen et al., 1986).

Arsenic has been implicated as a carcinogen by the inhalation route in both animal and human studies. Studies of populations living near arsenic-using pesticide manufacturing plants were shown to have an increased incidence of lung cancer. Also, case reports of arsenical pesticide applicators have demonstrated an association between arsenic exposure and lung cancer (IRIS, 1995).

Evidence for the carcinogenicity of arsenic via oral exposure comes from an epidemiological study where an arsenic-contaminated water supply was associated with a significant increase in cancer of the bladder, lung, liver, kidney, skin and colon. Because of arsenic's carcinogenic potential in humans, the EPA has classified it as a Group A carcinogen-human carcinogen (IRIS, 1995).

### BERYLLIUM

Sediment is the ultimate sink for beryllium in water, and its association with sediment would decrease the mobility in water. Beryllium does not bioconcentrate to high levels in aquatic animals, although the bioconcentration in bottom dwelling animals may be higher than nonbottom-dwelling animals. There is no evidence of biomagnification of beryllium within terrestrial or aquatic food chains (ATSDR, 1991a).

Beryllium enters the body through inhalation of air, consumption of food, and contact with water. Based on animal studies, pulmonary adsorption does not appear to be extensive, and absorption through the gastrointestinal tract and the skin appears to be minimal. Animal studies indicate that once beryllium enters the body via inhalation, it is circulated in the blood as an orthophosphate colloid and then distributed to the bone, lover, and kidneys in both humans and animals. Oral exposure of soluble beryllium in animal studies showed that distribution of the compound was mainly to the liver and intestine whereas insoluble beryllium was found mainly in the intestine. Although beryllium is not biotransformed, soluble beryllium compounds are partially converted to more insoluble forms in the lungs (ATSDR, 1991a).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

The most profound effect from inhalation appears in the lungs. Exposure to beryllium oxide or to soluble beryllium compounds may lead to the development of acute chemical pneumonitis. Chronic exposure to insoluble forms may lead to berylliosis. The most common clinical symptom of berylliosis is a granulomatous lung inflammation. Additional respiratory effects are rhinities, pharyngitis, and tracheobronchitis. Besides the lung, beryllium also accumulates in the bone, liver, and kidneys (ATSDR, 1991a).

Beryllium is among the substances classified as a probable human carcinogen. This classification is based on limited evidence of carcinogenicity in humans from epidemiologic studies (IRIS, 1994). Studies indicating increased lung cancer in individuals who have been exposed to beryllium, failed to account for confounding factors such as lung cancer associated with smoking, and did not include employees of the beryllium industry who were not exposed to the beryllium (ATSDR, 1991a).

There has been sufficient information to link beryllium to lung cancer via inhalation in animals; osteosarcomas have been observed in rabbits via intravenous or intramedullary injection (IRIS, 1994). Also, there has been sufficient information to link beryllium to an induction of tumors via inhalation and intratracheal instillation in rats and monkeys, and the induction of osteosarcomas in rabbits by intravenous or intramedullary injection in multiple studies (ATSDR, 1991a).

### CADMIUM

Cadmium is a soft, blue-white, malleable metal or gray-blue powder. Cadmium is used for electroplating, in pigment production, and in the manufacturing of plastic stabilizers and batteries. Sources of cadmium include smelter fumes and dusts, incineration products from cadmium-containing materials, fertilizer, and municipal wastewater and sludge discharges. It also is an industrial byproduct of the manufacturing of zinc, copper, and lead (ATSDR, 1991d).

Cadmium compounds have varying degrees of solubility ranging from very soluble (cadmium salts) to nearly insoluble (cadmium metal). The solubility affects cadmium adsorption and toxicity. Cadmium may exist in water as a hydrated ion or as metal inorganic complexes. Adsorption and desorption processes are the most likely processes controlling the concentrations of cadmium released into natural waters. Cadmium is more mobile in aquatic environments than most heavy metals (ATSDR, 1991d).

Adsorption and desorption rates of cadmium are rapid on mud solids and particles of clay, silica, humic material, and other naturally occurring solids. Changes in the physical chemistry of a water body (especially pH and redox potential) influence the suspension of cadmium from the sediments into the water column. During anaerobic conditions, cadmium is more likely to release from the sediments into the water column. Cadmium is not likely to partition from the water into the atmosphere because cadmium does not form volatile compounds (ATSDR, 1991d).

Aquatic and terrestrial organisms bioaccumulate cadmium up the food chain. Bioconcentration in fish is dependent upon the pH and the organic content of the water (ATSDR, 1991d). Cadmium may adversely impact the reproduction success of fish (Davis, 1994). Cadmium is more toxic to freshwater aquatic species followed by marine organisms, birds, and mammals. In a marine environment, survival of species exposed to cadmium is higher in lower water temperature and higher salinity areas (Eisler, 1985).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Cadmium exists in soil as free cadmium compounds. Cadmium released to soils may leach into water, especially under acidic conditions. The transformation of cadmium in soil is dependent on sorption and desorption from water, and includes precipitation, dissolution, complexation, and ion exchange. Factors affecting transformation in soil include cation exchange capacity; pH; and the content of clay minerals, carbonate minerals, oxides, organic matter, and oxygen (ATSDR, 1991d).

Cadmium is readily taken up by plant roots and tranlocates through the plant and accumulated. Cadmium depresses the uptake of iron, manganese, and probably calcium, magnesium, and nitrogen. Symptoms of plant toxicity include necrosis, wilting, reduced zinc levels, and reduction in growth. Agronomic crops are more sensitive to cadmium toxicity than trees (Will and Suter, 1995).

Cadmium can exist in the atmosphere as suspended particulate matter derived from sea spray, industrial emissions, combustion of fossil fuels, or the erosion of soils. Cadmium in the atmosphere will remain for approximately one to ten days before deposition occurs. Cadmium in the atmosphere usually takes the form of oxides, sulfates, sulfides, and chlorides. These complexes are stable and do not readily undergo photochemical reactions. Transformation of cadmium compounds in the air is mainly through dissolutions in water or dilute acids (ATSDR, 1991d).

Cadmium is a mutagen, teratogen, and a suspected carcinogen (RCTES, 1991). Tissue concentrations of cadmium increase with the age of the organisms and eventually act as a cumulative poison (Hammons et al., 1978). Teratogenic effect on animals is greater for cadmium than for arsenic, copper, indium, lead, and mercury. Vertebrates tend to accumulate cadmium in the kidney and liver tissue (Eisler, 1985). Cadmium replaces essential metals at critical sites on proteins and enzymes, and may inhibit a variety of enzymatic reactions. Cadmium inhibits Phase I and Phase II biotransformation reactions, probably by alteration of the enzymes responsible for these reactions (Sipes and Gandolfi, 1986). This metal also combines with sulfhydryl groups in enzymes, which affects the transfer of electrons from compounds in the citric acid cycle to compounds in the electron transport chain. Cadmium can inhibit adenosine triphosphate (ATP) activity in the following ways: it binds to and inactivates enzymes that synthesize ATP, and it binds to ATPase, which is required to convert ATP to ADP + $PO_4$ (Hammons et al., 1978).

Cadmium is a probable human carcinogen (Group B1) by inhalation based on animal and human data. It is not known whether cadmium causes cancer via ingestion and dermal exposure pathways (ATSDR, 1991d)

### CHROMIUM

Chromium is a semi-gray heavy metal that exists in either a trivalent (III) or hexavalent (VI) state. Chromium (III) occurs naturally in the environment; whereas, chromium (VI) is produced by industrial processes (ATSDR, 1991b).

In both freshwater and marine systems, hydrolysis and precipitation are the most important processes that determine the fate and effects of chromium; whereas, adsorption and bioaccumulation are relatively minor. Precipitated chromium (III) hydroxides remain in sediment under aerobic conditions. However, under anoxic and low pH conditions, chromium (III) hydroxides may solubilize and remain as ionic chromium (III) unless oxidized to chromium (VI) through mixing and aeration (Eisler, 1986a).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Fish do not readily accumulated chromium from the water column. Chromium is not expected to biomagnify in the aquatic food chain. The bioavailability of chromium (III) to freshwater invertebrates decreases with the addition of humic acid. The decrease in bioavailability of the free form of chromium is due to its complexation with humic acid (ATSDR, 1991b).

Chromium released into soil is mainly water-insoluble or is bound to the soil. However, a small fraction of chromium in soil will dissolve and may be transported deeper in the soil to groundwater. The transport of chromium in soil is dependent on the type and condition of the soil. Chromium is present in most soils as chromium (III) (ATSDR, 1991b). Chromium (III), as an insoluble salt, tends to adhere strongly to clay particles and organic matter; whereas, soluble chromium (VI) is not strongly adsorbed to soil. The fate of chromium in soil is dependent on the redox potential and the pH of the soil (ATSDR, 1991b).

Plants growing in chromium-containing soil will uptake the chromium into its roots, but only a small fraction of the chromium will be translocated in the aboveground, edible portions of the plants. There is no evidence that chromium will be bioaccumulated in plants. In addition, there is no evidence that chromium will biomagnify along the terrestrial food chain (ATSDR, 1991b).

The toxicity of chromium (III) to mammals is low because of its membrane permeability is poor and it is noncorrosive. In addition, there is not a likelihood that chromium (III) will biomagnify in food chains. Chromium (VI) is considered more toxic to wildlife because of its high oxidizing potential and it easily penetrates biological membranes (ATSDR, 1991b).

The trivalent form of chromium is usually found in biological materials. This form functions as an essential element in mammals by maintaining efficient glucose, lipid, and protein metabolism (Stevens et al., 1976). Chromium is beneficial but not essential to higher plants (Eisler, 1986a).

Chromium is mutagenic, carcinogenic, and teratogenic, with chromium (VI) exhibiting the greatest toxicity; relatively less is known about the toxicity of chromium (III). At high concentrations chromium (VI) is associated with abnormal enzyme activity, altered blood chemistry, lowered resistance to pathogenic organisms, behavioral modifications, disrupted feeding histopathology, osmoregulatory upset, alterations in population structure, and inhibition of photosynthesis (ATSDR, 1991b).

Rabbits fed chromium accumulated hyaluronate, chondroitin sulfates, and neural mucopolysaccharide in the soft tissues, causing pericappilary sclerosis (Kucher and Shabanov, 1976). This accumulation blocked blood tissue barriers, which are permeable under normal conditions, preventing the normal transport of metabolites. One manifestation of this condition was the inhibition of insulin production in the pancreatic islets due to damage to the beta cells contained therein.

The preliminary step in chromium-induced respiratory cancer is believed to be the scarring of alveolar tissue, followed by the elicitation of inflammatory reactions in lung tissue leading to bronchopneumonia, alveolar epithelial changes, atrophy, and benign tumor formation. Direct skin contact with high corrosive chromic acid and its anhydride produced skin ulcers and necrosis by mechanisms independent of any allergic response (Steven et al., 1976).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

### COBALT

Cobalt is a steel gray, shiny, hard, ductile ferromagnetic metal. Cobalt released into water is expected to take a soluble form. The mobility of cobalt is controlled by its characteristic of adsorbing to the clay minerals and hydrous oxides of iron, manganese, and aluminum available in sediments and soils. Chelation of cobalt is possible in sediments and soil (Hawley, 1987). Small amounts of cobalt may be solubilized by bacteriological activity. The effect of cobalt in the terrestrial environment is associated with nitrogen-fixation; however, excessive amounts can be toxic to plants. Vegetation is differentially susceptible to cobalt depending on the species. Grasses tend to be more susceptible to cobalt toxicity than broad leafed species (Davis, 1994).

In animal and human bodies, cobalt salts are well absorbed after oral ingestion, probably through the jejunum in the gastrointestinal tract. However, significant accumulation is not expected. Approximately 80 percent of all ingested cobalt is excreted in the urine with 15 percent of the remaining cobalt being excreted in the feces by an enterohepatic pathway. Breast milk and sweat are other secondary routes of excretion. Muscles contain the largest total fraction of cobalt, but fat has the highest concentrations. Among the organs that have a significantly higher concentration of cobalt than other organs are the liver, heart, and the hair (USEPA, 1985).

Cobalt metals and cobalt oxide have caused sarcomas at the injection site in rats. However, these data are inconclusive for determining the carcinogenic potential of cobalt. Because there have been no other positive carcinogenic animal bioassays, it is unlikely that cobalt poses a carcinogenic risk to humans (USEPA, 1985).

In terms of noncarcinogenic effects, ingestion of excessive amounts of cobalt results in vomiting, diarrhea, and a sensation of warmth in humans. Upon intravenous administration, flushing of the face, increased blood pressure, slow respiration, giddiness, tinnitus, and deafness due to nerve damage have been reported. Chronic oral exposure can cause goiter and decreased thyroid function, increased heart and respiration rates, and changes in blood lipid chemistry (USEPA, 1985).

### COPPER

Copper is a reddish-colored metal that occurs naturally in rock, soil, sediment, and air. Copper does not appear to have mutagenic properties (IRIS, 1990), but it is a teratogen (RTECS, 1991) and a possible carcinogen (Venugopal and Luckey, 1978). Copper is caustic with acute toxicity related to this causticity (Hatch, 1978).

The physicochemical form of copper released to the environment determines the impact of the element to the environment. Copper is released to water through natural weathering of soil and discharges from industries and sewage treatment plants. Copper released into water will most likely take the form of copper (II). Most copper in water is bound to organic matter; little is present in the free or readily exchangeable form. The concentration of dissolved copper in water is dependent on such factors as pH, the oxidation-reduction potential of the water, the presence of competing cations and anions of soluble cupric salts and the presence of organic/inorganic complexing agents (ATSDR, 1989a).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

The process of complexation, adsorption, and precipitation control the amount of copper (II) released into water. Copper released into water tends to bind to the bottom sediments. Organics and iron oxides are the most important contributors to binding of copper by aerobic sediments. However, copper is typically associated with carbonates. In anaerobic sediment, copper (II) will be reduced to copper (I) and insoluble cuprous salts will form (ATSDR, 1989a).

Copper released to soil will be strongly adsorbed and remain in the upper few centimeters of soil. In most soils, the pH, organic matter, and ionic strength of the soil solutions are the key factors affected adsorption. Copper will adsorb to organic matter, carbonate minerals, clay minerals, or hydrous iron and manganese oxides. Sandy soils with low pH have the greatest potential for leaching (ATSDR, 1989a).

No data were found that studied absorption of copper through inhalation or dermal exposure. However, via oral exposure, copper is absorbed in the stomach and small intestine. In humans, approximately 60 percent of an oral dose of $Cu^{64}$ as copper acetate was absorbed from the gastrointestinal tract. Once absorbed from the gastrointestinal tract, copper forms ionic copper or will bind to amino acids. The factors which may affect copper absorption include: competition with other metals, the amount of copper in the stomach, certain dietary components, and forms of copper (ATSDR, 1989a).

Wilson's disease (hepatolenticular degeneration), is the only significant manifestation of copper toxicity in humans. Death has been reported upon ingestion of large amounts of copper and attributed to extensive hepatic centrilobular necrosis. Systemic effects induced by copper ingestion include gastrointestinal irritation, manifested as vomiting, nausea, diarrhea, and anorexia. In individuals totally poisoned from copper, centrilobular necrosis of the liver and necrosis and sloughing of tubular cells in the kidney have been observed (ATSDR, 1989a).

The EPA carcinogen classification for copper is Group D - inadequate evidence of carcinogenicity. An elevated incidence of cancer has not been observed in humans or animals exposed to copper via inhalation, oral, or dermal routes of exposure (ATSDR, 1989a).

### CYANIDE

Cyanide is used widely and extensively in the manufacture of synthetic fabrics and plastics, in electroplating baths and metal mining operations, as pesticidal agents and intermediates in agricultural chemical production, and in predator control devices. Elevated cyanide levels are normally encountered in more than 1,000 species of food plants and forage crops, and this probably represents the greatest source of cyanide exposure and toxicosis to man and to range animals. Although cyanide is ubiquitous in the environment, levels tend to be elevated in the vicinity of metal processing operations, electroplates, gold-mining facilities, oil refineries, power plants, and solid waste combustion (Eisler, 1991).

Many chemical forms of cyanide are present in the environment, including free cyanide, metallocyanide complexes, and synthetic organocyanides, also known as nitriles. Yet only free cyanide is the primary toxic agent, regardless of origin.

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

All available evidence suggests that cyanide is neither mutagenic, teratogenic, nor carcinogenic. Moreover, there are no reports of cyanide biomagnification or cycling in living organisms, probably owing to its rapid detoxification. Cyanide seldom persists in surface waters and soils owing to complexation or sedimentation, microbial metabolism, and loss from volatilization (Eisler, 1991).

Higher plants are adversely affected by cyanide through cytochrome oxidase inhibition; the rate of production and release of cyanide by plants to the environment through death and decomposition is unknown. In some cases, soil bacteria and fungi produces cyanide as secondary metabolites, with adverse effects on certain plants. Several species of arthropods normally contain elevated whole-body cyanide concentrations, and these confer protection against predators and allow consumption of cyanogenic plants (Eisler, 1991).

Cyanide is less toxic to invertebrates than to vertebrates. Fish were the most sensitive aquatic organism tested. Biocidal properties of cyanide in aquatic environments were significantly modified by water, pH, temperature, and oxygen content; life stage, condition, and species assayed; previous exposure to cyanide; presence of other chemicals; and initial doses tested.

Birds that feed predominantly on flesh were more sensitive to cyanide than were herbivores.

In animals and human beings, cyanide is readily absorbed following inhalation, oral, and dermal routes of exposure. Following absorption by inhalation, cyanide is rapidly distributed by blood throughout the body. Metabolic pathways of cyanide include conversion to thiocyanate by either rhodanese or 3-mercaptopyruvate, conversion to 2-aminothiazoline-4-carboxylic acid, incorporation into a 1-carbon metabolic pool, or combining with hydroxycabalamin to form cyanocobalamin (USEPA, 1985).

Inhalation exposure to hydrogen cyanide gas can be rapidly lethal. Because of its high metabolic demands, the nervous system was the most effected by cyanide toxicity. Death from cyanide overdoses usually occurs through respiratory arrest. Inhalation and oral studies in animals have shown that cyanide exposure leads to encephalopathy in the corpus callosum, hippocampus, corpora striata, palladium, and the substantia nigra.

Additional studies have shown that cyanide induces cytotoxic damage to brain neurons via secondary effects on circulation and respiration. The most recent studies indicate that following acute cyanide exposure, disruption in neuronal calcium regulation may be an important factor in the manifestation of cyanide-induced neurotoxic events (USEPA, 1985).

A secondary effect from cyanide exposure is cardiovascular and respiratory perturbations in humans and animals. Reported symptoms included abnormal EKGs, increased blood levels of cardio-specific creatine phosphodinase, and altered cardiac and respiratory rates (USEPA, 1985).

Developmental toxicity was reported after administration of various concentrations of acetonitrile to pregnant hamsters. This study demonstrated concentration-related increases in maternal mortality, fetal resorptions, and fetal malformations consisting of exencephaly, exencephalocoele, and fused and bifurcated ribs. Studies concerning developmental effects of cyanide on humans were not

available. Also, studies regarding reproductive toxicity and genotoxicity of cyanide in humans and animals were not found in the available literature (USEPA, 1985).

The EPA has classified cyanides as Group D carcinogens - not classifiable as a human carcinogen. This indicates that pertinent data regarding the carcinogenicity in humans or animals have not been located in available literature or studies (IRIS, 1993).

## IRON

Iron is a silvery, white, malleable metal. It is the most abundant (by weight) of the elements that compose the earth's crust and in a major constituent in clay soils. Iron in water may be present in varying quantities dependent upon the geology of the area and other chemical components of the water body (USEPA, 1985). The bivalent and trivalent irons are the primary forms of concern in the aquatic environment. The ferrous or bivalent form can persist in waters void of dissolved oxygen and typically originate from groundwater of mines where these are pumped or drained. The ferric or trivalent form is insoluble. Iron can exist in natural organometallic or humic compounds and colloidal forms. Black or brown swamp waters may contain iron concentrations of several milligrams per liter in the presence or absence of dissolved oxygen, but this iron form has little effect on aquatic life. Iron entering water bodies is likely to partition into the bottom sediments (USEPA, 1985). Iron has relatively low mobility in soil.

There is some evidence that high concentrations of certain soluble iron salts may be teratogenic in animals. The ingestion of excess amounts of iron can irritate the gastrointestinal tract. A dose of approximately 30 grams of a soluble ferric salt is likely to be fatal in humans. Long-term inhalation exposure in an occupational setting to iron-containing dusts and fumes, especially iron oxide, can cause siderosis, a type of benign pneumoconiosis. Exposure to aerosols and mists of soluble iron salts may produce respiratory and skin irritation (USEPA, 1985).

## LEAD

Lead is a characteristic trace constituent in rocks, soils, water, plants, animals, and air. Lead is used in the manufacture of storage batteries, gasoline additives, pigment, alloys, and ammunition. Lead compounds are extremely persistent in water and soil. Natural lead compounds are not mobile in surface and groundwater because lead leached from ore is adsorbed by ferric hydroxide. Lead also readily combines with hydroxide, carbonate, and sulfate ions to form insoluble compounds. These compounds precipitate and settle in the bottom sediment. Lead is not volatile, therefore, volatilization is not an important transport process from the aquatic environment (USEPA, 1985).

In water, lead is most soluble and bioavailable under conditions of low pH; low organic content; low concentrations of suspended sediments; and low concentrations of the salts of calcium, cadmium, iron, manganese, and zinc. Lead tends to concentrate in the water surface microlayer (the upper 0.3 mm of water), especially when surface organic matter is present in thin films. However, most lead entering natural waters will precipitate to the sediment bottom as carbonates or hydroxides. Migration and speciation of lead in water are influenced by the water flow rate, increased flow rate

results in increased concentrations of particulate and labile lead and a decrease in bound forms. At low stream flow, lead is rapidly removed from the water column by sedimentation (Eisler, 1988b).

Lead in sediment is mobilized and released when the pH decreases suddenly or ionic composition changes. Methylation of lead occurs in the sediments and is positively correlated to increasing temperature, reduced pH, and high microbial activities (Davis, 1994).

Sorption is a dominant effect on the distribution of lead in soil. Lead readily adsorbs to inorganic solids, organic material and hydrous iron and manganese oxides. Because of its affinity for other materials, and its solubility characteristics, the mobility of lead in soil is low (USEPA, 1985). Lead is not readily taken up by plants. Therefore, its availability to terrestrial life forms also is limited. However, excessive amounts of lead can cause growth inhabitation, as well as reduced photosynthesis, mitosis, and water absorption (Eisler, 1988b).

Lead does not appear to significantly bioaccumulated in most fish (ATSDR, 1990b). Microcosm studies show that lead is not biomagnified through the food chain (USEPA, 1985). Lead concentrations tended to decrease markedly with increasing trophic level in both detritus-based and grazing aquatic food chains. However, lead is toxic to all phyla of aquatic biota, though effects are modified significantly by various biological and abiotic conditions (Eisler, 1988b).

Lead adversely influences survival, growth, development, and metabolism of most terrestrial species. The organic forms of lead tend to be more toxic to wildlife than the inorganic lead compounds, but the inorganic forms are easily converted into organic lead forms by microorganisms (Davis, 1994).

The toxic effects of lead on aquatic and terrestrial organisms are varied and include mortality, reduced growth and reproductive output, blood chemistry alterations, lesions, and behavioral changes. However, many of the effects exhibit general trends in their toxic mechanisms. Generally, lead inhibits the formation of heme, adversely affects blood chemistry, and accumulates at hematopoietic organs (Eisler, 1988b). At high concentrations near levels causing mortality, marked changes in the central nervous system occur prior to death (Eisler, 1988b).

Lead primarily enters the body by inhalation and ingestion. The primary site of absorption by ingestion in children is the gastrointestinal tract. Fifty percent of all dietary lead ingested by children is absorbed, whereas only 8 to 15 percent is absorbed by adults. Studies have also demonstrated that trans placental transfer of lead is possible. Inorganic lead is not metabolized in the body; rather it is absorbed, distributed and excreted. However, organic alkyl lead is metabolized in the liver via an oxidative dealkylation reaction that is catalyzed by cytochrome p-450 in animals (ATSDR, 1990b).

Lead affects various systems of the body. The endpoints elicited at low level exposure are neurobehavioral impairment, growth retardation in children, and hypertension in middle-aged men. High exposure levels produce encephalopathy, gastrointestinal effects, anemia, nephropathy, and electrocardiographic abnormalities (ATSDR, 1990b).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Lead affects the hematopoietic system by interfering with heme biosynthesis and ferrochelatase. The interference results in a reduction of the hemoglobin concentration in blood and an increase in erythrocyte destruction. The combination of these two effects produces hypochromic, normocytic anemia with associated reticulocytosis. The impairment of heme synthesis has a far ranging impact that is not limiting to the hematopoietic system (ATSDR, 1990b).

Lead exposure can also affect the central nervous system, cardiovascular system, and reproductive system. Death or irreversible health effects may occur as a result of central nervous system impairment. Common effects from high level exposure include cardiac lesions and electrocardiographic abnormalities. Hypertension has been clearly related to lead exposure. Additionally, because lead accumulates in the bones and is sporadically released into the blood, exposure prior to pregnancy may affect the fetus. Blood lead reaches the fetus by crossing through the placental barrier (ATSDR, 1990b).

The EPA has stated the "little can be concluded from available epidemiological studies" concerning the carcinogenic potential of lead (USEPA, 1990). However, the carcinogenicity of lead salts administered via injection or the oral route has been demonstrated in rats and mice in several studies. In most of the investigations, the carcinogenic response has been demonstrated only at the highest dose. Although the EPA has stated that animal data are sufficient to conclude carcinogenicity in animals, the Agency has further stated that available toxicity data on metallic lead and lead compounds are inadequate for quantitative risk assessment (IRIS, 1994).

### MANGANESE

Manganese is a brittle, silvery metal, which usually occurs as a complex with other metals, such as iron. Manganese can occur in soil, water, or air. Because it is an element, manganese cannot be degraded by environmental processes. However, it may transform from one manganese compound to another. While manganese can be transported in dusts or in water, the main source of routine manganese exposure is through ingestion of food. Vegetables, the germinal portions of grains, fruits, nuts, tea, and some spices are rich in manganese (Klaassen et al., 1986).

In the soil, the concentrations and chemical form in which manganese can occur is affected by pH, cation exchange capacity, drainage, and other factors. Lower pH and reducing conditions tend to favor solubility and hence, the mobility of manganese. Manganese often occurs at higher concentrations in the bottom of stratified lakes as a result of its release from bottom sediments as manganous ion under reducing conditions (USEPA, 1985).

Manganese can enter the body through the ingestion of manganese-bearing food or through the inhalation of air containing manganese fumes or dusts. It is considered an essential element and cofactor in a number of enzymatic reactions with daily intakes ranging from two to nine milligrams. Gastrointestinal absorption of the metal is less than five percent. Manganese is transported by a plasma-bound $\beta$1-globulin protein. It is widely distributed throughout the body, concentrating in cells rich in mitochondria. Consequently, tissues such as the pancreas, liver, kidney, and intestines, which contain high numbers of these organelles, tend to be deposits for manganese (Klaassen, 1987).

Noncarcinogenic effects in humans are most pronounced following inhalation exposure. The types of effects observed fall into two categories, depending upon the severity and duration of the exposure. The first type of effect observed, manganese pneumonitis, is the result of acute exposure. Individuals acutely exposed exhibit a lung condition characterized by pathologic changes including epithelial necrosis, followed by mononuclear proliferation. The second, and more serious effect observed following chronic manganese exposure, is characterized by neurologic symptoms. Chronic manganese poisoning is characterized by psychiatric disorders manifested as irritability, difficulty walking, speech disturbances and compulsive behaviors. Long-term etiology includes development of mask-like face and a Parkinsonian-like syndrome (Klaassen, 1987).

There are no epidemiological studies to suggest that manganese or its compounds are carcinogenic. Manganese is classified as a Group D carcinogen, indicating that it is not classifiable as a human carcinogen. The basis for this determination is the lack of existing studies to assess this material (IRIS, 1995). The evidence for rating manganese as a carcinogen in animals is considered inadequate. Most studies that have shown some evidence of carcinogenicity have failed to demonstrate a dose-response relationship (IRIS, 1995).

## MERCURY

Mercury is a silvery, heavy liquid. It exists as insoluble elemental mercury, organic species, and inorganic species. Mercury released to the environment will remain there indefinitely. The form that mercury exists in (organic or inorganic) may change with time. Chemical speciation is probably the most important variable influencing the ecotoxicology of mercury (Eisler, 1987b). Inorganic mercury can be methylated by microorganisms indigenous to soils, freshwater, and salt water. This process is mediated by various microbial populations under both aerobic and anaerobic conditions. Methyl mercury is the most hazardous mercury species due to its high stability, its lipid solubility, and its possession of ionic properties that create a high ability to penetrate membranes in living organisms. Methylmercury in surface waters is rapidly accumulated by aquatic organisms. The top-level predator species usually contain the highest concentrations of methyl mercury (Eisler, 1987b).

Freshwater plants exhibit a wide range of sensitivity to mercury; however, the most sensitive aquatic plant is less sensitive than the most sensitive freshwater animal. Fish tend to be more resistant to mercury than mollusks and crustaceans (Eisler, 1987b).

Mercury released into soils or surface water will exist in the mercuric state ($Hg^{++}$) and mercurous ($H^{+}$) states as a number of complex ions with varying water solubilities. Mercuric mercury, present as complexes and chelates with ligands, is probably the most predominant form of mercury present in surface waters (ATSDR, 1989c).

Volatile forms of mercury present in surface water are expected to evaporate into the air; whereas, solid forms of mercury partition to particulates or are transported in the water column, depending on their solubility. The two most important transformation processes in the fate of mercury in surface waters are biotransformation and bioaccumulation. Photolysis of organomercurial also may occur in surface waters (ATSDR, 1989c)

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Mercury released into soils may undergo the same chemical and biological transformations as mercury released into surface waters. Mercuric mercury usually forms complexes with chloride and hydroxide ions in soils. The specific compounds formed are dependent on pH, salt content, and composition of the soil solution (ATSDR, 1989c).

A number of toxic responses have been reported for mercury exposure. Eisler (1987b) reports that juvenile life stages are most susceptible to acute effects of mercury exposure. In fish, acute exposure, results in impaired respiration, sluggishness, and loss of equilibrium (Armstrong, 1979).

Mercury is a potent neurotoxin, resulting in impaired muscular coordination, weight loss, and apathy in birds, mammals, and fish (Eisler, 1987b). Other reported effects include histopathological changes, changes in enzyme activity levels, mutagenicity, teratogenicity, and reproductive impairment. Mercury, especially methylmercury, is known to concentrate in biological tissues and magnify through the food chain.

Mercury and its compounds have no known biological function. It is a mutagen, teratogen, and carcinogen, and causes embryocidal, cytochemical, and histopathological effects. Forms of mercury with relatively low toxicity can be transformed into forms of very high toxicity, such as methylmercury, through biological processes.

All mercury compounds interfere with thiol metabolism in organisms, causing inhibition or inactivation of proteins containing thiol ligands and ultimately leading to mitotic disturbances (Das et al, 1982). Mercury binds strongly with sulfhydryl groups. Phenyl-and methylmercury compounds are among the strongest known inhibitors of cell division (Birge et al., 1979). In mammals, methylmercury irreversibly destroys neurons of the central nervous system.

Early developmental stages are the most sensitive to toxic effects of mercury. Organomercury compound, especially methylmercury, are more toxic than inorganic forms. In aquatic organisms, mercury adversely affects reproduction, growth, behavior, osmoregulation and oxygen exchange. At comparatively low concentrations in birds and mammals, mercury adversely affects growth and development, behavior, motor coordination, vision, hearing, histology, and metabolism. In mammals, the fetus is the most sensitive stage (Eisler, 1987b)

### NICKEL

Nickel is a naturally occurring, silvery metal that is found in the earth's crust. Nickel released into water will exist in both soluble and insoluble forms depending on the chemical and physical properties of the water. Nickel has not been shown to volatilize from the water surface. Nickel is significantly bioaccumulated in some, but not all aquatic species (ATSDR, 1988). Nickel adversely influences cell membranes with increasing water hardness (Davis, 1994)

Nickel is extremely persistent in soil; however, it still has the potential to leach through soil into groundwater. The average residence time of nickel in soil is estimated to be 2,400 to 3,500 years. The sorption of nickel into soils has found to correlate with suspension pH, total iron, and surface area. Organic complexing agents in soil tend to restrict the movement and availability of nickel in soil by forming organo-nickel complexes. Nickel is not expected to volatilize from soils (ATSDR, 1996). Nickel is not essential to plants sometimes it produces toxic effects (Davis, 1994).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

The most probable exposure routes of nickel are through dermal contact, inhalation of dust, and ingestion of nickel-containing soils. The respiratory system is the primary targe of nickel exposure following inhalation. Manifestations such as inflammation of the lungs, fibrosis, macrophage hyperplasia, and increased lung weight have been noted in animals exposed to nickel. Animals exposed to nickel through oral exposure were noted to have lethargy, ataxia, irregular breathing, salvation, and squinting (ATSDR, 1996).

Teratogenic and reproductive effects of nickel in humans and animals are inadequate. However, mammalian cell transformations data suggests that specific nickel compounds are mutagenic and cause chromosomal alterations (ATSDR, 1988). Although the EPA has not assigned a carcinogen classification for soluble salts of nickel, it has assigned a Group A classification for nickel refinery dust, nickel carbonyl and nickel subsulfide. This classification indicates that there is sufficient evidence form epidemiologic studies to support a causal association between nickel exposure and cancer in humans (ATSDR, 1988).

### SILVER

Silver is a naturally occurring metal. It is acquired as a by-product during the retrieval of copper, lead, zinc, and gold ores. Silver has been used for surgical protheses, splints, fungicides, and coinage. Silver is currently being used in photographic materials, electrical products, paints, and batteries (ATSDR, 1989f).

Silver in water will exist as a monovalent ion in the forms of sulfate, bicarbonate, or sulfate salts or absorbed to particulate matter. In freshwater, silver may form complex ions with chlorides, ammonium, and sulfates; form soluble organic compounds; become adsorbed onto humic complexes and suspended particulates; or become incorporated into, or adsorbed onto aquatic biota. Sorption is the primary process causing silver partitioning in sediments. The majority of silver released into water will be sorbed by manganese dioxide which is affected by pH and oxidation-reduction conditions (ATSDR, 1989f).

The transportation of silver released to soils is dependent on the drainage (silver tends to be removed from well-drained soils), oxidation-reduction potential, pH conditions, and the presence of organic matter. Silver tends to form complexes with inorganic chemicals and humic substances in soils. Silver is not likely to biotransform due to its toxicity to soil microorganisms and inhibition of bacterial biodegrative enzymes (ATSDR, 1989f).

The major forms of silver in the atmosphere include metallic silver, silver sulfide, silver sulfate, silver carbonate, and silver halides. Silver released into the atmosphere is likely to travel long distances as fine particles (ATSDR, 1989f).

### THALLIUM

Thallium is crystalline form blue-white metal. Thallium metal forms a brownish-black oxide upon exposure to air. Thallium is highly reactive, readily soluble in acids and forms monovalent thallous and trivalent thallic salts, the latter being less stable (Friberg et al., 1986).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Thallium is found in the U.S.A. and Brazil in the minerals lorandite and crookesite. However, it is usually recovered from flue-dust residues from zinc and lead smelters and as a by-product of cadmium production. Thallous sulfate was used on a large scale as a rodenticide, but this has been replaced in some countries. Thallium is also used in photoelectric cells, lamps, in electronics, and in semiconductors and scintillation counters (Friberg et al., 1986).

Thallium is widely but sparingly distributed over the earth, mainly in rock formations and soils containing potassium feldspars and micas. Thallium is also found in potash, lead and zinc ores; and in fossil fuels. The most important sources of thallium exposure in the general population are air emissions from coal-burning power plants, and copper, lead, and zinc smelters (Friberg et al., 1986).

In reducing environments, thallium may be precipitated as the metal or as thallium sulfide. However, much of the thallium present in the aquatic systems is likely to remain in solution and be transported to the oceans. Active removal of some dissolved thallium by sorption to clay minerals and hydrous metal oxides present in bed sediments is probably an important environmental process. Thallium is readily taken up by aquatic organisms and bioaccumulation may also be an important process. Results of limited studies with algae suggest that thallium may also be available for food chain magnification (Doull et al., 1980).

There is no evidence to suggest that photolysis or volatilization are important environmental processes. Although there is speculation that thallium can be methylated under aerobic condition by electrophilic attack, biotransformation does not appear to be an important process in aquatic systems (Doull et al., 1980).

Thallium is not a normal constituent of animal tissues. It is absorbed through the skin and gastrointestinal tract (Klaassen, 1986). Symptoms associated with acute poisoning in humans include gastrointestinal irritation; liver and kidney damage; pulmonary edema; degenerative change in the adrenal, peripheral nervous system, and central nervous system; and ocular effects, including optic neuritis and, rarely, cataracts. Rats appear to be particularly sensitive to the catactogenic activity of thallium (Doull et al., 1980).

There is no evidence that thallium is carcinogenic to humans or experimental animals, and it does not appear to have significant mutagenic activity. Exposure to thallium salts during critical developmental stages is reported to produce achondroplasia in chickens and rats. No other significant teratogenic effects are reported (Doull et al., 1980).

### VANADIUM

Vanadium is a bright, white, soft, ductile metal. Vanadium is not found native, but is found in the following ores: patronite, roscoelite, carnotite, and vanadinite (Hawley, 1987). It can also be found in foods, such as milk, seafood, cereals, and vegetables (Klaassen et al., 1986). Vanadium is used as the target material for x-rays, in the manufacture of alloy steels, and as a catalyst for sulfuric acid and synthetic rubber (Hawley, 1987).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Vanadium released into surface water can be transported depending on the chemical species present and by environmental factors determining its solubility and binding to organic materials (Hawley, 1987).

Vanadium is moderately absorbed by human adipose tissue. Parenteral administration increases levels in the liver and kidney in animals, but these amounts may only be transient. Vanadium can also be found in lung tissue if it is inhaled, but other organs contain negligible amounts (Klaassen, 1987).

Vanadium has not produced carcinogenic, metagenic, teratogenic, or reproductive effects in humans or animals. However, industrial exposure to airborne vanadium compounds can cause eye and skin irritation. Also, gastrointestinal distress, nausea, vomiting, abdominal pain, cardiac palpitation, tremor, nervous depression, and kidney damage have been linked with industrial exposure (Klaassen, 1987).

### ZINC

Zinc is a bluish, white metal that is essential for normal growth and reproduction in plants and animals and is regulated by metallothioneins. Metallothioneins act as temporary zinc storage sites and aid in reducing the toxicity of zinc to both vertebrates and invertebrates (Olsson et al., 1989).

Zinc released into surface water does not volatilize, but primarily settles into the bottom sediments. Zinc can be present in water as either suspended or dissolved compounds. Dissolved zinc may occur as the free (hydrated) zinc ion or as dissolved complexes and compounds with varying degrees of stability. Suspended (undissolved) zinc may be dissolved following minor changes in the water chemistry or may be sorbed to suspended matter. The sorption of zinc is affected by the nature of the zinc, the concentrations of the zinc, the pH, and the salinity of the water. Zinc tends to be more absorbed at higher pH concentration (>7). Desorption of zinc from sediments occurs as salinity increases (ATSDR, 1989e).

Sorption of zinc is the dominant fate of zinc in the aquatic environment. Zinc partitions to sediments or suspended solids in surface water via sorption onto hydrous iron and manganese oxides, clay minerals, and organic matter. Transport of zinc in the aquatic environment is dependent upon the composition of suspended and bed sediments. Dissolved and particulate iron and manganese concentrations, pH, salinity, concentrations of complexing ligands, and the concentration of zinc affect the transport of zinc (Eisler, 1993). In freshwater, zinc is the most soluble at low pH and low alkalinity concentrations. In natural waters, two reactions can occur: the competition for complexation sites between metal ions, and the competition between different ligands for the same metal ion (ATSDR, 1989e).

Zinc is actively accumulated in aquatic systems. However, biota appear to represent a minor sink for zinc compared with the sediments (ATSDR, 1989e). Zinc bioavailability and toxicity to aquatic organisms are highest under conditions of low pH, low alkalinity, low dissolved oxygen, and elevated temperatures. Soluble species of zinc are the most bioavailable and most toxic (Eisler, 1993).

## K.1-ECOLOGICAL TOXICOLOGICAL PROFILES

Zinc released onto soil is likely to be strongly absorbed. The mobility of zinc in soil is dependent upon the solubility of the speciated forms of the compound and on the soil properties (sorption potential, pH, salinity; anaerobic). Little land-disposed zinc is in a soluble form; therefore, mobility is limited by a slow dissolution. Consequently, zinc is not likely to migrate into groundwater (ATSDR, 1989e).

Zinc has its primary metabolic effect on zinc-dependent enzymes that regulate the biosyntheses and catabolic rate of RNA and DNA. High levels of zinc induce copper deficiency and interfere with the metabolism of calcium and iron (Goyer, 1986). The pancreas and bone appear to be the primary targets of zinc toxicity in birds and mammals. Pancreatic effects include cytoplasmic vacuolation, cellular atrophy, and cell death (Lu and Combs, 1988). Zinc preferentially accumulates in bone, and induces osteomalacia (softening of the bone caused by a deficiency of calcium, phosphorus, and other minerals (Kaji et al., 1988). Gill epithelium is the primary target site in fish. Zinc toxicosis results in destruction of gill epithelium and tissue hypoxia (Spear, 1981).

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# APPENDIX K.2
# SITES 4, 21, AND 22 - TOXICITY BENCHMARK VALUES

## K.2 - SITES 4, 21, AND 22 - TOXICITY BENCHMARK VALUES

Studies used to estimate NOAELS and NOAELS not available from Suter et al. 1996 are discussed below.

### PAHs

The USEPA reported forestomach tumors in 100 percent of female mice fed 1,000 mg/kg BW/day of PAHs for 29 weeks. Rigdon (1967) conducted a feeding test on CFW mice. The endpoint in the test was forestomach tumors. Mice, in nine treatment groups, were fed between 0.13 mg/kg BW/day and 32.5 mg/kg BW/day for 110 days. The highest dose produced tumors in 90 percent of the mice. From this study, the NOAEL was determined to be 1.3 mg/kg BW/day and a LOAEL of 2.6 mg/kg BW/day (4 percent occurrence of tumors).

Based on these studies, 2.6 mg/kg BW/day LOAEL and 1.3 mg/kg BW/day NOAEL were for a 0.03 kg mouse (USEPA default body weight, 1993), were used to calculate NOAELs and LOAELs for the shrew, fox, mouse, mink, and vole.

Trust et al. (1993) conducted studies on adult and nesting European starlings. Nesting birds (nine days old) were gavaged with corn oil containing 7,12-dimethylbenz(a)anthracene at total doses of 0, 10, and 100 mg/kg BW/day (five equal doses of 0, 2, 20 mg/kg BW/day over five days). Nesting birds showed no adverse effects at 0 and 10 mg/kg Bw/day. However, 100 mg/kg BW/day resulted in 11 percent reductions in mean body weight, a 16 percent reduction in mean hemoglobin concentrations, and a 90 percent reduction in lymphocyte proliferation (as measured via a stimulation index). Adult starlings dosed as high as 300 mg/kg BW/day showed no adverse effects.

Based on the above-mention study, 100 mg/kg BW/day was used for a LOAEL and 10 mg/kg BW/day was used for a NOAEL (calculated from the LOAEL by dividing by a factor of ten) in the robin, quail, woodcock, wren, and hawk models for this ecological RA.

### DDD, DDE, and DDT

A study conducted by Ford (1991) found DDT doses of 0.088 mg/kg/day to have no effects on quail. Another study conducted by Fitzbugh (1948) using rats found an NOAEL value of 0.8 mg/kg/day. For this ecological RA, a NOAEL of 0.88 mg/kg/day was used in the receptor models for the heron, wren, woodcock, hawk, and robin for DDD, DDE, and DDT. A NOAEL value of 0.8 mg/kg/day for a 0.35 kg rat (default body weight, USEPA, 1993) was used to calculate NOAELS and NOAELS for mammalian receptors for DDD, DDE, and DDT. No NOAELS or LOAELs were found for the fish or frog models; therefore, these receptors were not modeled in the ecological assessment for DDD, DDE, or DDT.

### 1,3-Dinitrobenzene

A study (Linder et al., 1986) was conducted on Sprague-Dawley rats to determine reproductive impacts of 1,3-dinitrobenzene. The study was conducted for five days a week for 12 weeks. Rats were fed doses of 0, 0.75, 1.5, 3.0, and 6 mg/kg/day of dinitrobenzene. No offspring were produced from untreated females and males dosed with 3 or 6 mg/kg/day of RDX. Decreased spermatogenesis occurred in males dosed with 1.5 mg/kg/day. No adverse effects were observed at 0.75 mg/kg/day of RDX.

## K.2 - SITES 4, 21, AND 22 - TOXICITY BENCHMARK VALUES

Cody et al. (1981) conducted a study on Charles River rats for 7 days a week for 16 weeks. The rats were orally fed (through drinking water) 0, 3, 8, and 20 mg/L of RDX. The average doses were reported to be 0, 0.4, 1.13, and 2.64 mg/kg for males. The test results show a significant decrease in testes weight and histological evidence of slight to moderate decrease in spermatogenesis in rats receiving 2.64 mg/kg/day. No adverse effects were observed at 1.13 or 0.4 mg/kg/day.

From the above studies, a chronic NOAEL of 0.054 mg/kg/day for a 0.35 kg rat (default body weight, USEPA, 1993) was used to calculate NOAELs and LOAELs for mammalian receptors.

### HMX

A study (Everett et al., 1985) conducted on B6C3Fi mice for 13-weeks fed doses of 0, 50, 12, 30, 75, and 200 mg/kg/day to males and doses of 0, 10, 30, 90, 250, and 750 mg/kg/day. The study found a decrease in survival at dose levels greater than 30000 μg/kg/day.

For this assessment, a NOAEL of 3 mg/kg/day for a 0.03 kg mouse (default body weight, USEPA, 1993) was used to calculate NOAELs and LOAELs in the receptor models for the shrew, vole, mink, fox, and mouse. No NOAEL values were located for the avian and aquatic species; therefore, HMX concentrations were not evaluated in the bass, frog, heron, robin, woodcock, wren, quail, or hawk receptor models.

### RDX

A lowest chronic value for the protection of fish of 4,900 μg/L was used as a NOAEL in this ecological assessment (Talmage and Opresko, 1996b).

A study (Lish et al., 1984) was conducted on B6C3Fi mice for two years. The mice were exposed to dose concentrations of 0, 1.5, 7.0, 35.0, and 100 mg/kg/day of RDX. Statistically significant levels of testicular degeneration occurred at 35 and 100 mg/kg/day. In addition, at these levels, dosed females exhibited a statistically significant increase in hepatocellular carcinomas. Weekly and biweekly body weights for the male mice in the 78 mg/kg/day group ranged from 24.1 g before the test began to 38.6 g after 53 weeks and 37.8 g after 104 weeks. The overall mean of weekly and biweekly means was calculated to be 35.9g.

A NOAEL of 7 mg/kg/day for a 0.03 kg mouse (default body weight, USEPA, 1993) was used in this risk assessment to calculate NOAELs and LOAELs for mammalian receptors.

### 1,3,5-Trinitrobenzene

A study (Pathology Associates, Inc., 1994) was conducted on male white-foot mice for 90-days to determine reproductive effects. Mice were fed doses of 0, 150, 375, and 750 mg/kg diet. The average doses were calculated at 0, 23.5, 67.44, and 113.51 mg/kg/day of trinitrobenzene. Seminiferous tubular degeneration was observed in 3 of the 9 males receiving 113.51 mg/kg/day of trinitrobenzene. No adverse testicular effects were found in the mice dosed with 23.5 and 67.4 mg/kg/day of trinitrobenzene.

Another rat study (Reddy et al., 1994) was conducted for 90-days. The rats were dosed with 0, 4, 21, and 44 mg/kg/day of trinitrobenzene. Moderate to severe seminiferous tubular degeneration was seen in males receiving 21 or 44 mg/kg/day of the trinitrobenzene. No adverse effects occurred at 4 mg/kg/day.

For this assessment, a chronic NOAEL of 0.4 mg/kg/day for a 0.35 kg rat (default body weight, USEPA, 1993) was used to calculate NOAELs and LOAELs for mammalian receptors to trinitrobenzene concentrations.

**2,4,6-Trinitrotoluene (surface soil, surface water, and sediment)**

A study conducted by Bailey and Spanggord (1983) found TNT to cause no effects to fathead minnow eggs at concentrations ranging from 40 to 1200 μg/L. A NOAEL value of 40 μg/L was used to assess effects of surface water concentrations of TNT to the fish community.

The study by Dilley et al. (1982) in which Sprague-Dawley rats were administered TNT in the diet at doses of 0, 1.4, 6.97, 34.7, or 160 mg/kg/day for 13 weeks was chosen to derive screening benchmarks for representative wildlife. A NOAEL of 1.6 mg/kg/day was calculated from a subchronic LOAEL of 160 mg/kg/day with the endpoint being effects on the reproductive system.

A 13-week study (Levine et al., 1990) was conducted using rats to determine reproductive system affects to TNT concentrations. The rats were fed 0, 2, 5, 25, 125, 300 mg/kg/day of TNT. Anemia and congestion of the spleen occurred in male rats receiving 25 mg/kg/day. Males and females dosed with 300 mg/kg/day exhibited histopathologic changes in the brain, liver, and kidneys. The incidence of degeneration of the seimniferous tubular epithelium of the testes was 1/10, 6/10, 10/10 for males dosed with 25, 125, and 300 mg/kg/day was LOAEL for testicular atrophy and 5 mg/kg/day was the NOAEL.

For this assessment, a chronic NOAEL of 0.5 mg/kg/day for a 0.35 kg rat (default body weight, USEPA, 1993) of TNT was used to calculate NOAELs and LOAELs to mammalian receptors. No NOAELs were found for avian or aquatic species; therefore, TNT was not assessed in the bass, frog, heron, robin, woodcock, wren, quail, or hawk models.

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## K.2 - SITES 4, 21, AND 22 - TOXICITY BENCHMARK VALUES


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# APPENDIX K.3
# FIELD DATA FORMS

SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 22 SD01 Date: 8-23-96 Time: ~~0840~~ 0915

Samplers: AMB/PAM Date: _____ Time: _____

Water Body: Marsh of Felgates State: _____ County: _____

Sample Type: Fish Benthic Macroinvertebrate (Sediment) Surface Water

SAMPLING EQUIPMENT: Seine Gill Net Ponar Kemmerer Sediment Corer Spoon Other: (Spoon)

Riparian Zone/Instream Features

Predominant Surrounding Land Use: (Forest) Urban Industrial Other: + brocell

Shore Vegetation: grasses

Aquatic Vegetation: _____

Estimated Stream Width: NA ft Est. Stream Depth: NA ft Riffle: — ft Run: — ft Pool: — ft

Stream Type: Cold Water Warm Water Velocity: _____ Channelized: Yes __ No __

Canopy Cover: Open Partly Open (Partly Shaded) Shaded

Sediment/Substrate:

Sediment Odors: Normal Sewage Petroleum Chemical (Anaerobic) Other: _____

Sediment Oils: (Absent) Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: ____ Replicate #2: ____ Replicate #3: ____

Sediment Description: brown silt

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: Normal Sewage Petroleum Chemical Other: _____

Water Surface Oils: Slick Sheen None Secchi: _____ ft.

Turbidity: Clear Slightly Turbid Turbid Opaque Water Color: _____

Weather Conditions: _____ Tide: In Out

Comments: _____

## SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 225D02 Date: 8-23-96 Time: 1000

Samplers: AMB/BAM Date: _____ Time: _____

Water Body: Marsh of Felgates State: _____ County: _____

Sample Type: Fish Benthic Macroinvertebrate (Sediment) Surface Water

SAMPLING EQUIPMENT: Seine Gill Net Ponar Kemmerer Sediment Corer Spoon Other (Spoon)

Riparian Zone/Instream Features

Predominant Surrounding Land Use: (Forest) Urban Industrial Other: & broad

Shore Vegetation: grasses

Aquatic Vegetation: _____

Estimated Stream Width: NA ft Est. Stream Depth: NA ft Riffle: NA Run: _____ft Pool: _____ft

Stream Type: Cold Water Warm Water Velocity: _____ Channelized: Yes __ No __

Canopy Cover: Open Partly Open (Partly Shaded) Shaded

Sediment/Substrate:

Sediment Odors: Normal Sewage Petroleum Chemical (Anaerobic) Other: _____

Sediment Oils: (Absent) Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: ____ Replicate #2: ____ Replicate #3: ____

Sediment Description: brown silt

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: Normal Sewage Petroleum Chemical Other: _____

Water Surface Oils: Slick Sheen None Secchi: _____ft.

Turbidity: Clear Slightly Turbid Turbid Opaque Water Color: _____

Weather Conditions: _____ Tide: In Out

Comments: _____

SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 22SD03 Date: 8-23-96 Time: 1110

Samplers: AMB/PAM Date: _____ Time: _____

Water Body: Marsh off Felgates State: _____ County: _____

Sample Type: Fish Benthic Macroinvertebrate (Sediment) Surface Water

SAMPLING EQUIPMENT: Seine Gill Net Ponar Kemmerer Sediment Corer (Spoon) Other: _____

Riparian Zone/Instream Features

Predominant Surrounding Land Use: (Forest) Urban Industrial Other: + brocelf

Shore Vegetation: grasses

Aquatic Vegetation: _____

Estimated Stream Width: NA ft Est. Stream Depth: NA ft Riffle: NA ft Run: NA ft Pool: NA ft

Stream Type: Cold Water Warm Water Velocity: _____ Channelized: Yes __ No __

Canopy Cover: Open (Partly Open) Partly Shaded Shaded

Sediment/Substrate:

Sediment Odors: Normal Sewage Petroleum Chemical (Anaerobic) Other: _____

Sediment Oils: (Absent) Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: ____ Replicate #2: ____ Replicate #3: ____

Sediment Description: brown silt

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: Normal Sewage Petroleum Chemical Other: _____

Water Surface Oils: Slick Sheen None Secchi: _____ ft.

Turbidity: Clear Slightly Turbid Turbid Opaque Water Color: _____

Weather Conditions: _____ Tide: In Out

Comments: _____

SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 1SW/SD07 Date: 8-22-96 Time: 1305(SW) 1323(SC)

Samplers: AMB/JAG/PAM Date: 8-22-96 Time: 1350(benthics)

Water Body: headwaters of Felgates State: _____ County: _____

Sample Type: Fish Benthic Macroinvertebrate Sediment Surface Water

SAMPLING EQUIPMENT: Seine Gill Net Ponar Kemmerer Sediment ~~Corer~~ Sleeve Spoon Other: ~~Dip~~ Peristaulic Pump

Riparian Zone/Instream Features

Predominant Surrounding Land Use: Forest Urban Industrial Other: _____

Shore Vegetation: hardwoods

Aquatic Vegetation: None

Estimated Stream Width: 2-3 ft Est. Stream Depth: 1"-3" ~~ft~~ Riffle: ____ft Run: ____ft Pool: ____ft

Stream Type: Cold Water Warm Water Velocity: _____ Channelized: Yes __ No __

Canopy Cover: Open Partly Open Partly Shaded Shaded

Sediment/Substrate:

Sediment Odors: Normal Sewage Petroleum Chemical Anaerobic Other: _____

Sediment Oils: Absent Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: 2 Replicate #2: 2 Replicate #3: 2

Sediment Description: Coarse sand

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| surface | 21.5 | 6.70 | NA | 164.9 | 0.01 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: Normal Sewage Petroleum Chemical Other: _____

Water Surface Oils: Slick Sheen None Secchi: _____ft.

Turbidity: Clear Slightly Turbid Turbid Opaque Water Color: _____

Weather Conditions: _____ Tide: In Out NA

Comments: _____

SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 4SW/SD08 Date: 8-22-96 Time: 1135(SW) 1200(BN) 1143(Sd)

Samplers: AMB/PAM/JAG Date: Time:

Water Body: headwaters of Felgates State: County:

Sample Type: Fish Benthic Macroinvertebrate Sediment Surface Water

SAMPLING EQUIPMENT: Seine Gill Net Ponar Kemmerer Sediment ~~Corer~~ Sleeve Spoon Other: DIP

Riparian Zone/Instream Features

Predominant Surrounding Land Use: Forest Urban Industrial Other:

Shore Vegetation: hardwood

Aquatic Vegetation: None

Estimated Stream Width: 1-3 ft Est. Stream Depth: 1/2"-4" ~~ft~~ Riffle: — ft Run: — ft Pool: — ft

Stream Type: Cold Water Warm Water Velocity: Channelized: Yes __ No __

Canopy Cover: Open Partly Open Partly Shaded Shaded

Sediment/Substrate:

Sediment Odors: Normal Sewage Petroleum Chemical Anaerobic Other:

Sediment Oils: Absent Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: 3 Replicate #2: 2 Replicate #3: 2

Sediment Description: Coarse Sand

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| Surface | 26.0 | 7.36 | NA | 382.2 | 0.2 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: Normal Sewage Petroleum Chemical Other:

Water Surface Oils: Slick Sheen None Secchi: ft.

Turbidity: Clear Slightly Turbid Turbid Opaque Water Color:

Weather Conditions: Tide: In Out NA

Comments: Freshwater

SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 4SW/SD09 Date: 8-20-96 Time: 1710(SW)/1718(SD)

Samplers: AMB/PAM/JAG Date: 8-21-96 Time: 1520(benthics)

Water Body: Felgates east branch State: VA County: _____

Sample Type: Fish (Benthic Macroinvertebrate) (Sediment) (Surface Water)

SAMPLING EQUIPMENT: Seine Gill Net (Ponar) Kemmerer Sediment ~~Corer~~ sleeve Spoon Other: (Dip)

Riparian Zone/Instream Features

Predominant Surrounding Land Use: (Forest) Urban Industrial Other: _____

Shore Vegetation: grasses

Aquatic Vegetation: Marshy area

Estimated Stream Width: 4-5 ft Est. Stream Depth: 1-3 ft Riffle: — ft Run: — ft Pool: — ft

Stream Type: Cold Water (Warm Water) Velocity: tidal Channelized: Yes __ No X

Canopy Cover: (Open) Partly Open Partly Shaded Shaded

Sediment/Substrate:

Sediment Odors: Normal Sewage Petroleum Chemical (Anaerobic) Other: Strong

Sediment Oils: Absent Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: 2 Replicate #2: 2 Replicate #3: 2

Sediment Description: dark gray silt w/ sand traces + organic debris

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| below surface | 27.9 | NA | NA | 15,550 | 9.0 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: (Normal) Sewage Petroleum Chemical Other: _____

Water Surface Oils: Slick Sheen (None) Secchi: _____ ft.

Turbidity: Clear Slightly Turbid (Turbid) Opaque Water Color: _____

Weather Conditions: Sunny, appx 75° Tide: In (Out)

Comments: _____

# SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 4SA13D10 Date: Aug 20, 96 Time: 1100 (sw)

Samplers: AMB/JAG/PAM Date: Aug 20, 96 Time: 1208 (sd) 8-21-96 (0755) (Fish) (1010) (benthic)

Water Body: East branch of Felgates State: VA County:

Sample Type: (Fish) (Benthic Macroinvertebrate) (Sediment) (Surface Water)

SAMPLING EQUIPMENT: Seine (Gill Net) (Ponar) ~~Kemmerer~~ Sediment Corer Spoon (Other: Dip) (Sod sleeve)

Riparian Zone/Instream Features

Predominant Surrounding Land Use: (Forest) Urban Industrial Other:

Shore Vegetation: Grasses

Aquatic Vegetation: None

Estimated Stream Width: 10' ft Est. Stream Depth: <1-3 ft Riffle: – ft Run: – ft Pool: – ft

Stream Type: Cold Water (Warm Water) Velocity: tidal Channelized: Yes _ No X

Canopy Cover: (Open) Partly Open Partly Shaded Shaded

Sediment/Substrate:

Sediment Odors: Normal Sewage Petroleum Chemical (Anaerobic) Other:

Sediment Oils: (Absent) Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: 1 Replicate #2: ~~1~~ 1 Replicate #3: ~~2~~ 1

Sediment Description: Gray silt/sand w/ organic debris

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| below surface ~~mid~~ | 28.3 | 8.37 | NA | 11.75 | 7.5 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: (Normal) Sewage Petroleum Chemical Other:

Water Surface Oils: Slick Sheen (None) Secchi: — ft.

Turbidity: Clear Slightly Turbid (Turbid) Opaque Water Color: Brown

Weather Conditions: Tide: In (Out)

Comments: At mouth of trib. is ~~the~~ East branch of Felgates
→ Collected duplicate & MS/MSD

## SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 4SW/SD11 Date: 8-20-96 Time: 1045 (SW) 1843 (SD)

Samplers: AMB; PAM; JAG Date: 8-21-96 Time: 1045 (benthics)

Water Body: Eastern Branch Felgates State: VA County: _____

Sample Type: Fish Benthic Macroinvertebrate (Sediment) (Surface Water)

SAMPLING EQUIPMENT: Seine Gill Net Ponar Kemmerer Sediment Corer Spoon Other: Dip

Riparian Zone/Instream Features

Predominant Surrounding Land Use: (Forest) Urban Industrial Other: _____

Shore Vegetation: grasses

Aquatic Vegetation: _____

Estimated Stream Width: 75 ft Est. Stream Depth: 3-5 ft Riffle: — ft Run: — ft Pool: — ft

Stream Type: Cold Water (Warm Water) Velocity: tidal Channelized: Yes __ No __

Canopy Cover: (Open) Partly Open Partly Shaded Shaded

Sediment/Substrate:

Sediment Odors: (Normal) Sewage Petroleum Chemical Anaerobic Other: _____

Sediment Oils: (Absent) Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: 1 Replicate #2: 2 Replicate #3: 2

Sediment Description: gray silt

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| below surface | 22.62 | 8.62 | NA | 13,000 | 7.4 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: (Normal) Sewage Petroleum Chemical Other: _____

Water Surface Oils: Slick Sheen (None) Secchi: _____ ft.

Turbidity: Clear Slightly Turbid (Turbid) Opaque Water Color: _____

Weather Conditions: Sunny ~75° F windy Tide: In (Out)

Comments: _____

SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 1SW/SD12 Date: 8-20-96 Time: 1145(SW) 1248(SD)

Samplers: AMB, PAM, JAG Date: 8-21-96 Time: 0855(fish) 0945(Benthic)

Water Body: East. Branch Felgates State: VA County: _____

Sample Type: Fish Benthic Macroinvertebrate Sediment Surface Water

SAMPLING EQUIPMENT: Seine Gill Net Ponar Kemmerer Sediment Corer Spoon Other: Dip Sleeve

Riparian Zone/Instream Features

Predominant Surrounding Land Use: Forest Urban Industrial Other: _____

Shore Vegetation: Grasses

Aquatic Vegetation: None

Estimated Stream Width: 50 ft Est. Stream Depth: 3-5 ft Riffle: — ft Run: — ft Pool: — ft

Stream Type: Cold Water Warm Water Velocity: tidal Channelized: Yes _ No X

Canopy Cover: Open Partly Open Partly Shaded Shaded

Sediment/Substrate:

Sediment Odors: Normal Sewage Petroleum Chemical Anaerobic Other: _____

Sediment Oils: Absent Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: 2 Replicate #2: 2 Replicate #3: 2 jars

Sediment Description: gray silt/ sand w/ alot of organic debris

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| belowsurface | 26.9 | 7.49 | 2.55 | 13.91 | 8.1 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: Normal Sewage Petroleum Chemical Other: _____

Water Surface Oils: Slick Sheen None Secchi: _____ ft.

Turbidity: Clear Slightly Turbid Turbid Opaque Water Color: brown

Weather Conditions: _____ Tide: In Out

Comments: _____

SAMPLING STATION CHARACTERIZATION DATA SHEET

Station Number: 4SW/SD13 Date: 8-22-96 Time: 0903(Sd) 11

Samplers: AMB/JAG/PAM Date: Time:

Water Body: Felgates-East branch State: VA County:

Sample Type: Fish Benthic Macroinvertebrate Sediment Surface Water

SAMPLING EQUIPMENT: Seine Gill Net Ponar Kemmerer Sediment Corer Spoon Other:

Riparian Zone/Instream Features

Predominant Surrounding Land Use: (Forest) Urban Industrial Other:

Shore Vegetation: grasses + forest

Aquatic Vegetation:

Estimated Stream Width: 5-6 ft Est. Stream Depth: NA ft Riffle: — ft Run: — ft Pool: — ft

Stream Type: Cold Water (Warm Water) Velocity: tidal Channelized: Yes — (No)

Canopy Cover: Open Partly Open Partly Shaded Shaded

Sediment/Substrate:

Sediment Odors: Normal Sewage Petroleum Chemical (Anaerobic) Other: Silt

Sediment Oils: (Absent) Slight Moderate Profuse HNu

Ponar Grab: Number of Jars Filled with Sediments Replicate: #1: ____ Replicate #2: ____ Replicate #3: ____

Sediment Description: dark gray sand

Water:

| Depth | Temp. °C | pH (s.u.) | Dissolved Oxygen (mg/L) | Conductivity (micromhos/cm) | Salinity (ppt) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Water Odors: Normal Sewage Petroleum Chemical Other:

Water Surface Oils: Slick Sheen None Secchi: ____ ft.

Turbidity: Clear Slightly Turbid Turbid Opaque Water Color:

Weather Conditions: Tide: In (Out)

Comments: No water present when collected sediment checked @ high tide still no water - sediments are wet ∴ no sw or benthics were collected

# APPENDIX L
# RECEPTOR MODELS

# APPENDIX L.1
# TERRESTRIAL RECEPTOR MODELS, SITE 4 - SOIL HOT SPOT

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | American Woodcock | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.730E-02 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.663E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.270E-01 | |
| FI | Food ingestion rate (kg/day) | 1.663E-01 | |
| WI | Water ingestion rate (L/day) | 2.113E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 3710 | 0.147 | 2.00E-01 | 1.48E+03 | 1.097E+02 | 13.5 |
| Antimony | 20.4 | 0 | 1.00E+00 | 2.95E+01 | NA | NA |
| Arsenic | 486 | 0 | 5.23E-01 | 3.99E+02 | 2.460E+00 | 162.2 |
| Barium | 45.3 | 0.0308 | 3.60E-01 | 2.75E+01 | 2.080E+01 | 1.3 |
| Chromium | 6.9 | 0.0037 | 3.16E+00 | 2.95E+01 | 1.000E+00 | 29.5 |
| Copper | 15 | 0 | 1.53E+00 | 3.21E+01 | 4.700E+01 | 0.7 |
| Iron | 8910 | 0.336 | 1.00E-01 | 2.38E+03 | NA | NA |
| Lead | 45 | 0 | 1.52E+00 | 9.58E+01 | 3.850E+00 | 24.9 |
| Manganese | 224 | 0.0947 | 1.24E-01 | 6.69E+01 | 9.770E+02 | 0.1 |
| Vanadium | 11.8 | 0.0034 | 8.80E-02 | 2.97E+00 | 1.140E+01 | 0.3 |
| Zinc | 79.7 | 0 | 1.29E+01 | 1.36E+03 | 1.450E+01 | 93.5 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK
CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.077 | 0 | 2.00E+00 | 2.12E-01 | 8.800E-01 | 0.2 |
| 4,4'-DDE | 0.073 | 0 | 1.06E+01 | 1.02E+00 | 8.800E-01 | 1.2 |
| 4,4'-DDT | 0.93 | 0 | 7.00E-01 | 9.79E-01 | 8.800E-01 | 1.1 |
| alpha-Chlordane | 0.0078 | 0 | 3.00E+00 | 3.17E-02 | 2.140E+00 | 0.0 |
| Aroclor-1016 | 0.081 | 0 | 1.59E+01 | 1.70E+00 | NA | NA |
| Endosulfan II | 0.0046 | 0 | 1.00E+00 | 6.65E-03 | 1.000E+01 | 0.0 |
| Endrin Aldehyde | 0.011 | 0 | 1.00E+00 | 1.59E-02 | NA | NA |
| 2-Methylnaphthalene | 3 | 0 | 2.00E-01 | 1.19E+00 | 1.000E+01 | 0.1 |
| Acenaphthene | 25 | 0 | 3.00E-01 | 1.32E+01 | 1.000E+01 | 1.3 |
| Acenaphthylene | 0.58 | 0 | 2.20E-01 | 2.46E-01 | 1.000E+01 | 0.0 |
| Anthracene | 34 | 0 | 3.20E-01 | 1.89E+01 | 1.000E+01 | 1.9 |
| Benzo(a)anthracene | 67 | 0 | 2.70E-01 | 3.28E+01 | 1.000E+01 | 3.3 |
| Benzo(a)pyrene | 56 | 0 | 3.40E-01 | 3.26E+01 | 1.000E+01 | 3.3 |
| Benzo(b)fluoranthene | 54 | 0 | 2.10E-01 | 2.22E+01 | 1.000E+01 | 2.2 |
| Benzo(g,h,i)perylene | 14 | 0 | 1.50E-01 | 4.66E+00 | 1.000E+01 | 0.5 |
| Benzo(k)fluoranthene | 7.8 | 0 | 2.10E-01 | 3.21E+00 | 1.000E+01 | 0.3 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.04 | 1.00E+00 | 1.27E-01 | 1.100E+00 | 0.1 |
| Carbazole | 44 | 0 | 1.00E+00 | 6.36E+01 | 1.000E+01 | 6.4 |
| Chrysene | 63 | 0 | 4.40E-01 | 4.49E+01 | 1.000E+01 | 4.5 |
| Dibenz(a,h)anthracene | 6.1 | 0 | 4.90E-01 | 4.75E+00 | 1.000E+01 | 0.5 |
| Dibenzofuran | 8.1 | 0 | 1.00E+00 | 1.17E+01 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 3.47E-01 | 1.100E-01 | 3.2 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 8.53E-02 | NA | NA |
| Fluoranthene | 140 | 0 | 3.70E-01 | 8.69E+01 | 1.000E+01 | 8.7 |
| Fluorene | 12 | 0 | 2.00E-01 | 4.78E+00 | 1.000E+01 | 0.5 |
| Indeno(1,2,3-cd)pyrene | 32 | 0 | 4.10E-01 | 2.15E+01 | 1.000E+01 | 2.2 |
| Naphthalene | 8.9 | 0 | 2.10E-01 | 3.66E+00 | 1.000E+01 | 0.4 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 3.18E-01 | NA | NA |
| Phenanthrene | 120 | 0 | 2.80E-01 | 6.03E+01 | 1.000E+01 | 6.0 |
| Pyrene | 110 | 0 | 3.90E-01 | 7.12E+01 | 1.000E+01 | 7.1 |
| Trichloroethene | 0.008 | 0 | 1.00E+00 | 1.16E-02 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*BAF*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Bobwhite Quail | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil-Plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.803E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.803E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.540E-01 | |
| FI | Food ingestion rate (kg/day) | 1.803E-02 | |
| WI | Water ingestion rate (L/day) | 2.521E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 3710 | 0.147 | 4.00E-03 | 4.52E+01 | 1.097E+02 | 0.4 |
| Antimony | 20.4 | 0 | 2.00E-01 | 7.17E-01 | NA | NA |
| Arsenic | 486 | 0 | 1.10E+00 | 6.85E+01 | 2.460E+00 | 27.8 |
| Barium | 45.3 | 0.0308 | 1.50E-01 | 1.33E+00 | 2.080E+01 | 0.1 |
| Chromium | 6.9 | 0.0037 | 7.50E-03 | 8.75E-02 | 1.000E+00 | 0.1 |
| Copper | 15 | 0 | 6.25E-01 | 1.27E+00 | 4.700E+01 | 0.0 |
| Iron | 8910 | 0.336 | 4.00E-03 | 1.09E+02 | NA | NA |
| Lead | 45 | 0 | 4.68E-01 | 2.99E+00 | 3.850E+00 | 0.8 |
| Manganese | 224 | 0.0947 | 2.50E-01 | 9.20E+00 | 9.770E+02 | 0.0 |
| Vanadium | 11.8 | 0.0034 | 5.50E-03 | 1.46E-01 | 1.140E+01 | 0.0 |
| Zinc | 79.7 | 0 | 1.82E+00 | 1.79E+01 | 1.450E+01 | 1.2 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.077 | 0 | 1.15E-02 | 1.01E-03 | 8.800E-01 | 0.0 |
| 4,4'-DDE | 0.073 | 0 | 4.80E-03 | 8.96E-04 | 8.800E-01 | 0.0 |
| 4,4'-DDT | 0.93 | 0 | 6.50E-03 | 1.16E-02 | 8.800E-01 | 0.0 |
| alpha-Chlordane | 0.0078 | 0 | 8.90E-03 | 9.95E-05 | 2.140E+00 | 0.0 |
| Aroclor-1016 | 0.081 | 0 | 2.24E-02 | 1.16E-03 | NA | NA |
| Endosulfan II | 0.0046 | 0 | 9.45E-02 | 1.05E-04 | 1.000E+01 | 0.0 |
| Endrin Aldehyde | 0.011 | 0 | 1.89E-01 | 3.72E-04 | NA | NA |
| 2-Methylnaphthalene | 3 | 0 | 2.16E-01 | 1.11E-01 | 1.000E+01 | 0.0 |
| Acenaphthene | 25 | 0 | 2.10E-01 | 9.07E-01 | 1.000E+01 | 0.1 |
| Acenaphthylene | 0.58 | 0 | 1.65E-01 | 1.80E-02 | 1.000E+01 | 0.0 |
| Anthracene | 34 | 0 | 9.08E-02 | 7.60E-01 | 1.000E+01 | 0.1 |
| Benzo(a)anthracene | 67 | 0 | 1.97E-02 | 9.39E-01 | 1.000E+01 | 0.1 |
| Benzo(a)pyrene | 56 | 0 | 1.14E-02 | 7.30E-01 | 1.000E+01 | 0.1 |
| Benzo(b)fluoranthene | 54 | 0 | 1.01E-02 | 6.96E-01 | 1.000E+01 | 0.1 |
| Benzo(g,h,i)perylene | 14 | 0 | 5.20E-03 | 1.72E-01 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 7.8 | 0 | 1.01E-02 | 1.01E-01 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.04 | 2.30E-03 | 7.54E-03 | 1.100E+00 | 0.0 |
| Carbazole | 44 | 0 | 3.26E-01 | 2.19E+00 | 1.000E+01 | 0.2 |
| Chrysene | 63 | 0 | 1.97E-02 | 8.83E-01 | 1.000E+01 | 0.1 |
| Dibenz(a,h)anthracene | 6.1 | 0 | 5.30E-03 | 7.52E-02 | 1.000E+01 | 0.0 |
| Dibenzofuran | 8.1 | 0 | 1.45E-01 | 2.32E-01 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 8.38E-02 | 5.17E-03 | 1.100E-01 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 8.00E-04 | 6.96E-04 | NA | NA |
| Fluoranthene | 140 | 0 | 4.25E-02 | 2.34E+00 | 1.000E+01 | 0.2 |
| Fluorene | 12 | 0 | 1.43E-01 | 3.41E-01 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 32 | 0 | 5.60E-03 | 3.96E-01 | 1.000E+01 | 0.0 |
| Naphthalene | 8.9 | 0 | 4.43E-01 | 5.65E-01 | 1.000E+01 | 0.1 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 5.78E-01 | 1.75E-02 | NA | NA |
| Phenanthrene | 120 | 0 | 9.08E-02 | 2.68E+00 | 1.000E+01 | 0.3 |
| Pyrene | 110 | 0 | 4.31E-02 | 1.84E+00 | 1.000E+01 | 0.2 |
| Trichloroethene | 0.008 | 0 | 1.05E+00 | 1.08E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Marsh Wren | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.961E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 2.961E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 9.400E-03 | |
| FI | Food ingestion rate (kg/day) | 2.961E-03 | |
| WI | Water ingestion rate (L/day) | 2.804E-03 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 3710 | 0.147 | 2.00E-01 | 3.51E+02 | 1.097E+02 | 3.2 |
| Antimony | 20.4 | 0 | 1.00E+00 | 7.07E+00 | NA | NA |
| Arsenic | 486 | 0 | 5.23E-01 | 9.54E+01 | 2.460E+00 | 38.8 |
| Barium | 45.3 | 0.0308 | 3.60E-01 | 6.57E+00 | 2.080E+01 | 0.3 |
| Chromium | 6.9 | 0.0037 | 3.16E+00 | 7.09E+00 | 1.000E+00 | 7.1 |
| Copper | 15 | 0 | 1.53E+00 | 7.71E+00 | 4.700E+01 | 0.2 |
| Iron | 8910 | 0.336 | 1.00E-01 | 5.61E+02 | NA | NA |
| Lead | 45 | 0 | 1.52E+00 | 2.30E+01 | 3.850E+00 | 6.0 |
| Manganese | 224 | 0.0947 | 1.24E-01 | 1.58E+01 | 9.770E+02 | 0.0 |
| Vanadium | 11.8 | 0.0034 | 8.80E-02 | 7.00E-01 | 1.140E+01 | 0.1 |
| Zinc | 79.7 | 0 | 1.29E+01 | 3.26E+02 | 1.450E+01 | 22.5 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.077 | 0 | 2.00E+00 | 5.09E-02 | 8.800E-01 | 0.1 |
| 4,4'-DDE | 0.073 | 0 | 1.06E+01 | 2.46E-01 | 8.800E-01 | 0.3 |
| 4,4'-DDT | 0.93 | 0 | 7.00E-01 | 2.34E-01 | 8.800E-01 | 0.3 |
| alpha-Chlordane | 0.0078 | 0 | 3.00E+00 | 7.62E-03 | 2.140E+00 | 0.0 |
| Aroclor-1016 | 0.081 | 0 | 1.59E+01 | 4.08E-01 | NA | NA |
| Endosulfan II | 0.0046 | 0 | 1.00E+00 | 1.59E-03 | 1.000E+01 | 0.0 |
| Endrin Aldehyde | 0.011 | 0 | 1.00E+00 | 3.81E-03 | NA | NA |
| 2-Methylnaphthalene | 3 | 0 | 2.00E-01 | 2.83E-01 | 1.000E+01 | 0.0 |
| Acenaphthene | 25 | 0 | 3.00E-01 | 3.15E+00 | 1.000E+01 | 0.3 |
| Acenaphthylene | 0.58 | 0 | 2.20E-01 | 5.85E-02 | 1.000E+01 | 0.0 |
| Anthracene | 34 | 0 | 3.20E-01 | 4.50E+00 | 1.000E+01 | 0.4 |
| Benzo(a)anthracene | 67 | 0 | 2.70E-01 | 7.81E+00 | 1.000E+01 | 0.8 |
| Benzo(a)pyrene | 56 | 0 | 3.40E-01 | 7.76E+00 | 1.000E+01 | 0.8 |
| Benzo(b)fluoranthene | 54 | 0 | 2.10E-01 | 5.27E+00 | 1.000E+01 | 0.5 |
| Benzo(g,h,i)perylene | 14 | 0 | 1.50E-01 | 1.10E+00 | 1.000E+01 | 0.1 |
| Benzo(k)fluoranthene | 7.8 | 0 | 2.10E-01 | 7.62E-01 | 1.000E+01 | 0.1 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.04 | 1.00E+00 | 4.07E-02 | 1.100E+00 | 0.0 |
| Carbazole | 44 | 0 | 1.00E+00 | 1.52E+01 | 1.000E+01 | 1.5 |
| Chrysene | 63 | 0 | 4.40E-01 | 1.07E+01 | 1.000E+01 | 1.1 |
| Dibenz(a,h)anthracene | 6.1 | 0 | 4.90E-01 | 1.13E+00 | 1.000E+01 | 0.1 |
| Dibenzofuran | 8.1 | 0 | 1.00E+00 | 2.81E+00 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 8.32E-02 | 1.100E-01 | 0.8 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 2.04E-02 | NA | NA |
| Fluoranthene | 140 | 0 | 3.70E-01 | 2.07E+01 | 1.000E+01 | 2.1 |
| Fluorene | 12 | 0 | 2.00E-01 | 1.13E+00 | 1.000E+01 | 0.1 |
| Indeno(1,2,3-cd)pyrene | 32 | 0 | 4.10E-01 | 5.14E+00 | 1.000E+01 | 0.5 |
| Naphthalene | 8.9 | 0 | 2.10E-01 | 8.69E-01 | 1.000E+01 | 0.1 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 7.62E-02 | NA | NA |
| Phenanthrene | 120 | 0 | 2.80E-01 | 1.44E+01 | 1.000E+01 | 1.4 |
| Pyrene | 110 | 0 | 3.90E-01 | 1.70E+01 | 1.000E+01 | 1.7 |
| Trichloroethene | 0.008 | 0 | 1.00E+00 | 2.77E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red-Tailed Hawk | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.717E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 1.359E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 9.570E-01 | |
| FI | Food ingestion rate (kg/day) | 1.359E-01 | |
| WI | Water ingestion rate (L/day) | 6.796E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 3710 | 0.147 | 1.00E+00 | 5.37E+02 | 1.097E+02 | 4.9 |
| Antimony | 20.4 | 0 | 1.00E+00 | 2.95E+00 | NA | NA |
| Arsenic | 486 | 0 | 1.60E-02 | 2.48E+00 | 2.460E+00 | 1.0 |
| Barium | 45.3 | 0.0308 | 2.53E-01 | 1.76E+00 | 2.080E+01 | 0.1 |
| Chromium | 6.9 | 0.0037 | 3.09E-01 | 3.23E-01 | 1.000E+00 | 0.3 |
| Copper | 15 | 0 | 1.29E+00 | 2.79E+00 | 4.700E+01 | 0.1 |
| Iron | 8910 | 0.336 | 2.40E-02 | 5.57E+01 | NA | NA |
| Lead | 45 | 0 | 1.87E-01 | 1.32E+00 | 3.850E+00 | 0.3 |
| Manganese | 224 | 0.0947 | 1.00E+00 | 3.24E+01 | 9.770E+02 | 0.0 |
| Vanadium | 11.8 | 0.0034 | 1.00E+00 | 1.71E+00 | 1.140E+01 | 0.1 |
| Zinc | 79.7 | 0 | 2.32E+00 | 2.64E+01 | 1.450E+01 | 1.8 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.077 | 0 | 1.00E+00 | 1.11E-02 | 8.800E-01 | 0.0 |
| 4,4'-DDE | 0.073 | 0 | 1.00E+00 | 1.06E-02 | 8.800E-01 | 0.0 |
| 4,4'-DDT | 0.93 | 0 | 1.00E+00 | 1.35E-01 | 8.800E-01 | 0.2 |
| alpha-Chlordane | 0.0078 | 0 | 1.00E+00 | 1.13E-03 | 2.140E+00 | 0.0 |
| Aroclor-1016 | 0.081 | 0 | 1.00E+00 | 1.17E-02 | NA | NA |
| Endosulfan II | 0.0046 | 0 | 1.00E+00 | 6.66E-04 | 1.000E+01 | 0.0 |
| Endrin Aldehyde | 0.011 | 0 | 1.00E+00 | 1.59E-03 | NA | NA |
| 2-Methylnaphthalene | 3 | 0 | 1.00E+00 | 4.34E-01 | 1.000E+01 | 0.0 |
| Acenaphthene | 25 | 0 | 1.00E+00 | 3.62E+00 | 1.000E+01 | 0.4 |
| Acenaphthylene | 0.58 | 0 | 1.00E+00 | 8.40E-02 | 1.000E+01 | 0.0 |
| Anthracene | 34 | 0 | 1.00E+00 | 4.92E+00 | 1.000E+01 | 0.5 |
| Benzo(a)anthracene | 67 | 0 | 1.00E+00 | 9.70E+00 | 1.000E+01 | 1.0 |
| Benzo(a)pyrene | 56 | 0 | 1.00E+00 | 8.11E+00 | 1.000E+01 | 0.8 |
| Benzo(b)fluoranthene | 54 | 0 | 1.00E+00 | 7.82E+00 | 1.000E+01 | 0.8 |
| Benzo(g,h,i)perylene | 14 | 0 | 1.00E+00 | 2.03E+00 | 1.000E+01 | 0.2 |
| Benzo(k)fluoranthene | 7.8 | 0 | 1.00E+00 | 1.13E+00 | 1.000E+01 | 0.1 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.04 | 1.00E+00 | 1.49E-02 | 1.100E+00 | 0.0 |
| Carbazole | 44 | 0 | 1.00E+00 | 6.37E+00 | 1.000E+01 | 0.6 |
| Chrysene | 63 | 0 | 1.00E+00 | 9.12E+00 | 1.000E+01 | 0.9 |
| Dibenz(a,h)anthracene | 6.1 | 0 | 1.00E+00 | 8.83E-01 | 1.000E+01 | 0.1 |
| Dibenzofuran | 8.1 | 0 | 1.00E+00 | 1.17E+00 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 3.48E-02 | 1.100E-01 | 0.3 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 8.54E-03 | NA | NA |
| Fluoranthene | 140 | 0 | 1.00E+00 | 2.03E+01 | 1.000E+01 | 2.0 |
| Fluorene | 12 | 0 | 1.00E+00 | 1.74E+00 | 1.000E+01 | 0.2 |
| Indeno(1,2,3-cd)pyrene | 32 | 0 | 1.00E+00 | 4.63E+00 | 1.000E+01 | 0.5 |
| Naphthalene | 8.9 | 0 | 1.00E+00 | 1.29E+00 | 1.000E+01 | 0.1 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 3.19E-02 | NA | NA |
| Phenanthrene | 120 | 0 | 1.00E+00 | 1.74E+01 | 1.000E+01 | 1.7 |
| Pyrene | 110 | 0 | 1.00E+00 | 1.59E+01 | 1.000E+01 | 1.6 |
| Trichloroethene | 0.008 | 0 | 1.00E+00 | 1.16E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | American Robin | |
|---|---|---|---|
| BAF | Plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 0.0019 | |
| Iv | Rate of vegetation ingestion (kg/day) | 0.00759 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 0.01309 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 6.350E-02 | |
| FI | Food Ingestion Rate (kg/day) | 0.02068 | |
| WI | Water ingestion rate (L/day) | 1.287E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 3710 | 0.147 | 4.00E-03 | 2.00E-01 | 2.66E+02 | 1.097E+02 | 2.4 |
| Antimony | 20.4 | 0 | 2.00E-01 | 1.00E+00 | 5.30E+00 | NA | NA |
| Arsenic | 486 | 0 | 1.10E+00 | 5.23E-01 | 1.31E+02 | 2.460E+00 | 53.3 |
| Barium | 45.3 | 0.0308 | 1.50E-01 | 3.60E-01 | 5.54E+00 | 2.080E+01 | 0.3 |
| Chromium | 6.9 | 0.0037 | 7.50E-03 | 3.16E+00 | 4.71E+00 | 1.000E+00 | 4.7 |
| Copper | 15 | 0 | 6.25E-01 | 1.53E+00 | 6.30E+00 | 4.700E+01 | 0.1 |
| Iron | 8910 | 0.336 | 4.00E-03 | 1.00E-01 | 4.55E+02 | NA | NA |
| Lead | 45 | 0 | 4.68E-01 | 1.52E+00 | 1.80E+01 | 3.850E+00 | 4.7 |
| Manganese | 224 | 0.0947 | 2.50E-01 | 1.24E-01 | 1.91E+01 | 9.770E+02 | 0.0 |
| Vanadium | 11.8 | 0.0034 | 5.50E-03 | 8.80E-02 | 5.76E-01 | 1.140E+01 | 0.1 |
| Zinc | 79.7 | 0 | 1.82E+00 | 1.29E+01 | 2.31E+02 | 1.450E+01 | 16.0 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.077 | 0 | 1.15E-02 | 2.00E+00 | 3.42E-02 | 8.800E-01 | 0.0 |
| 4,4'-DDE | 0.073 | 0 | 4.80E-03 | 1.06E+01 | 1.62E-01 | 8.800E-01 | 0.2 |
| 4,4'-DDT | 0.93 | 0 | 6.50E-03 | 7.00E-01 | 1.63E-01 | 8.800E-01 | 0.2 |
| alpha-Chlordane | 0.0078 | 0 | 8.90E-03 | 3.00E+00 | 5.07E-03 | 2.140E+00 | 0.0 |
| Aroclor-1016 | 0.081 | 0 | 2.24E-02 | 1.59E+01 | 2.68E-01 | NA | NA |
| Endosulfan II | 0.0046 | 0 | 9.45E-02 | 1.00E+00 | 1.14E-03 | 1.000E+01 | 0.0 |
| Endrin Aldehyde | 0.011 | 0 | 1.89E-01 | 1.00E+00 | 2.84E-03 | NA | NA |
| 2-Methylnaphthalene | 3 | 0 | 2.16E-01 | 2.00E-01 | 2.91E-01 | 1.000E+01 | 0.0 |
| Acenaphthene | 25 | 0 | 2.10E-01 | 3.00E-01 | 2.92E+00 | 1.000E+01 | 0.3 |
| Acenaphthylene | 0.58 | 0 | 1.65E-01 | 2.20E-01 | 5.51E-02 | 1.000E+01 | 0.0 |
| Anthracene | 34 | 0 | 9.08E-02 | 3.20E-01 | 3.63E+00 | 1.000E+01 | 0.4 |
| Benzo(a)anthracene | 67 | 0 | 1.97E-02 | 2.70E-01 | 5.89E+00 | 1.000E+01 | 0.6 |
| Benzo(a)pyrene | 56 | 0 | 1.14E-02 | 3.40E-01 | 5.68E+00 | 1.000E+01 | 0.6 |
| Benzo(b)fluoranthene | 54 | 0 | 1.01E-02 | 2.10E-01 | 4.02E+00 | 1.000E+01 | 0.4 |
| Benzo(g,h,i)perylene | 14 | 0 | 5.20E-03 | 1.50E-01 | 8.60E-01 | 1.000E+01 | 0.1 |
| Benzo(k)fluoranthene | 7.8 | 0 | 1.01E-02 | 2.10E-01 | 5.80E-01 | 1.000E+01 | 0.1 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.04 | 2.30E-03 | 1.00E+00 | 2.77E-02 | 1.100E+00 | 0.0 |
| Carbazole | 44 | 0 | 3.26E-01 | 1.00E+00 | 1.21E+01 | 1.000E+01 | 1.2 |
| Chrysene | 63 | 0 | 1.97E-02 | 4.40E-01 | 7.75E+00 | 1.000E+01 | 0.8 |
| Dibenz(a,h)anthracene | 6.1 | 0 | 5.30E-03 | 4.90E-01 | 8.03E-01 | 1.000E+01 | 0.1 |
| Dibenzofuran | 8.1 | 0 | 1.45E-01 | 1.00E+00 | 2.05E+00 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 8.38E-02 | 1.00E+00 | 5.91E-02 | 1.100E-01 | 0.5 |
| Di-n-octylphthalate | 0.059 | 0 | 8.00E-04 | 1.00E+00 | 1.39E-02 | NA | NA |
| Fluoranthene | 140 | 0 | 4.25E-02 | 3.70E-01 | 1.56E+01 | 1.000E+01 | 1.6 |
| Fluorene | 12 | 0 | 1.43E-01 | 2.00E-01 | 1.06E+00 | 1.000E+01 | 0.1 |
| Indeno(1,2,3-cd)pyrene | 32 | 0 | 5.60E-03 | 4.10E-01 | 3.68E+00 | 1.000E+01 | 0.4 |
| Naphthalene | 8.9 | 0 | 4.43E-01 | 2.10E-01 | 1.12E+00 | 1.000E+01 | 0.1 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 5.78E-01 | 1.00E+00 | 6.71E-02 | NA | NA |
| Phenanthrene | 120 | 0 | 9.08E-02 | 2.80E-01 | 1.18E+01 | 1.000E+01 | 1.2 |
| Pyrene | 110 | 0 | 4.31E-02 | 3.90E-01 | 1.27E+01 | 1.000E+01 | 1.3 |
| Trichloroethene | 0.008 | 0 | 1.05E+00 | 1.00E+00 | 2.89E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Soil-plant bioaccumulation facotr | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 2.007E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 4.014E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 6.021E-03 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.960E-02 | |
| FI | Food Ingestion Rate (kg/day) | 1.004E-02 | |
| WI | Water ingestion rate (L/day) | 7.022E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 3710 | 0.147 | 4.00E-03 | 2.00E-01 | 2.69E+02 | 2.147E+00 | 125.5 |
| Antimony | 20.4 | 0 | 2.00E-01 | 1.00E+00 | 7.31E+00 | 1.390E-01 | 52.6 |
| Arsenic | 486 | 0 | 1.10E+00 | 5.23E-01 | 1.93E+02 | 1.401E-01 | 1376.0 |
| Barium | 45.3 | 0.0308 | 1.50E-01 | 3.60E-01 | 6.98E+00 | 1.107E+01 | 0.6 |
| Chromium | 6.9 | 0.0037 | 7.50E-03 | 3.16E+00 | 6.80E+00 | 5.626E+03 | 0.0 |
| Copper | 15 | 0 | 6.25E-01 | 1.53E+00 | 9.13E+00 | 3.127E+01 | 0.3 |
| Iron | 8910 | 0.336 | 4.00E-03 | 1.00E-01 | 3.73E+02 | NA | NA |
| Lead | 45 | 0 | 4.68E-01 | 1.52E+00 | 2.58E+01 | 1.645E+01 | 1.6 |
| Manganese | 224 | 0.0947 | 2.50E-01 | 1.24E-01 | 2.26E+01 | 1.809E+02 | 0.1 |
| Vanadium | 11.8 | 0.0034 | 5.50E-03 | 8.80E-02 | 4.65E-01 | 4.008E-01 | 1.2 |
| Zinc | 79.7 | 0 | 1.82E+00 | 1.29E+01 | 3.46E+02 | 3.289E+02 | 1.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.077 | 0 | 1.15E-02 | 2.00E+00 | 4.83E-02 | 1.645E+00 | 0.0 |
| 4,4'-DDE | 0.073 | 0 | 4.80E-03 | 1.06E+01 | 2.39E-01 | 1.645E+00 | 0.1 |
| 4,4'-DDT | 0.93 | 0 | 6.50E-03 | 7.00E-01 | 2.11E-01 | 1.645E+00 | 0.1 |
| alpha-Chlordane | 0.0078 | 0 | 8.90E-03 | 3.00E+00 | 7.28E-03 | 5.117E+00 | 0.0 |
| Aroclor-1016 | 0.081 | 0 | 2.24E-02 | 1.59E+01 | 3.97E-01 | NA | NA |
| Endosulfan II | 0.0046 | 0 | 9.45E-02 | 1.00E+00 | 1.55E-03 | 3.084E-01 | 0.0 |
| Endrin Aldehyde | 0.011 | 0 | 1.89E-01 | 1.00E+00 | 3.92E-03 | NA | NA |
| 2-Methylnaphthalene | 3 | 0 | 2.16E-01 | 2.00E-01 | 3.48E-01 | 1.446E+00 | 0.2 |
| Acenaphthene | 25 | 0 | 2.10E-01 | 3.00E-01 | 3.64E+00 | 1.446E+00 | 2.5 |
| Acenaphthylene | 0.58 | 0 | 1.65E-01 | 2.20E-01 | 6.48E-02 | 1.446E+00 | 0.0 |
| Anthracene | 34 | 0 | 9.08E-02 | 3.20E-01 | 4.32E+00 | 1.446E+00 | 3.0 |
| Benzo(a)anthracene | 67 | 0 | 1.97E-02 | 2.70E-01 | 6.51E+00 | 1.446E+00 | 4.5 |
| Benzo(a)pyrene | 56 | 0 | 1.14E-02 | 3.40E-01 | 6.55E+00 | 1.112E+00 | 5.9 |
| Benzo(b)fluoranthene | 54 | 0 | 1.01E-02 | 2.10E-01 | 4.15E+00 | 1.446E+00 | 2.9 |
| Benzo(g,h,i)perylene | 14 | 0 | 5.20E-03 | 1.50E-01 | 8.03E-01 | 1.446E+00 | 0.6 |
| Benzo(k)fluoranthene | 7.8 | 0 | 1.01E-02 | 2.10E-01 | 5.99E-01 | 1.446E+00 | 0.4 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.04 | 2.30E-03 | 1.00E+00 | 1.70E-01 | 2.035E+01 | 0.0 |
| Carbazole | 44 | 0 | 3.26E-01 | 1.00E+00 | 1.69E+01 | 1.446E+00 | 11.7 |
| Chrysene | 63 | 0 | 1.97E-02 | 4.40E-01 | 9.41E+00 | 1.446E+00 | 6.5 |
| Dibenz(a,h)anthracene | 6.1 | 0 | 5.30E-03 | 4.90E-01 | 9.87E-01 | 1.446E+00 | 0.7 |
| Dibenzofuran | 8.1 | 0 | 1.45E-01 | 1.00E+00 | 2.81E+00 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 8.38E-02 | 1.00E+00 | 8.03E-02 | 6.118E+02 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 8.00E-04 | 1.00E+00 | 1.87E-02 | NA | NA |
| Fluoranthene | 140 | 0 | 4.25E-02 | 3.70E-01 | 1.86E+01 | 1.446E+00 | 12.8 |
| Fluorene | 12 | 0 | 1.43E-01 | 2.00E-01 | 1.21E+00 | 1.446E+00 | 0.8 |
| Indeno(1,2,3-cd)pyrene | 32 | 0 | 5.60E-03 | 4.10E-01 | 4.39E+00 | 1.446E+00 | 3.0 |
| Naphthalene | 8.9 | 0 | 4.43E-01 | 2.10E-01 | 1.47E+00 | 1.446E+00 | 1.0 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 5.78E-01 | 1.00E+00 | 9.59E-02 | NA | NA |
| Phenanthrene | 120 | 0 | 9.08E-02 | 2.80E-01 | 1.38E+01 | 1.446E+00 | 9.5 |
| Pyrene | 110 | 0 | 4.31E-02 | 3.90E-01 | 1.53E+01 | 1.446E+00 | 10.6 |
| Trichloroethene | 0.008 | 0 | 1.05E+00 | 1.00E+00 | 4.26E-03 | 7.786E-01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Short-Tailed Shrew | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 7.289E-05 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 3.037E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.250E-02 | |
| FI | Food ingestion rate (kg/day) | 3.037E-03 | |
| WI | Water ingestion rate (L/day) | 7.036E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 3710 | 0.147 | 2.00E-01 | 2.03E+02 | 2.402E+00 | 84.4 |
| Antimony | 20.4 | 0 | 1.00E+00 | 5.08E+00 | 1.556E-01 | 32.6 |
| Arsenic | 486 | 0 | 5.23E-01 | 6.46E+01 | 1.568E-01 | 411.9 |
| Barium | 45.3 | 0.0308 | 3.60E-01 | 4.40E+00 | 1.239E+01 | 0.4 |
| Chromium | 6.9 | 0.0037 | 3.16E+00 | 5.36E+00 | 6.296E+03 | 0.0 |
| Copper | 15 | 0 | 1.53E+00 | 5.67E+00 | 3.499E+01 | 0.2 |
| Iron | 8910 | 0.336 | 1.00E-01 | 2.70E+02 | NA | NA |
| Lead | 45 | 0 | 1.52E+00 | 1.69E+01 | 1.840E+01 | 0.9 |
| Manganese | 224 | 0.0947 | 1.24E-01 | 8.59E+00 | 2.024E+02 | 0.0 |
| Vanadium | 11.8 | 0.0034 | 8.80E-02 | 3.40E-01 | 4.485E-01 | 0.8 |
| Zinc | 79.7 | 0 | 1.29E+01 | 2.50E+02 | 3.681E+02 | 0.7 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.077 | 0 | 2.00E+00 | 3.79E-02 | 1.840E+00 | 0.0 |
| 4,4'-DDE | 0.073 | 0 | 1.06E+01 | 1.88E-01 | 1.840E+00 | 0.1 |
| 4,4'-DDT | 0.93 | 0 | 7.00E-01 | 1.64E-01 | 1.840E+00 | 0.1 |
| alpha-Chlordane | 0.0078 | 0 | 3.00E+00 | 5.73E-03 | 5.725E+00 | 0.0 |
| Aroclor-1016 | 0.081 | 0 | 1.59E+01 | 3.14E-01 | NA | NA |
| Endosulfan II | 0.0046 | 0 | 1.00E+00 | 1.14E-03 | 3.450E-01 | 0.0 |
| Endrin Aldehyde | 0.011 | 0 | 1.00E+00 | 2.74E-03 | NA | NA |
| 2-Methylnaphthalene | 3 | 0 | 2.00E-01 | 1.63E-01 | 1.618E+00 | 0.1 |
| Acenaphthene | 25 | 0 | 3.00E-01 | 1.97E+00 | 1.618E+00 | 1.2 |
| Acenaphthylene | 0.58 | 0 | 2.20E-01 | 3.44E-02 | 1.618E+00 | 0.0 |
| Anthracene | 34 | 0 | 3.20E-01 | 2.84E+00 | 1.618E+00 | 1.8 |
| Benzo(a)anthracene | 67 | 0 | 2.70E-01 | 4.79E+00 | 1.618E+00 | 3.0 |
| Benzo(a)pyrene | 56 | 0 | 3.40E-01 | 4.95E+00 | 1.245E+00 | 4.0 |
| Benzo(b)fluoranthene | 54 | 0 | 2.10E-01 | 3.07E+00 | 1.618E+00 | 1.9 |
| Benzo(g,h,i)perylene | 14 | 0 | 1.50E-01 | 5.92E-01 | 1.618E+00 | 0.4 |
| Benzo(k)fluoranthene | 7.8 | 0 | 2.10E-01 | 4.43E-01 | 1.618E+00 | 0.3 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.04 | 1.00E+00 | 2.46E-01 | 2.278E+01 | 0.0 |
| Carbazole | 44 | 0 | 1.00E+00 | 1.09E+01 | 1.618E+00 | 6.8 |
| Chrysene | 63 | 0 | 4.40E-01 | 7.10E+00 | 1.618E+00 | 4.4 |
| Dibenz(a,h)anthracene | 6.1 | 0 | 4.90E-01 | 7.62E-01 | 1.618E+00 | 0.5 |
| Dibenzofuran | 8.1 | 0 | 1.00E+00 | 2.02E+00 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 5.97E-02 | 6.846E+02 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 1.47E-02 | NA | NA |
| Fluoranthene | 140 | 0 | 3.70E-01 | 1.34E+01 | 1.618E+00 | 8.3 |
| Fluorene | 12 | 0 | 2.00E-01 | 6.53E-01 | 1.618E+00 | 0.4 |
| Indeno(1,2,3-cd)pyrene | 32 | 0 | 4.10E-01 | 3.37E+00 | 1.618E+00 | 2.1 |
| Naphthalene | 8.9 | 0 | 2.10E-01 | 5.06E-01 | 1.618E+00 | 0.3 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 5.47E-02 | NA | NA |
| Phenanthrene | 120 | 0 | 2.80E-01 | 8.86E+00 | 1.618E+00 | 5.5 |
| Pyrene | 110 | 0 | 3.90E-01 | 1.11E+01 | 1.618E+00 | 6.8 |
| Trichloroethene | 0.008 | 0 | 1.00E+00 | 1.99E-03 | 8.713E-01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Bv*Iv)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Meadow Vole | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| Bv | Vegetation biotransfer factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 3.773E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.572E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.700E-02 | |
| FI | Food ingestion rate (kg/day) | 1.572E-02 | |
| WI | Water ingestion rate (L/day) | 1.100E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 3710 | 0.147 | 4.00E-03 | 9.62E+01 | 2.224E+00 | 43.2 |
| Antimony | 20.4 | 0 | 2.00E-01 | 4.23E+00 | 1.441E-01 | 29.3 |
| Arsenic | 486 | 0 | 1.10E+00 | 5.06E+02 | 1.452E-01 | 3487.6 |
| Barium | 45.3 | 0.0308 | 1.50E-01 | 7.31E+00 | 1.147E+01 | 0.6 |
| Chromium | 6.9 | 0.0037 | 7.50E-03 | 2.03E-01 | 5.830E+03 | 0.0 |
| Copper | 15 | 0 | 6.25E-01 | 9.00E+00 | 3.240E+01 | 0.3 |
| Iron | 8910 | 0.336 | 4.00E-03 | 2.31E+02 | NA | NA |
| Lead | 45 | 0 | 4.68E-01 | 2.05E+01 | 1.704E+01 | 1.2 |
| Manganese | 224 | 0.0947 | 2.50E-01 | 5.68E+01 | 1.875E+02 | 0.3 |
| Vanadium | 11.8 | 0.0034 | 5.50E-03 | 3.24E-01 | 4.153E-01 | 0.8 |
| Zinc | 79.7 | 0 | 1.82E+00 | 1.36E+02 | 3.408E+02 | 0.4 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.077 | 0 | 1.15E-02 | 2.53E-03 | 1.704E+00 | 0.0 |
| 4,4'-DDE | 0.073 | 0 | 4.80E-03 | 1.94E-03 | 1.704E+00 | 0.0 |
| 4,4'-DDT | 0.93 | 0 | 6.50E-03 | 2.62E-02 | 1.704E+00 | 0.0 |
| alpha-Chlordane | 0.0078 | 0 | 8.90E-03 | 2.37E-04 | 5.302E+00 | 0.0 |
| Aroclor-1016 | 0.081 | 0 | 2.24E-02 | 3.48E-03 | NA | NA |
| Endosulfan II | 0.0046 | 0 | 9.45E-02 | 5.04E-04 | 3.195E-01 | 0.0 |
| Endrin Aldehyde | 0.011 | 0 | 1.89E-01 | 2.16E-03 | NA | NA |
| 2-Methylnaphthalene | 3 | 0 | 2.16E-01 | 6.65E-01 | 1.498E+00 | 0.4 |
| Acenaphthene | 25 | 0 | 2.10E-01 | 5.41E+00 | 1.498E+00 | 3.6 |
| Acenaphthylene | 0.58 | 0 | 1.65E-01 | 1.02E-01 | 1.498E+00 | 0.1 |
| Anthracene | 34 | 0 | 9.08E-02 | 3.61E+00 | 1.498E+00 | 2.4 |
| Benzo(a)anthracene | 67 | 0 | 1.97E-02 | 2.71E+00 | 1.498E+00 | 1.8 |
| Benzo(a)pyrene | 56 | 0 | 1.14E-02 | 1.83E+00 | 1.153E+00 | 1.6 |
| Benzo(b)fluoranthene | 54 | 0 | 1.01E-02 | 1.70E+00 | 1.498E+00 | 1.1 |
| Benzo(g,h,i)perylene | 14 | 0 | 5.20E-03 | 3.78E-01 | 1.498E+00 | 0.3 |
| Benzo(k)fluoranthene | 7.8 | 0 | 1.01E-02 | 2.46E-01 | 1.498E+00 | 0.2 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.04 | 2.30E-03 | 2.79E-02 | 2.109E+01 | 0.0 |
| Carbazole | 44 | 0 | 3.26E-01 | 1.42E+01 | 1.498E+00 | 9.5 |
| Chrysene | 63 | 0 | 1.97E-02 | 2.55E+00 | 1.498E+00 | 1.7 |
| Dibenz(a,h)anthracene | 6.1 | 0 | 5.30E-03 | 1.65E-01 | 1.498E+00 | 0.1 |
| Dibenzofuran | 8.1 | 0 | 1.45E-01 | 1.26E+00 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 8.38E-02 | 2.39E-02 | 6.339E+02 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 8.00E-04 | 1.35E-03 | NA | NA |
| Fluoranthene | 140 | 0 | 4.25E-02 | 8.61E+00 | 1.498E+00 | 5.7 |
| Fluorene | 12 | 0 | 1.43E-01 | 1.85E+00 | 1.498E+00 | 1.2 |
| Indeno(1,2,3-cd)pyrene | 32 | 0 | 5.60E-03 | 8.76E-01 | 1.498E+00 | 0.6 |
| Naphthalene | 8.9 | 0 | 4.43E-01 | 3.84E+00 | 1.498E+00 | 2.6 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 5.78E-01 | 1.22E-01 | NA | NA |
| Phenanthrene | 120 | 0 | 9.08E-02 | 1.27E+01 | 1.498E+00 | 8.5 |
| Pyrene | 110 | 0 | 4.31E-02 | 6.83E+00 | 1.498E+00 | 4.6 |
| Trichloroethene | 0.008 | 0 | 1.05E+00 | 7.95E-03 | 8.068E-01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red Fox | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.360E-02 | |
| Im | Rate of small mammal ingestion (kg/day) | 4.858E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.950E+00 | |
| FI | Food ingestion rate (kg/day) | 4.858E-01 | |
| WI | Water ingestion rate (L/day) | 1.180E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 3710 | 0.147 | 1.00E+00 | 6.28E+02 | 6.129E-01 | 1024.7 |
| Antimony | 20.4 | 0 | 1.00E+00 | 3.45E+00 | 3.969E-02 | 87.0 |
| Arsenic | 486 | 0 | 1.60E-02 | 3.52E+00 | 4.001E-02 | 88.0 |
| Barium | 45.3 | 0.0308 | 2.53E-01 | 2.10E+00 | 3.160E+00 | 0.7 |
| Chromium | 6.9 | 0.0037 | 3.09E-01 | 3.83E-01 | 1.606E+03 | 0.0 |
| Copper | 15 | 0 | 1.29E+00 | 3.26E+00 | 8.928E+00 | 0.4 |
| Iron | 8910 | 0.336 | 2.40E-02 | 7.63E+01 | NA | NA |
| Lead | 45 | 0 | 1.87E-01 | 1.59E+00 | 4.695E+00 | 0.3 |
| Manganese | 224 | 0.0947 | 1.00E+00 | 3.79E+01 | 5.165E+01 | 0.7 |
| Vanadium | 11.8 | 0.0034 | 1.00E+00 | 2.00E+00 | 1.144E-01 | 17.5 |
| Zinc | 79.7 | 0 | 2.32E+00 | 3.08E+01 | 9.390E+01 | 0.3 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.077 | 0 | 1.00E+00 | 1.30E-02 | 4.695E-01 | 0.0 |
| 4,4'-DDE | 0.073 | 0 | 1.00E+00 | 1.24E-02 | 4.695E-01 | 0.0 |
| 4,4'-DDT | 0.93 | 0 | 1.00E+00 | 1.57E-01 | 4.695E-01 | 0.3 |
| alpha-Chlordane | 0.0078 | 0 | 1.00E+00 | 1.32E-03 | 1.461E+00 | 0.0 |
| Aroclor-1016 | 0.081 | 0 | 1.00E+00 | 1.37E-02 | NA | NA |
| Endosulfan II | 0.0046 | 0 | 1.00E+00 | 7.79E-04 | 8.803E-02 | 0.0 |
| Endrin Aldehyde | 0.011 | 0 | 1.00E+00 | 1.86E-03 | NA | NA |
| 2-Methylnaphthalene | 3 | 0 | 1.00E+00 | 5.08E-01 | 4.128E-01 | 1.2 |
| Acenaphthene | 25 | 0 | 1.00E+00 | 4.23E+00 | 4.128E-01 | 10.3 |
| Acenaphthylene | 0.58 | 0 | 1.00E+00 | 9.82E-02 | 4.128E-01 | 0.2 |
| Anthracene | 34 | 0 | 1.00E+00 | 5.76E+00 | 4.128E-01 | 13.9 |
| Benzo(a)anthracene | 67 | 0 | 1.00E+00 | 1.13E+01 | 4.128E-01 | 27.5 |
| Benzo(a)pyrene | 56 | 0 | 1.00E+00 | 9.48E+00 | 3.176E-01 | 29.9 |
| Benzo(b)fluoranthene | 54 | 0 | 1.00E+00 | 9.14E+00 | 4.128E-01 | 22.1 |
| Benzo(g,h,i)perylene | 14 | 0 | 1.00E+00 | 2.37E+00 | 4.128E-01 | 5.7 |
| Benzo(k)fluoranthene | 7.8 | 0 | 1.00E+00 | 1.32E+00 | 4.128E-01 | 3.2 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.04 | 1.00E+00 | 1.56E-02 | 5.811E+00 | 0.0 |
| Carbazole | 44 | 0 | 1.00E+00 | 7.45E+00 | 4.128E-01 | 18.0 |
| Chrysene | 63 | 0 | 1.00E+00 | 1.07E+01 | 4.128E-01 | 25.8 |
| Dibenz(a,h)anthracene | 6.1 | 0 | 1.00E+00 | 1.03E+00 | 4.128E-01 | 2.5 |
| Dibenzofuran | 8.1 | 0 | 1.00E+00 | 1.37E+00 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 4.06E-02 | 1.747E+02 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 9.99E-03 | NA | NA |
| Fluoranthene | 140 | 0 | 1.00E+00 | 2.37E+01 | 4.128E-01 | 57.4 |
| Fluorene | 12 | 0 | 1.00E+00 | 2.03E+00 | 4.128E-01 | 4.9 |
| Indeno(1,2,3-cd)pyrene | 32 | 0 | 1.00E+00 | 5.42E+00 | 4.128E-01 | 13.1 |
| Naphthalene | 8.9 | 0 | 1.00E+00 | 1.51E+00 | 4.128E-01 | 3.6 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 3.72E-02 | NA | NA |
| Phenanthrene | 120 | 0 | 1.00E+00 | 2.03E+01 | 4.128E-01 | 49.2 |
| Pyrene | 110 | 0 | 1.00E+00 | 1.86E+01 | 4.128E-01 | 45.1 |
| Trichloroethene | 0.008 | 0 | 1.00E+00 | 1.35E-03 | 2.223E-01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | American Woodcock | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.317E-02 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.266E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.644E-01 | |
| FI | Food ingestion rate (kg/day) | 1.266E-01 | |
| WI | Water ingestion rate (L/day) | 1.760E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 2900 | 0.11325 | 2.00E-01 | 6.79E+02 | 1.097E+03 | 0.6 |
| Antimony | 5.25 | 0 | 1.00E+00 | 4.46E+00 | NA | NA |
| Arsenic | 98.884 | 0 | 5.23E-01 | 4.77E+01 | 7.380E+00 | 6.5 |
| Barium | 22.26 | 0.0169 | 3.60E-01 | 7.95E+00 | 4.170E+01 | 0.2 |
| Chromium | 5.06 | 0.002675 | 3.16E+00 | 1.27E+01 | 5.000E+00 | 2.5 |
| Copper | 7.56 | 0 | 1.53E+00 | 9.52E+00 | 6.170E+01 | 0.2 |
| Iron | 5150 | 0.2041 | 1.00E-01 | 8.09E+02 | NA | NA |
| Lead | 26.28 | 0 | 1.52E+00 | 3.29E+01 | 3.850E+01 | 0.9 |
| Manganese | 184.4 | 0.0491 | 1.24E-01 | 3.24E+01 | 9.770E+03 | 0.0 |
| Vanadium | 7.98 | 0.002325 | 8.80E-02 | 1.18E+00 | 1.140E+02 | 0.0 |
| Zinc | 51.52 | 0 | 1.29E+01 | 5.15E+02 | 1.310E+02 | 3.9 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0479 | 0 | 2.00E+00 | 7.76E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0373333 | 0 | 1.06E+01 | 3.08E-01 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.341 | 0 | 7.00E-01 | 2.11E-01 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0066 | 0 | 3.00E+00 | 1.58E-02 | 1.070E+01 | 0.0 |
| Aroclor-1016 | 0.0453333 | 0 | 1.59E+01 | 5.59E-01 | NA | NA |
| Endosulfan II | 0.0034 | 0 | 1.00E+00 | 2.89E-03 | 1.000E+02 | 0.0 |
| Endrin Aldehyde | 0.0052333 | 0 | 1.00E+00 | 4.45E-03 | NA | NA |
| 2-Methylnaphthalene | 0.7694 | 0 | 2.00E-01 | 1.80E-01 | 1.000E+02 | 0.0 |
| Acenaphthene | 6.048 | 0 | 3.00E-01 | 1.88E+00 | 1.000E+02 | 0.0 |
| Acenaphthylene | 0.3678 | 0 | 2.20E-01 | 9.18E-02 | 1.000E+02 | 0.0 |
| Anthracene | 8.368 | 0 | 3.20E-01 | 2.73E+00 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 18.04 | 0 | 2.70E-01 | 5.20E+00 | 1.000E+02 | 0.1 |
| Benzo(a)pyrene | 15.178 | 0 | 3.40E-01 | 5.19E+00 | 1.000E+02 | 0.1 |
| Benzo(b)fluoranthene | 14.82 | 0 | 2.10E-01 | 3.58E+00 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 4.806 | 0 | 1.50E-01 | 9.40E-01 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 2.278 | 0 | 2.10E-01 | 5.51E-01 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.0205 | 1.00E+00 | 7.28E-02 | 1.100E+01 | 0.0 |
| Carbazole | 10.21 | 0 | 1.00E+00 | 8.68E+00 | 1.000E+02 | 0.1 |
| Chrysene | 17.232 | 0 | 4.40E-01 | 7.22E+00 | 1.000E+02 | 0.1 |
| Dibenz(a,h)anthracene | 1.801 | 0 | 4.90E-01 | 8.24E-01 | 1.000E+02 | 0.0 |
| Dibenzofuran | 1.9826 | 0 | 1.00E+00 | 1.69E+00 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 2.04E-01 | 1.100E+00 | 0.2 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 5.02E-02 | NA | NA |
| Fluoranthene | 37.9 | 0 | 3.70E-01 | 1.38E+01 | 1.000E+02 | 0.1 |
| Fluorene | 3.112 | 0 | 2.00E-01 | 7.28E-01 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 8.706 | 0 | 4.10E-01 | 3.45E+00 | 1.000E+02 | 0.0 |
| Naphthalene | 2.051 | 0 | 2.10E-01 | 4.96E-01 | 1.000E+02 | 0.0 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 1.87E-01 | NA | NA |
| Phenanthrene | 31.56 | 0 | 2.80E-01 | 9.33E+00 | 1.000E+02 | 0.1 |
| Pyrene | 29.82 | 0 | 3.90E-01 | 1.13E+01 | 1.000E+02 | 0.1 |
| Trichloroethene | 0.0064 | 0 | 1.00E+00 | 5.44E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*BAF*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Bobwhite Quail | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.378E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.378E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.767E-01 | |
| FI | Food ingestion rate (kg/day) | 1.378E-02 | |
| WI | Water ingestion rate (L/day) | 2.297E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| **INORGANICS** | | | | | | |
| Aluminum | 2900 | 0.11325 | 4.00E-03 | 2.35E+01 | 1.097E+03 | 0.0 |
| Antimony | 5.25 | 0 | 2.00E-01 | 1.23E-01 | NA | NA |
| Arsenic | 98.884 | 0 | 1.10E+00 | 9.28E+00 | 7.380E+00 | 1.3 |
| Barium | 22.26 | 0.0169 | 1.50E-01 | 4.36E-01 | 4.170E+01 | 0.0 |
| Chromium | 5.06 | 0.002675 | 7.50E-03 | 4.28E-02 | 5.000E+00 | 0.0 |
| Copper | 7.56 | 0 | 6.25E-01 | 4.28E-01 | 6.170E+01 | 0.0 |
| Iron | 5150 | 0.2041 | 4.00E-03 | 4.18E+01 | NA | NA |
| Lead | 26.28 | 0 | 4.68E-01 | 1.16E+00 | 3.850E+01 | 0.0 |
| Manganese | 184.4 | 0.0491 | 2.50E-01 | 5.04E+00 | 9.770E+03 | 0.0 |
| Vanadium | 7.98 | 0.002325 | 5.50E-03 | 6.60E-02 | 1.140E+02 | 0.0 |
| Zinc | 51.52 | 0 | 1.82E+00 | 7.72E+00 | 1.310E+02 | 0.1 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*BAF*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Bobwhite Quail | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.378E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.378E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.767E-01 | |
| FI | Food ingestion rate (kg/day) | 1.378E-02 | |
| WI | Water ingestion rate (L/day) | 2.297E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| **INORGANICS** | | | | | | |
| Aluminum | 2900 | 0.11325 | 4.00E-03 | 2.35E+01 | 1.097E+03 | 0.0 |
| Antimony | 5.25 | 0 | 2.00E-01 | 1.23E-01 | NA | NA |
| Arsenic | 98.884 | 0 | 1.10E+00 | 9.28E+00 | 7.380E+00 | 1.3 |
| Barium | 22.26 | 0.0169 | 1.50E-01 | 4.36E-01 | 4.170E+01 | 0.0 |
| Chromium | 5.06 | 0.002675 | 7.50E-03 | 4.28E-02 | 5.000E+00 | 0.0 |
| Copper | 7.56 | 0 | 6.25E-01 | 4.28E-01 | 6.170E+01 | 0.0 |
| Iron | 5150 | 0.2041 | 4.00E-03 | 4.18E+01 | NA | NA |
| Lead | 26.28 | 0 | 4.68E-01 | 1.16E+00 | 3.850E+01 | 0.0 |
| Manganese | 184.4 | 0.0491 | 2.50E-01 | 5.04E+00 | 9.770E+03 | 0.0 |
| Vanadium | 7.98 | 0.002325 | 5.50E-03 | 6.60E-02 | 1.140E+02 | 0.0 |
| Zinc | 51.52 | 0 | 1.82E+00 | 7.72E+00 | 1.310E+02 | 0.1 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| **ORGANICS** | | | | | | |
| 4,4'-DDD | 0.0479 | 0 | 1.15E-02 | 4.17E-04 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0373333 | 0 | 4.80E-03 | 3.05E-04 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.341 | 0 | 6.50E-03 | 2.83E-03 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0066 | 0 | 8.90E-03 | 5.61E-05 | 1.070E+01 | 0.0 |
| Aroclor-1016 | 0.0453333 | 0 | 2.24E-02 | 4.33E-04 | NA | NA |
| Endosulfan II | 0.0034 | 0 | 9.45E-02 | 5.16E-05 | 1.000E+02 | 0.0 |
| Endrin Aldehyde | 0.0052333 | 0 | 1.89E-01 | 1.18E-04 | NA | NA |
| 2-Methylnaphthalene | 0.7694 | 0 | 2.16E-01 | 1.89E-02 | 1.000E+02 | 0.0 |
| Acenaphthene | 6.048 | 0 | 2.10E-01 | 1.46E-01 | 1.000E+02 | 0.0 |
| Acenaphthylene | 0.3678 | 0 | 1.65E-01 | 7.61E-03 | 1.000E+02 | 0.0 |
| Anthracene | 8.368 | 0 | 9.08E-02 | 1.25E-01 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 18.04 | 0 | 1.97E-02 | 1.68E-01 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 15.178 | 0 | 1.14E-02 | 1.32E-01 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 14.82 | 0 | 1.01E-02 | 1.27E-01 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 4.806 | 0 | 5.20E-03 | 3.94E-02 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 2.278 | 0 | 1.01E-02 | 1.96E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.0205 | 2.30E-03 | 3.33E-03 | 1.100E+01 | 0.0 |
| Carbazole | 10.21 | 0 | 3.26E-01 | 3.39E-01 | 1.000E+02 | 0.0 |
| Chrysene | 17.232 | 0 | 1.97E-02 | 1.61E-01 | 1.000E+02 | 0.0 |
| Dibenz(a,h)anthracene | 1.801 | 0 | 5.30E-03 | 1.48E-02 | 1.000E+02 | 0.0 |
| Dibenzofuran | 1.9826 | 0 | 1.45E-01 | 3.78E-02 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 8.38E-02 | 3.44E-03 | 1.100E+00 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 8.00E-04 | 4.64E-04 | NA | NA |
| Fluoranthene | 37.9 | 0 | 4.25E-02 | 4.21E-01 | 1.000E+02 | 0.0 |
| Fluorene | 3.112 | 0 | 1.43E-01 | 5.89E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 8.706 | 0 | 5.60E-03 | 7.17E-02 | 1.000E+02 | 0.0 |
| Naphthalene | 2.051 | 0 | 4.43E-01 | 8.68E-02 | 1.000E+02 | 0.0 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 5.78E-01 | 1.16E-02 | NA | NA |
| Phenanthrene | 31.56 | 0 | 9.08E-02 | 4.70E-01 | 1.000E+02 | 0.0 |
| Pyrene | 29.82 | 0 | 4.31E-02 | 3.33E-01 | 1.000E+02 | 0.0 |
| Trichloroethene | 0.0064 | 0 | 1.05E+00 | 5.75E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Marsh Wren | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| Br | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.818E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 2.818E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.000E-02 | |
| FI | Food ingestion rate (kg/day) | 2.818E-03 | |
| WI | Water ingestion rate (L/day) | 2.697E-03 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| **INORGANICS** | | | | | | |
| Aluminum | 2900 | 0.11325 | 2.00E-01 | 2.45E+02 | 1.097E+03 | 0.2 |
| Antimony | 5.25 | 0 | 1.00E+00 | 1.63E+00 | NA | NA |
| Arsenic | 98.884 | 0 | 5.23E-01 | 1.74E+01 | 7.380E+00 | 2.4 |
| Barium | 22.26 | 0.0169 | 3.60E-01 | 2.89E+00 | 4.170E+01 | 0.1 |
| Chromium | 5.06 | 0.002675 | 3.16E+00 | 4.65E+00 | 5.000E+00 | 0.9 |
| Copper | 7.56 | 0 | 1.53E+00 | 3.47E+00 | 6.170E+01 | 0.1 |
| Iron | 5150 | 0.2041 | 1.00E-01 | 2.90E+02 | NA | NA |
| Lead | 26.28 | 0 | 1.52E+00 | 1.20E+01 | 3.850E+01 | 0.3 |
| Manganese | 184.4 | 0.0491 | 1.24E-01 | 1.17E+01 | 9.770E+03 | 0.0 |
| Vanadium | 7.98 | 0.002325 | 8.80E-02 | 4.23E-01 | 1.140E+02 | 0.0 |
| Zinc | 51.52 | 0 | 1.29E+01 | 1.89E+02 | 1.310E+02 | 1.4 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| **ORGANICS** | | | | | | |
| 4,4'-DDD | 0.0479 | 0 | 2.00E+00 | 2.83E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0373333 | 0 | 1.06E+01 | 1.13E-01 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.341 | 0 | 7.00E-01 | 7.69E-02 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0066 | 0 | 3.00E+00 | 5.76E-03 | 1.070E+01 | 0.0 |
| Aroclor-1016 | 0.0453333 | 0 | 1.59E+01 | 2.04E-01 | NA | NA |
| Endosulfan II | 0.0034 | 0 | 1.00E+00 | 1.05E-03 | 1.000E+02 | 0.0 |
| Endrin Aldehyde | 0.0052333 | 0 | 1.00E+00 | 1.62E-03 | NA | NA |
| 2-Methylnaphthalene | 0.7694 | 0 | 2.00E-01 | 6.50E-02 | 1.000E+02 | 0.0 |
| Acenaphthene | 6.048 | 0 | 3.00E-01 | 6.82E-01 | 1.000E+02 | 0.0 |
| Acenaphthylene | 0.3678 | 0 | 2.20E-01 | 3.32E-02 | 1.000E+02 | 0.0 |
| Anthracene | 8.368 | 0 | 3.20E-01 | 9.90E-01 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 18.04 | 0 | 2.70E-01 | 1.88E+00 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 15.178 | 0 | 3.40E-01 | 1.88E+00 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 14.82 | 0 | 2.10E-01 | 1.29E+00 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 4.806 | 0 | 1.50E-01 | 3.39E-01 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 2.278 | 0 | 2.10E-01 | 1.99E-01 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.0205 | 1.00E+00 | 3.13E-02 | 1.100E+01 | 0.0 |
| Carbazole | 10.21 | 0 | 1.00E+00 | 3.16E+00 | 1.000E+02 | 0.0 |
| Chrysene | 17.232 | 0 | 4.40E-01 | 2.62E+00 | 1.000E+02 | 0.0 |
| Dibenz(a,h)anthracene | 1.801 | 0 | 4.90E-01 | 2.99E-01 | 1.000E+02 | 0.0 |
| Dibenzofuran | 1.9826 | 0 | 1.00E+00 | 6.14E-01 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 7.44E-02 | 1.100E+00 | 0.1 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 1.83E-02 | NA | NA |
| Fluoranthene | 37.9 | 0 | 3.70E-01 | 5.02E+00 | 1.000E+02 | 0.1 |
| Fluorene | 3.112 | 0 | 2.00E-01 | 2.63E-01 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 8.706 | 0 | 4.10E-01 | 1.25E+00 | 1.000E+02 | 0.0 |
| Naphthalene | 2.051 | 0 | 2.10E-01 | 1.79E-01 | 1.000E+02 | 0.0 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 6.82E-02 | NA | NA |
| Phenanthrene | 31.56 | 0 | 2.80E-01 | 3.38E+00 | 1.000E+02 | 0.0 |
| Pyrene | 29.82 | 0 | 3.90E-01 | 4.12E+00 | 1.000E+02 | 0.0 |
| Trichloroethene | 0.0064 | 0 | 1.00E+00 | 1.98E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red-Tailed Hawk | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.222E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 1.111E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.126E+00 | |
| FI | Food ingestion rate (kg/day) | 1.111E-01 | |
| WI | Water ingestion rate (L/day) | 6.388E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 2900 | 0.11325 | 1.00E+00 | 2.92E+02 | 1.097E+03 | 0.3 |
| Antimony | 5.25 | 0 | 1.00E+00 | 5.28E-01 | NA | NA |
| Arsenic | 98.884 | 0 | 1.60E-02 | 3.51E-01 | 7.380E+00 | 0.0 |
| Barium | 22.26 | 0.0169 | 2.53E-01 | 6.01E-01 | 4.170E+01 | 0.0 |
| Chromium | 5.06 | 0.002675 | 3.09E-01 | 1.64E-01 | 5.000E+00 | 0.0 |
| Copper | 7.56 | 0 | 1.29E+00 | 9.77E-01 | 6.170E+01 | 0.0 |
| Iron | 5150 | 0.2041 | 2.40E-02 | 2.24E+01 | NA | NA |
| Lead | 26.28 | 0 | 1.87E-01 | 5.37E-01 | 3.850E+01 | 0.0 |
| Manganese | 184.4 | 0.0491 | 1.00E+00 | 1.86E+01 | 9.770E+03 | 0.0 |
| Vanadium | 7.98 | 0.002325 | 1.00E+00 | 8.03E-01 | 1.140E+02 | 0.0 |
| Zinc | 51.52 | 0 | 2.32E+00 | 1.19E+01 | 1.310E+02 | 0.1 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0479 | 0 | 1.00E+00 | 4.82E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0373333 | 0 | 1.00E+00 | 3.76E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.341 | 0 | 1.00E+00 | 3.43E-02 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0066 | 0 | 1.00E+00 | 6.64E-04 | 1.070E+01 | 0.0 |
| Aroclor-1016 | 0.0453333 | 0 | 1.00E+00 | 4.56E-03 | NA | NA |
| Endosulfan II | 0.0034 | 0 | 1.00E+00 | 3.42E-04 | 1.000E+02 | 0.0 |
| Endrin Aldehyde | 0.0052333 | 0 | 1.00E+00 | 5.27E-04 | NA | NA |
| 2-Methylnaphthalene | 0.7694 | 0 | 1.00E+00 | 7.74E-02 | 1.000E+02 | 0.0 |
| Acenaphthene | 6.048 | 0 | 1.00E+00 | 6.09E-01 | 1.000E+02 | 0.0 |
| Acenaphthylene | 0.3678 | 0 | 1.00E+00 | 3.70E-02 | 1.000E+02 | 0.0 |
| Anthracene | 8.368 | 0 | 1.00E+00 | 8.42E-01 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 18.04 | 0 | 1.00E+00 | 1.82E+00 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 15.178 | 0 | 1.00E+00 | 1.53E+00 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 14.82 | 0 | 1.00E+00 | 1.49E+00 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 4.806 | 0 | 1.00E+00 | 4.84E-01 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 2.278 | 0 | 1.00E+00 | 2.29E-01 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.0205 | 1.00E+00 | 9.52E-03 | 1.100E+01 | 0.0 |
| Carbazole | 10.21 | 0 | 1.00E+00 | 1.03E+00 | 1.000E+02 | 0.0 |
| Chrysene | 17.232 | 0 | 1.00E+00 | 1.73E+00 | 1.000E+02 | 0.0 |
| Dibenz(a,h)anthracene | 1.801 | 0 | 1.00E+00 | 1.81E-01 | 1.000E+02 | 0.0 |
| Dibenzofuran | 1.9826 | 0 | 1.00E+00 | 2.00E-01 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 2.42E-02 | 1.100E+00 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 5.94E-03 | NA | NA |
| Fluoranthene | 37.9 | 0 | 1.00E+00 | 3.81E+00 | 1.000E+02 | 0.0 |
| Fluorene | 3.112 | 0 | 1.00E+00 | 3.13E-01 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 8.706 | 0 | 1.00E+00 | 8.76E-01 | 1.000E+02 | 0.0 |
| Naphthalene | 2.051 | 0 | 1.00E+00 | 2.06E-01 | 1.000E+02 | 0.0 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 2.21E-02 | NA | NA |
| Phenanthrene | 31.56 | 0 | 1.00E+00 | 3.18E+00 | 1.000E+02 | 0.0 |
| Pyrene | 29.82 | 0 | 1.00E+00 | 3.00E+00 | 1.000E+02 | 0.0 |
| Trichloroethene | 0.0064 | 0 | 1.00E+00 | 6.44E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Cm = (((Cs*Bv*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*Bv*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | American Robin | |
|---|---|---|---|
| Bv | Vegetation biotransfer factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 1.490E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 2.075E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.026E-02 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 7.730E-02 | |
| FI | Food Ingestion Rate (kg/day) | 1.603E-02 | |
| WI | Water ingestion rate (L/day) | 1.062E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 2900 | 0.11325 | 4.00E-03 | 2.00E-01 | 1.33E+02 | 1.097E+03 | 0.1 |
| Antimony | 5.25 | 0 | 2.00E-01 | 1.00E+00 | 8.27E-01 | NA | NA |
| Arsenic | 98.884 | 0 | 1.10E+00 | 5.23E-01 | 1.17E+01 | 7.380E+00 | 1.6 |
| Barium | 22.26 | 0.0169 | 1.50E-01 | 3.60E-01 | 1.59E+00 | 4.170E+01 | 0.0 |
| Chromium | 5.06 | 0.002675 | 7.50E-03 | 3.16E+00 | 2.22E+00 | 5.000E+00 | 0.4 |
| Copper | 7.56 | 0 | 6.25E-01 | 1.53E+00 | 1.81E+00 | 6.170E+01 | 0.0 |
| Iron | 5150 | 0.2041 | 4.00E-03 | 1.00E-01 | 1.68E+02 | NA | NA |
| Lead | 26.28 | 0 | 4.68E-01 | 1.52E+00 | 6.15E+00 | 3.850E+01 | 0.2 |
| Manganese | 184.4 | 0.0491 | 2.50E-01 | 1.24E-01 | 7.83E+00 | 9.770E+03 | 0.0 |
| Vanadium | 7.98 | 0.002325 | 5.50E-03 | 8.80E-02 | 2.49E-01 | 1.140E+02 | 0.0 |
| Zinc | 51.52 | 0 | 1.82E+00 | 1.29E+01 | 9.17E+01 | 1.310E+02 | 0.7 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant Transfer Coefficient (Bv) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.0479 | 0 | 1.15E-02 | 2.00E+00 | 1.37E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0373333 | 0 | 4.80E-03 | 1.06E+01 | 5.33E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.341 | 0 | 6.50E-03 | 7.00E-01 | 3.83E-02 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0066 | 0 | 8.90E-03 | 3.00E+00 | 2.76E-03 | 1.070E+01 | 0.0 |
| Aroclor-1016 | 0.0453333 | 0 | 2.24E-02 | 1.59E+01 | 9.67E-02 | NA | NA |
| Endosulfan II | 0.0034 | 0 | 9.45E-02 | 1.00E+00 | 5.26E-04 | 1.000E+02 | 0.0 |
| Endrin Aldehyde | 0.0052333 | 0 | 1.89E-01 | 1.00E+00 | 8.22E-04 | NA | NA |
| 2-Methylnaphthalene | 0.7694 | 0 | 2.16E-01 | 2.00E-01 | 3.97E-02 | 1.000E+02 | 0.0 |
| Acenaphthene | 6.048 | 0 | 2.10E-01 | 3.00E-01 | 3.92E-01 | 1.000E+02 | 0.0 |
| Acenaphthylene | 0.3678 | 0 | 1.65E-01 | 2.20E-01 | 1.95E-02 | 1.000E+02 | 0.0 |
| Anthracene | 8.368 | 0 | 9.08E-02 | 3.20E-01 | 5.37E-01 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 18.04 | 0 | 1.97E-02 | 2.70E-01 | 1.00E+00 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 15.178 | 0 | 1.14E-02 | 3.40E-01 | 9.82E-01 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 14.82 | 0 | 1.01E-02 | 2.10E-01 | 7.03E-01 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 4.806 | 0 | 5.20E-03 | 1.50E-01 | 1.89E-01 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 2.278 | 0 | 1.01E-02 | 2.10E-01 | 1.08E-01 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.0205 | 2.30E-03 | 1.00E+00 | 1.54E-02 | 1.100E+01 | 0.0 |
| Carbazole | 10.21 | 0 | 3.26E-01 | 1.00E+00 | 1.64E+00 | 1.000E+02 | 0.0 |
| Chrysene | 17.232 | 0 | 1.97E-02 | 4.40E-01 | 1.35E+00 | 1.000E+02 | 0.0 |
| Dibenz(a,h)anthracene | 1.801 | 0 | 5.30E-03 | 4.90E-01 | 1.52E-01 | 1.000E+02 | 0.0 |
| Dibenzofuran | 1.9826 | 0 | 1.45E-01 | 1.00E+00 | 3.09E-01 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 8.38E-02 | 1.00E+00 | 3.70E-02 | 1.100E+00 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 8.00E-04 | 1.00E+00 | 8.97E-03 | NA | NA |
| Fluoranthene | 37.9 | 0 | 4.25E-02 | 3.70E-01 | 2.64E+00 | 1.000E+02 | 0.0 |
| Fluorene | 3.112 | 0 | 1.43E-01 | 2.00E-01 | 1.55E-01 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 8.706 | 0 | 5.60E-03 | 4.10E-01 | 6.43E-01 | 1.000E+02 | 0.0 |
| Naphthalene | 2.051 | 0 | 4.43E-01 | 2.10E-01 | 1.21E-01 | 1.000E+02 | 0.0 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 5.78E-01 | 1.00E+00 | 3.69E-02 | NA | NA |
| Phenanthrene | 31.56 | 0 | 9.08E-02 | 2.80E-01 | 1.86E+00 | 1.000E+02 | 0.0 |
| Pyrene | 29.82 | 0 | 4.31E-02 | 3.90E-01 | 2.15E+00 | 1.000E+02 | 0.0 |
| Trichloroethene | 0.0064 | 0 | 1.05E+00 | 1.00E+00 | 1.15E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*Bv*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Vegetation biotransfer factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 1.038E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 2.075E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 3.113E-03 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.533E-02 | |
| FI | Food Ingestion Rate (kg/day) | 5.188E-03 | |
| WI | Water ingestion rate (L/day) | 7.112E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 2900 | 0.11325 | 4.00E-03 | 2.00E-01 | 8.44E+01 | 2.147E+00 | 39.3 |
| Antimony | 5.25 | 0 | 2.00E-01 | 1.00E+00 | 7.53E-01 | 1.390E-01 | 5.4 |
| Arsenic | 98.884 | 0 | 1.10E+00 | 5.23E-01 | 1.57E+01 | 1.401E-01 | 112.0 |
| Barium | 22.26 | 0.0169 | 1.50E-01 | 3.60E-01 | 1.40E+00 | 1.107E+01 | 0.1 |
| Chromium | 5.06 | 0.002675 | 7.50E-03 | 3.16E+00 | 2.00E+00 | 5.626E+03 | 0.0 |
| Copper | 7.56 | 0 | 6.25E-01 | 1.53E+00 | 1.84E+00 | 3.127E+01 | 0.1 |
| Iron | 5150 | 0.2041 | 4.00E-03 | 1.00E-01 | 8.66E+01 | NA | NA |
| Lead | 26.28 | 0 | 4.68E-01 | 1.52E+00 | 6.03E+00 | 1.645E+01 | 0.4 |
| Manganese | 184.4 | 0.0491 | 2.50E-01 | 1.24E-01 | 7.48E+00 | 1.809E+02 | 0.0 |
| Vanadium | 7.98 | 0.002325 | 5.50E-03 | 8.80E-02 | 1.29E-01 | 4.008E-01 | 0.3 |
| Zinc | 51.52 | 0 | 1.82E+00 | 1.29E+01 | 8.95E+01 | 3.289E+02 | 0.3 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.0479 | 0 | 1.15E-02 | 2.00E+00 | 1.20E-02 | 1.645E+00 | 0.0 |
| 4,4'-DDE | 0.0373333 | 0 | 4.80E-03 | 1.06E+01 | 4.88E-02 | 1.645E+00 | 0.0 |
| 4,4'-DDT | 0.341 | 0 | 6.50E-03 | 7.00E-01 | 3.09E-02 | 1.645E+00 | 0.0 |
| alpha-Chlordane | 0.0066 | 0 | 8.90E-03 | 3.00E+00 | 2.46E-03 | 5.117E+00 | 0.0 |
| Aroclor-1016 | 0.0453333 | 0 | 2.24E-02 | 1.59E+01 | 8.89E-02 | NA | NA |
| Endosulfan II | 0.0034 | 0 | 9.45E-02 | 1.00E+00 | 4.58E-04 | 3.084E-01 | 0.0 |
| Endrin Aldehyde | 0.0052333 | 0 | 1.89E-01 | 1.00E+00 | 7.45E-04 | NA | NA |
| 2-Methylnaphthalene | 0.7694 | 0 | 2.16E-01 | 2.00E-01 | 3.57E-02 | 1.446E+00 | 0.0 |
| Acenaphthene | 6.048 | 0 | 2.10E-01 | 3.00E-01 | 3.52E-01 | 1.446E+00 | 0.2 |
| Acenaphthylene | 0.3678 | 0 | 1.65E-01 | 2.20E-01 | 1.64E-02 | 1.446E+00 | 0.0 |
| Anthracene | 8.368 | 0 | 9.08E-02 | 3.20E-01 | 4.26E-01 | 1.446E+00 | 0.3 |
| Benzo(a)anthracene | 18.04 | 0 | 1.97E-02 | 2.70E-01 | 7.02E-01 | 1.446E+00 | 0.5 |
| Benzo(a)pyrene | 15.178 | 0 | 1.14E-02 | 3.40E-01 | 7.10E-01 | 1.112E+00 | 0.6 |
| Benzo(b)fluoranthene | 14.82 | 0 | 1.01E-02 | 2.10E-01 | 4.55E-01 | 1.446E+00 | 0.3 |
| Benzo(g,h,i)perylene | 4.806 | 0 | 5.20E-03 | 1.50E-01 | 1.10E-01 | 1.446E+00 | 0.1 |
| Benzo(k)fluoranthene | 2.278 | 0 | 1.01E-02 | 2.10E-01 | 7.00E-02 | 1.446E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.0205 | 2.30E-03 | 1.00E+00 | 6.81E-02 | 2.035E+01 | 0.0 |
| Carbazole | 10.21 | 0 | 3.26E-01 | 1.00E+00 | 1.57E+00 | 1.446E+00 | 1.1 |
| Chrysene | 17.232 | 0 | 1.97E-02 | 4.40E-01 | 1.03E+00 | 1.446E+00 | 0.7 |
| Dibenz(a,h)anthracene | 1.801 | 0 | 5.30E-03 | 4.90E-01 | 1.17E-01 | 1.446E+00 | 0.1 |
| Dibenzofuran | 1.9826 | 0 | 1.45E-01 | 1.00E+00 | 2.75E-01 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 8.38E-02 | 1.00E+00 | 3.21E-02 | 6.118E+02 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 8.00E-04 | 1.00E+00 | 7.50E-03 | NA | NA |
| Fluoranthene | 37.9 | 0 | 4.25E-02 | 3.70E-01 | 2.01E+00 | 1.446E+00 | 1.4 |
| Fluorene | 3.112 | 0 | 1.43E-01 | 2.00E-01 | 1.26E-01 | 1.446E+00 | 0.1 |
| Indeno(1,2,3-cd)pyrene | 8.706 | 0 | 5.60E-03 | 4.10E-01 | 4.78E-01 | 1.446E+00 | 0.3 |
| Naphthalene | 2.051 | 0 | 4.43E-01 | 2.10E-01 | 1.36E-01 | 1.446E+00 | 0.1 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 5.78E-01 | 1.00E+00 | 3.83E-02 | NA | NA |
| Phenanthrene | 31.56 | 0 | 9.08E-02 | 2.80E-01 | 1.45E+00 | 1.446E+00 | 1.0 |
| Pyrene | 29.82 | 0 | 4.31E-02 | 3.90E-01 | 1.66E+00 | 1.446E+00 | 1.1 |
| Trichloroethene | 0.0064 | 0 | 1.05E+00 | 1.00E+00 | 1.36E-03 | 7.786E-01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*BAF*Iv)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Meadow Vole | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.366E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 9.858E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 3.286E-02 | |
| FI | Food ingestion rate (kg/day) | 9.858E-03 | |
| WI | Water ingestion rate (L/day) | 6.901E-03 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 2900 | 0.11325 | 4.00E-03 | 2.44E+01 | 1.887E+01 | 1.3 |
| Antimony | 5.25 | 0 | 2.00E-01 | 3.53E-01 | 1.222E+00 | 0.3 |
| Arsenic | 98.884 | 0 | 1.10E+00 | 3.34E+01 | 1.232E+00 | 27.1 |
| Barium | 22.26 | 0.0169 | 1.50E-01 | 1.17E+00 | 3.577E+01 | 0.0 |
| Chromium | 5.06 | 0.002675 | 7.50E-03 | 4.84E-02 | 4.945E+04 | 0.0 |
| Copper | 7.56 | 0 | 6.25E-01 | 1.47E+00 | 3.556E+01 | 0.0 |
| Iron | 5150 | 0.2041 | 4.00E-03 | 4.33E+01 | NA | NA |
| Lead | 26.28 | 0 | 4.68E-01 | 3.88E+00 | 1.445E+02 | 0.0 |
| Manganese | 184.4 | 0.0491 | 2.50E-01 | 1.52E+01 | 5.131E+02 | 0.0 |
| Vanadium | 7.98 | 0.002325 | 5.50E-03 | 7.11E-02 | 3.522E+00 | 0.0 |
| Zinc | 51.52 | 0 | 1.82E+00 | 2.85E+01 | 5.781E+02 | 0.0 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0479 | 0 | 1.15E-02 | 5.10E-04 | 1.445E+01 | 0.0 |
| 4,4'-DDE | 0.0373333 | 0 | 4.80E-03 | 3.23E-04 | 1.445E+01 | 0.0 |
| 4,4'-DDT | 0.341 | 0 | 6.50E-03 | 3.12E-03 | 1.445E+01 | 0.0 |
| alpha-Chlordane | 0.0066 | 0 | 8.90E-03 | 6.51E-05 | 8.993E+00 | 0.0 |
| Aroclor-1016 | 0.0453333 | 0 | 2.24E-02 | 6.31E-04 | NA | NA |
| Endosulfan II | 0.0034 | 0 | 9.45E-02 | 1.21E-04 | 2.710E+00 | 0.0 |
| Endrin Aldehyde | 0.0052333 | 0 | 1.89E-01 | 3.34E-04 | NA | NA |
| 2-Methylnaphthalene | 0.7694 | 0 | 2.16E-01 | 5.53E-02 | 2.541E+00 | 0.0 |
| Acenaphthene | 6.048 | 0 | 2.10E-01 | 4.25E-01 | 2.541E+00 | 0.2 |
| Acenaphthylene | 0.3678 | 0 | 1.65E-01 | 2.09E-02 | 2.541E+00 | 0.0 |
| Anthracene | 8.368 | 0 | 9.08E-02 | 2.88E-01 | 2.541E+00 | 0.1 |
| Benzo(a)anthracene | 18.04 | 0 | 1.97E-02 | 2.37E-01 | 2.541E+00 | 0.1 |
| Benzo(a)pyrene | 15.178 | 0 | 1.14E-02 | 1.61E-01 | 9.775E+00 | 0.0 |
| Benzo(b)fluoranthene | 14.82 | 0 | 1.01E-02 | 1.52E-01 | 2.541E+00 | 0.1 |
| Benzo(g,h,i)perylene | 4.806 | 0 | 5.20E-03 | 4.21E-02 | 2.541E+00 | 0.0 |
| Benzo(k)fluoranthene | 2.278 | 0 | 1.01E-02 | 2.33E-02 | 2.541E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.0205 | 2.30E-03 | 4.96E-03 | 1.789E+02 | 0.0 |
| Carbazole | 10.21 | 0 | 3.26E-01 | 1.07E+00 | 2.541E+00 | 0.4 |
| Chrysene | 17.232 | 0 | 1.97E-02 | 2.26E-01 | 2.541E+00 | 0.1 |
| Dibenz(a,h)anthracene | 1.801 | 0 | 5.30E-03 | 1.58E-02 | 2.541E+00 | 0.0 |
| Dibenzofuran | 1.9826 | 0 | 1.45E-01 | 1.00E-01 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 8.38E-02 | 7.76E-03 | 1.792E+03 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 8.00E-04 | 4.39E-04 | NA | NA |
| Fluoranthene | 37.9 | 0 | 4.25E-02 | 7.56E-01 | 2.541E+00 | 0.3 |
| Fluorene | 3.112 | 0 | 1.43E-01 | 1.56E-01 | 2.541E+00 | 0.1 |
| Indeno(1,2,3-cd)pyrene | 8.706 | 0 | 5.60E-03 | 7.73E-02 | 2.541E+00 | 0.0 |
| Naphthalene | 2.051 | 0 | 4.43E-01 | 2.87E-01 | 2.541E+00 | 0.1 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 5.78E-01 | 3.97E-02 | NA | NA |
| Phenanthrene | 31.56 | 0 | 9.08E-02 | 1.09E+00 | 2.541E+00 | 0.4 |
| Pyrene | 29.82 | 0 | 4.31E-02 | 6.00E-01 | 2.541E+00 | 0.2 |
| Trichloroethene | 0.0064 | 0 | 1.05E+00 | 2.06E-03 | 6.842E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Short-Tailed Shrew | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 4.663E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.943E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.152E-01 | |
| FI | Food ingestion rate (kg/day) | 1.943E-02 | |
| WI | Water ingestion rate (L/day) | 8.621E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| **INORGANICS** | | | | | | |
| Aluminum | 2900 | 0.11325 | 2.00E-01 | 5.87E+01 | 1.179E+01 | 5.0 |
| Antimony | 5.25 | 0 | 1.00E+00 | 4.85E-01 | 7.638E-01 | 0.6 |
| Arsenic | 98.884 | 0 | 5.23E-01 | 4.88E+00 | 7.700E-01 | 6.3 |
| Barium | 22.26 | 0.0169 | 3.60E-01 | 7.79E-01 | 2.236E+01 | 0.0 |
| Chromium | 5.06 | 0.002675 | 3.16E+00 | 1.46E+00 | 3.091E+04 | 0.0 |
| Copper | 7.56 | 0 | 1.53E+00 | 1.06E+00 | 2.223E+01 | 0.0 |
| Iron | 5150 | 0.2041 | 1.00E-01 | 5.78E+01 | NA | NA |
| Lead | 26.28 | 0 | 1.52E+00 | 3.67E+00 | 9.035E+01 | 0.0 |
| Manganese | 184.4 | 0.0491 | 1.24E-01 | 2.48E+00 | 3.207E+02 | 0.0 |
| Vanadium | 7.98 | 0.002325 | 8.80E-02 | 8.16E-02 | 2.202E+00 | 0.0 |
| Zinc | 51.52 | 0 | 1.29E+01 | 6.01E+01 | 3.614E+02 | 0.2 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| **ORGANICS** | | | | | | |
| 4,4'-DDD | 0.0479 | 0 | 2.00E+00 | 8.76E-03 | 9.035E+00 | 0.0 |
| 4,4'-DDE | 0.0373333 | 0 | 1.06E+01 | 3.58E-02 | 9.035E+00 | 0.0 |
| 4,4'-DDT | 0.341 | 0 | 7.00E-01 | 2.23E-02 | 9.035E+00 | 0.0 |
| alpha-Chlordane | 0.0066 | 0 | 3.00E+00 | 1.80E-03 | 5.622E+00 | 0.0 |
| Aroclor-1016 | 0.0453333 | 0 | 1.59E+01 | 6.52E-02 | NA | NA |
| Endosulfan II | 0.0034 | 0 | 1.00E+00 | 3.14E-04 | 1.694E+00 | 0.0 |
| Endrin Aldehyde | 0.0052333 | 0 | 1.00E+00 | 4.84E-04 | NA | NA |
| 2-Methylnaphthalene | 0.7694 | 0 | 2.00E-01 | 1.56E-02 | 1.589E+00 | 0.0 |
| Acenaphthene | 6.048 | 0 | 3.00E-01 | 1.77E-01 | 1.589E+00 | 0.1 |
| Acenaphthylene | 0.3678 | 0 | 2.20E-01 | 8.10E-03 | 1.589E+00 | 0.0 |
| Anthracene | 8.368 | 0 | 3.20E-01 | 2.60E-01 | 1.589E+00 | 0.2 |
| Benzo(a)anthracene | 18.04 | 0 | 2.70E-01 | 4.79E-01 | 1.589E+00 | 0.3 |
| Benzo(a)pyrene | 15.178 | 0 | 3.40E-01 | 4.99E-01 | 6.111E+00 | 0.1 |
| Benzo(b)fluoranthene | 14.82 | 0 | 2.10E-01 | 3.13E-01 | 1.589E+00 | 0.2 |
| Benzo(g,h,i)perylene | 4.806 | 0 | 1.50E-01 | 7.55E-02 | 1.589E+00 | 0.0 |
| Benzo(k)fluoranthene | 2.278 | 0 | 2.10E-01 | 4.81E-02 | 1.589E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.0205 | 1.00E+00 | 1.59E-02 | 1.118E+02 | 0.0 |
| Carbazole | 10.21 | 0 | 1.00E+00 | 9.44E-01 | 1.589E+00 | 0.6 |
| Chrysene | 17.232 | 0 | 4.40E-01 | 7.22E-01 | 1.589E+00 | 0.5 |
| Dibenz(a,h)anthracene | 1.801 | 0 | 4.90E-01 | 8.36E-02 | 1.589E+00 | 0.1 |
| Dibenzofuran | 1.9826 | 0 | 1.00E+00 | 1.83E-01 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 2.22E-02 | 1.120E+03 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 5.46E-03 | NA | NA |
| Fluoranthene | 37.9 | 0 | 3.70E-01 | 1.35E+00 | 1.589E+00 | 0.8 |
| Fluorene | 3.112 | 0 | 2.00E-01 | 6.30E-02 | 1.589E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 8.706 | 0 | 4.10E-01 | 3.41E-01 | 1.589E+00 | 0.2 |
| Naphthalene | 2.051 | 0 | 2.10E-01 | 4.33E-02 | 1.589E+00 | 0.0 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 2.03E-02 | NA | NA |
| Phenanthrene | 31.56 | 0 | 2.80E-01 | 8.66E-01 | 1.589E+00 | 0.5 |
| Pyrene | 29.82 | 0 | 3.90E-01 | 1.11E+00 | 1.589E+00 | 0.7 |
| Trichloroethene | 0.0064 | 0 | 1.00E+00 | 5.92E-04 | 4.278E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red Fox | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 8.762E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 3.129E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 4.535E+00 | |
| FI | Food ingestion rate (kg/day) | 3.129E-01 | |
| WI | Water ingestion rate (L/day) | 1.134E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 2900 | 0.11325 | 1.00E+00 | 2.06E+02 | 5.504E+00 | 37.4 |
| Antimony | 5.25 | 0 | 1.00E+00 | 3.72E-01 | 3.565E-01 | 1.0 |
| Arsenic | 98.884 | 0 | 1.60E-02 | 3.00E-01 | 3.593E-01 | 0.8 |
| Barium | 22.26 | 0.0169 | 2.53E-01 | 4.32E-01 | 1.044E+01 | 0.0 |
| Chromium | 5.06 | 0.002675 | 3.09E-01 | 1.18E-01 | 1.443E+04 | 0.0 |
| Copper | 7.56 | 0 | 1.29E+00 | 6.88E-01 | 1.037E+01 | 0.1 |
| Iron | 5150 | 0.2041 | 2.40E-02 | 1.85E+01 | NA | NA |
| Lead | 26.28 | 0 | 1.87E-01 | 3.90E-01 | 4.217E+01 | 0.0 |
| Manganese | 184.4 | 0.0491 | 1.00E+00 | 1.31E+01 | 1.497E+02 | 0.1 |
| Vanadium | 7.98 | 0.002325 | 1.00E+00 | 5.66E-01 | 1.028E+00 | 0.6 |
| Zinc | 51.52 | 0 | 2.32E+00 | 8.34E+00 | 1.687E+02 | 0.0 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, SOIL HOT SPOT
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0479 | 0 | 1.00E+00 | 3.40E-03 | 4.217E+00 | 0.0 |
| 4,4'-DDE | 0.0373333 | 0 | 1.00E+00 | 2.65E-03 | 4.217E+00 | 0.0 |
| 4,4'-DDT | 0.341 | 0 | 1.00E+00 | 2.42E-02 | 4.217E+00 | 0.0 |
| alpha-Chlordane | 0.0066 | 0 | 1.00E+00 | 4.68E-04 | 2.624E+00 | 0.0 |
| Aroclor-1016 | 0.0453333 | 0 | 1.00E+00 | 3.22E-03 | NA | NA |
| Endosulfan II | 0.0034 | 0 | 1.00E+00 | 2.41E-04 | 7.906E-01 | 0.0 |
| Endrin Aldehyde | 0.0052333 | 0 | 1.00E+00 | 3.71E-04 | NA | NA |
| 2-Methylnaphthalene | 0.7694 | 0 | 1.00E+00 | 5.46E-02 | 7.415E-01 | 0.1 |
| Acenaphthene | 6.048 | 0 | 1.00E+00 | 4.29E-01 | 7.415E-01 | 0.6 |
| Acenaphthylene | 0.3678 | 0 | 1.00E+00 | 2.61E-02 | 7.415E-01 | 0.0 |
| Anthracene | 8.368 | 0 | 1.00E+00 | 5.94E-01 | 7.415E-01 | 0.8 |
| Benzo(a)anthracene | 18.04 | 0 | 1.00E+00 | 1.28E+00 | 7.415E-01 | 1.7 |
| Benzo(a)pyrene | 15.178 | 0 | 1.00E+00 | 1.08E+00 | 2.852E+00 | 0.4 |
| Benzo(b)fluoranthene | 14.82 | 0 | 1.00E+00 | 1.05E+00 | 7.415E-01 | 1.4 |
| Benzo(g,h,i)perylene | 4.806 | 0 | 1.00E+00 | 3.41E-01 | 7.415E-01 | 0.5 |
| Benzo(k)fluoranthene | 2.278 | 0 | 1.00E+00 | 1.62E-01 | 7.415E-01 | 0.2 |
| Bis-(2-Ethylhexyl)phthalate | 0.083 | 0.0205 | 1.00E+00 | 6.40E-03 | 5.219E+01 | 0.0 |
| Carbazole | 10.21 | 0 | 1.00E+00 | 7.24E-01 | 7.415E-01 | 1.0 |
| Chrysene | 17.232 | 0 | 1.00E+00 | 1.22E+00 | 7.415E-01 | 1.6 |
| Dibenz(a,h)anthracene | 1.801 | 0 | 1.00E+00 | 1.28E-01 | 7.415E-01 | 0.2 |
| Dibenzofuran | 1.9826 | 0 | 1.00E+00 | 1.41E-01 | NA | NA |
| Di-n-butylphthalate | 0.24 | 0 | 1.00E+00 | 1.70E-02 | 5.228E+02 | 0.0 |
| Di-n-octylphthalate | 0.059 | 0 | 1.00E+00 | 4.18E-03 | NA | NA |
| Fluoranthene | 37.9 | 0 | 1.00E+00 | 2.69E+00 | 7.415E-01 | 3.6 |
| Fluorene | 3.112 | 0 | 1.00E+00 | 2.21E-01 | 7.415E-01 | 0.3 |
| Indeno(1,2,3-cd)pyrene | 8.706 | 0 | 1.00E+00 | 6.18E-01 | 7.415E-01 | 0.8 |
| Naphthalene | 2.051 | 0 | 1.00E+00 | 1.45E-01 | 7.415E-01 | 0.2 |
| N-Nitrosodiphenylamine | 0.22 | 0 | 1.00E+00 | 1.56E-02 | NA | NA |
| Phenanthrene | 31.56 | 0 | 1.00E+00 | 2.24E+00 | 7.415E-01 | 3.0 |
| Pyrene | 29.82 | 0 | 1.00E+00 | 2.12E+00 | 7.415E-01 | 2.9 |
| Trichloroethene | 0.0064 | 0 | 1.00E+00 | 4.54E-04 | 1.996E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

# APPENDIX L.2
# TERRESTRIAL RECEPTOR MODELS, SITE 4 PROPER

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | American Woodcock | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.730E-02 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.663E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.270E-01 | |
| FI | Food ingestion rate (kg/day) | 1.663E-01 | |
| WI | Water ingestion rate (L/day) | 2.113E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 81200 | 0.147 | 2.00E-01 | 3.23E+04 | 1.097E+02 | 29417 |
| Antimony | 3.7 | 0 | 1.00E+00 | 5.35E+00 | NA | NA |
| Arsenic | 48.3 | 0 | 5.23E-01 | 3.97E+01 | 2.460E+00 | 16.1 |
| Barium | 180 | 0.0308 | 3.60E-01 | 1.09E+02 | 2.080E+01 | 5.3 |
| Beryllium | 1.2 | 0 | 1.00E+00 | 1.73E+00 | NA | NA |
| Cadmium | 6 | 0 | 4.07E+01 | 3.21E+02 | 1.450E+00 | 221.1 |
| Chromium | 36.5 | 0.0037 | 3.16E+00 | 1.56E+02 | 1.000E+00 | 156.1 |
| Cobalt | 14.1 | 0 | 1.00E+00 | 2.04E+01 | NA | NA |
| Copper | 337 | 0 | 1.53E+00 | 7.22E+02 | 4.700E+01 | 15.4 |
| Iron | 42600 | 0.336 | 1.00E-01 | 1.14E+04 | NA | NA |
| Lead | 383 | 0 | 1.52E+00 | 8.16E+02 | 3.850E+00 | 211.8 |
| Manganese | 17700 | 0.0947 | 1.24E-01 | 5.29E+03 | 9.770E+02 | 5.4 |
| Mercury | 1.3 | 0 | 2.06E+01 | 3.53E+01 | 4.500E-01 | 78.4 |
| Nickel | 20.3 | 0 | 4.73E+00 | 1.29E+02 | 7.740E+01 | 1.7 |
| Selenium | 0.75 | 0 | 1.34E+00 | 1.42E+00 | 5.000E-01 | 2.8 |
| Thallium | 0.15 | 0 | 1.00E+00 | 2.17E-01 | NA | NA |
| Vanadium | 42.5 | 0.0034 | 8.80E-02 | 1.07E+01 | 1.140E+01 | 0.9 |
| Zinc | 15200 | 0 | 1.29E+01 | 2.59E+05 | 1.450E+01 | 17838.5 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.23 | 0 | 2.00E+00 | 6.34E-01 | 8.800E-01 | 0.7 |
| 4,4'-DDE | 0.07 | 0 | 1.06E+01 | 9.81E-01 | 8.800E-01 | 1.1 |
| 4,4'-DDT | 0.2 | 0 | 7.00E-01 | 2.11E-01 | 8.800E-01 | 0.2 |
| alpha-Chlordane | 0.038 | 0 | 3.00E+00 | 1.54E-01 | 2.140E+00 | 0.1 |
| Aroclor-1254 | 0.28 | 0 | 1.59E+01 | 5.87E+00 | 1.800E-01 | 32.6 |
| Aroclor-1260 | 0.4 | 0 | 1.59E+01 | 8.39E+00 | 1.800E-01 | 46.6 |
| Dieldrin | 0.012 | 0 | 8.00E+00 | 1.27E-01 | NA | NA |
| Endosulfan II | 0.02 | 0 | 1.00E+00 | 2.89E-02 | 1.000E+01 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 3.76E-03 | 1.000E-02 | 0.4 |
| Endrin Aldehyde | 0.0094 | 0 | 1.00E+00 | 1.36E-02 | NA | NA |
| Endrin Ketone | 0.0084 | 0 | 1.00E+00 | 1.21E-02 | 1.000E-02 | 1.2 |
| Gamma-Chlordane | 0.045 | 0 | 3.00E+00 | 1.83E-01 | 2.140E+00 | 0.1 |
| Heptachlor | 0.031 | 0 | 1.00E+01 | 4.10E-01 | NA | NA |
| Heptachlor Epoxide | 0.002 | 0 | 1.00E+01 | 2.65E-02 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 2.02E-03 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 2.00E-01 | 2.75E-02 | 1.000E+01 | 0.0 |
| Acenaphthene | 0.43 | 0 | 3.00E-01 | 2.28E-01 | 1.000E+01 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 2.20E-01 | 1.23E+00 | 1.000E+01 | 0.1 |
| Anthracene | 2.5 | 0 | 3.20E-01 | 1.39E+00 | 1.000E+01 | 0.1 |
| Benzo(a)anthracene | 5.4 | 0 | 2.70E-01 | 2.64E+00 | 1.000E+01 | 0.3 |
| Benzo(a)pyrene | 4.5 | 0 | 3.40E-01 | 2.62E+00 | 1.000E+01 | 0.3 |
| Benzo(b)fluoranthene | 4.3 | 0 | 2.10E-01 | 1.77E+00 | 1.000E+01 | 0.2 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.50E-01 | 7.32E-01 | 1.000E+01 | 0.1 |
| Benzo(k)fluoranthene | 4.4 | 0 | 2.10E-01 | 1.81E+00 | 1.000E+01 | 0.2 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.04 | 1.00E+00 | 9.32E-01 | 1.100E+00 | 0.8 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 2.17E-01 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 1.88E+00 | 1.000E+01 | 0.2 |
| Chrysene | 4.9 | 0 | 4.40E-01 | 3.49E+00 | 1.000E+01 | 0.3 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 4.90E-01 | 4.51E-01 | 1.000E+01 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 3.33E-01 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 2.75E-01 | 1.100E-01 | 2.5 |
| Fluoranthene | 8.9 | 0 | 3.70E-01 | 5.52E+00 | 1.000E+01 | 0.6 |
| Fluorene | 0.44 | 0 | 2.00E-01 | 1.75E-01 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 4.10E-01 | 1.75E+00 | 1.000E+01 | 0.2 |
| Naphthalene | 0.17 | 0 | 2.10E-01 | 6.99E-02 | 1.000E+01 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 8.00E+00 | 5.52E-01 | NA | NA |
| Phenanthrene | 3.9 | 0 | 2.80E-01 | 1.96E+00 | 1.000E+01 | 0.2 |
| Pyrene | 8.1 | 0 | 3.90E-01 | 5.24E+00 | 1.000E+01 | 0.5 |
| Toluene | 0.027 | 0 | 1.00E+00 | 3.90E-02 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*BAF*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Bobwhite Quail | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.803E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.803E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.540E-01 | |
| FI | Food ingestion rate (kg/day) | 1.803E-02 | |
| WI | Water ingestion rate (L/day) | 2.521E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 81200 | 0.147 | 4.00E-03 | 9.89E+02 | 1.097E+02 | 9.0 |
| Antimony | 3.7 | 0 | 2.00E-01 | 1.30E-01 | NA | NA |
| Arsenic | 48.3 | 0 | 1.10E+00 | 6.80E+00 | 2.460E+00 | 2.8 |
| Barium | 180 | 0.0308 | 1.50E-01 | 5.27E+00 | 2.080E+01 | 0.3 |
| Beryllium | 1.2 | 0 | 1.00E-02 | 1.55E-02 | NA | NA |
| Cadmium | 6 | 0 | 3.25E+00 | 2.35E+00 | 1.450E+00 | 1.6 |
| Chromium | 36.5 | 0.0037 | 7.50E-03 | 4.60E-01 | 1.000E+00 | 0.5 |
| Cobalt | 14.1 | 0 | 2.00E-02 | 1.98E-01 | NA | NA |
| Copper | 337 | 0 | 6.25E-01 | 2.86E+01 | 4.700E+01 | 0.6 |
| Iron | 42600 | 0.336 | 4.00E-03 | 5.19E+02 | NA | NA |
| Lead | 383 | 0 | 4.68E-01 | 2.55E+01 | 3.850E+00 | 6.6 |
| Manganese | 17700 | 0.0947 | 2.50E-01 | 7.25E+02 | 9.770E+02 | 0.7 |
| Mercury | 1.3 | 0 | 5.00E+00 | 7.76E-01 | 4.500E-01 | 1.7 |
| Nickel | 20.3 | 0 | 1.41E+00 | 3.59E+00 | 7.740E+01 | 0.0 |
| Selenium | 0.75 | 0 | 3.01E+00 | 2.73E-01 | 5.000E-01 | 0.5 |
| Thallium | 0.15 | 0 | 4.00E-03 | 1.83E-03 | NA | NA |
| Vanadium | 42.5 | 0.0034 | 5.50E-03 | 5.26E-01 | 1.140E+01 | 0.0 |
| Zinc | 15200 | 0 | 1.82E+00 | 3.42E+03 | 1.450E+01 | 235.7 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.23 | 0 | 1.15E-02 | 3.00E-03 | 8.800E-01 | 0.0 |
| 4,4'-DDE | 0.07 | 0 | 4.80E-03 | 8.59E-04 | 8.800E-01 | 0.0 |
| 4,4'-DDT | 0.2 | 0 | 6.50E-03 | 2.49E-03 | 8.800E-01 | 0.0 |
| alpha-Chlordane | 0.038 | 0 | 8.90E-03 | 4.85E-04 | 2.140E+00 | 0.0 |
| Aroclor-1254 | 0.28 | 0 | 6.80E-03 | 3.50E-03 | 1.800E-01 | 0.0 |
| Aroclor-1260 | 0.4 | 0 | 4.50E-03 | 4.89E-03 | 1.800E-01 | 0.0 |
| Dieldrin | 0.012 | 0 | 3.05E-02 | 1.83E-04 | NA | NA |
| Endosulfan II | 0.02 | 0 | 9.45E-02 | 4.56E-04 | 1.000E+01 | 0.0 |
| Endrin | 0.0026 | 0 | 4.61E-02 | 4.45E-05 | 1.000E-02 | 0.0 |
| Endrin Aldehyde | 0.0094 | 0 | 1.89E-01 | 3.18E-04 | NA | NA |
| Endrin Ketone | 0.0084 | 0 | 1.89E-01 | 2.84E-04 | 1.000E-02 | 0.0 |
| Gamma-Chlordane | 0.045 | 0 | 8.60E-03 | 5.72E-04 | 2.140E+00 | 0.0 |
| Heptachlor | 0.031 | 0 | 9.30E-03 | 3.97E-04 | NA | NA |
| Heptachlor Epoxide | 0.002 | 0 | 4.99E-02 | 3.51E-05 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 4.48E-02 | 2.37E-05 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 2.16E-01 | 2.55E-03 | 1.000E+01 | 0.0 |
| Acenaphthene | 0.43 | 0 | 2.10E-01 | 1.56E-02 | 1.000E+01 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.65E-01 | 9.01E-02 | 1.000E+01 | 0.0 |
| Anthracene | 2.5 | 0 | 9.08E-02 | 5.59E-02 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 1.97E-02 | 7.57E-02 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 4.5 | 0 | 1.14E-02 | 5.87E-02 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.01E-02 | 5.54E-02 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 5.20E-03 | 2.71E-02 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.01E-02 | 5.67E-02 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.04 | 2.30E-03 | 1.42E-02 | 1.100E+00 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 6.17E-02 | 2.84E-03 | NA | NA |
| Carbazole | 1.3 | 0 | 3.26E-01 | 6.48E-02 | 1.000E+01 | 0.0 |
| Chrysene | 4.9 | 0 | 1.97E-02 | 6.87E-02 | 1.000E+01 | 0.0 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 5.30E-03 | 7.15E-03 | 1.000E+01 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.45E-01 | 6.59E-03 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 8.38E-02 | 4.09E-03 | 1.100E-01 | 0.0 |
| Fluoranthene | 8.9 | 0 | 4.25E-02 | 1.49E-01 | 1.000E+01 | 0.0 |
| Fluorene | 0.44 | 0 | 1.43E-01 | 1.25E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 5.60E-03 | 3.21E-02 | 1.000E+01 | 0.0 |
| Naphthalene | 0.17 | 0 | 4.43E-01 | 1.08E-02 | 1.000E+01 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 4.43E-02 | 8.79E-04 | NA | NA |
| Phenanthrene | 3.9 | 0 | 9.08E-02 | 8.71E-02 | 1.000E+01 | 0.0 |
| Pyrene | 8.1 | 0 | 4.31E-02 | 1.36E-01 | 1.000E+01 | 0.0 |
| Toluene | 0.027 | 0 | 9.97E-01 | 3.47E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Marsh Wren | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.961E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 2.961E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 9.400E-03 | |
| FI | Food ingestion rate (kg/day) | 2.961E-03 | |
| WI | Water ingestion rate (L/day) | 2.804E-03 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 81200 | 0.147 | 2.00E-01 | 7.67E+03 | 1.097E+02 | 69.9 |
| Antimony | 3.7 | 0 | 1.00E+00 | 1.28E+00 | NA | NA |
| Arsenic | 48.3 | 0 | 5.23E-01 | 9.48E+00 | 2.460E+00 | 3.9 |
| Barium | 180 | 0.0308 | 3.60E-01 | 2.61E+01 | 2.080E+01 | 1.3 |
| Beryllium | 1.2 | 0 | 1.00E+00 | 4.16E-01 | NA | NA |
| Cadmium | 6 | 0 | 4.07E+01 | 7.71E+01 | 1.450E+00 | 53.2 |
| Chromium | 36.5 | 0.0037 | 3.16E+00 | 3.75E+01 | 1.000E+00 | 37.5 |
| Cobalt | 14.1 | 0 | 1.00E+00 | 4.89E+00 | NA | NA |
| Copper | 337 | 0 | 1.53E+00 | 1.73E+02 | 4.700E+01 | 3.7 |
| Iron | 42600 | 0.336 | 1.00E-01 | 2.68E+03 | NA | NA |
| Lead | 383 | 0 | 1.52E+00 | 1.96E+02 | 3.850E+00 | 50.8 |
| Manganese | 17700 | 0.0947 | 1.24E-01 | 1.25E+03 | 9.770E+02 | 1.3 |
| Mercury | 1.3 | 0 | 2.06E+01 | 8.49E+00 | 4.500E-01 | 18.9 |
| Nickel | 20.3 | 0 | 4.73E+00 | 3.09E+01 | 7.740E+01 | 0.4 |
| Selenium | 0.75 | 0 | 1.34E+00 | 3.40E-01 | 5.000E-01 | 0.7 |
| Thallium | 0.15 | 0 | 1.00E+00 | 5.20E-02 | NA | NA |
| Vanadium | 42.5 | 0.0034 | 8.80E-02 | 2.52E+00 | 1.140E+01 | 0.2 |
| Zinc | 15200 | 0 | 1.29E+01 | 6.22E+04 | 1.450E+01 | 4288.9 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.23 | 0 | 2.00E+00 | 1.52E-01 | 8.800E-01 | 0.2 |
| 4,4'-DDE | 0.07 | 0 | 1.06E+01 | 2.36E-01 | 8.800E-01 | 0.3 |
| 4,4'-DDT | 0.2 | 0 | 7.00E-01 | 5.04E-02 | 8.800E-01 | 0.1 |
| alpha-Chlordane | 0.038 | 0 | 3.00E+00 | 3.71E-02 | 2.140E+00 | 0.0 |
| Aroclor-1254 | 0.28 | 0 | 1.59E+01 | 1.41E+00 | 1.800E-01 | 7.8 |
| Aroclor-1260 | 0.4 | 0 | 1.59E+01 | 2.02E+00 | 1.800E-01 | 11.2 |
| Dieldrin | 0.012 | 0 | 8.00E+00 | 3.06E-02 | NA | NA |
| Endosulfan II | 0.02 | 0 | 1.00E+00 | 6.93E-03 | 1.000E+01 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 9.01E-04 | 1.000E-02 | 0.1 |
| Endrin Aldehyde | 0.0094 | 0 | 1.00E+00 | 3.26E-03 | NA | NA |
| Endrin Ketone | 0.0084 | 0 | 1.00E+00 | 2.91E-03 | 1.000E-02 | 0.3 |
| Gamma-Chlordane | 0.045 | 0 | 3.00E+00 | 4.39E-02 | 2.140E+00 | 0.0 |
| Heptachlor | 0.031 | 0 | 1.00E+01 | 9.86E-02 | NA | NA |
| Heptachlor Epoxide | 0.002 | 0 | 1.00E+01 | 6.36E-03 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 4.85E-04 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 2.00E-01 | 6.52E-03 | 1.000E+01 | 0.0 |
| Acenaphthene | 0.43 | 0 | 3.00E-01 | 5.42E-02 | 1.000E+01 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 2.20E-01 | 2.92E-01 | 1.000E+01 | 0.0 |
| Anthracene | 2.5 | 0 | 3.20E-01 | 3.31E-01 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 2.70E-01 | 6.29E-01 | 1.000E+01 | 0.1 |
| Benzo(a)pyrene | 4.5 | 0 | 3.40E-01 | 6.24E-01 | 1.000E+01 | 0.1 |
| Benzo(b)fluoranthene | 4.3 | 0 | 2.10E-01 | 4.20E-01 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.50E-01 | 1.73E-01 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 2.10E-01 | 4.30E-01 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.04 | 1.00E+00 | 2.34E-01 | 1.100E+00 | 0.2 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 5.20E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 4.50E-01 | 1.000E+01 | 0.0 |
| Chrysene | 4.9 | 0 | 4.40E-01 | 8.33E-01 | 1.000E+01 | 0.1 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 4.90E-01 | 1.08E-01 | 1.000E+01 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 7.97E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 6.58E-02 | 1.100E-01 | 0.6 |
| Fluoranthene | 8.9 | 0 | 3.70E-01 | 1.32E+00 | 1.000E+01 | 0.1 |
| Fluorene | 0.44 | 0 | 2.00E-01 | 4.16E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 4.10E-01 | 4.18E-01 | 1.000E+01 | 0.0 |
| Naphthalene | 0.17 | 0 | 2.10E-01 | 1.66E-02 | 1.000E+01 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 8.00E+00 | 1.33E-01 | NA | NA |
| Phenanthrene | 3.9 | 0 | 2.80E-01 | 4.67E-01 | 1.000E+01 | 0.0 |
| Pyrene | 8.1 | 0 | 3.90E-01 | 1.25E+00 | 1.000E+01 | 0.1 |
| Toluene | 0.027 | 0 | 1.00E+00 | 9.35E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red-Tailed Hawk | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.717E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 1.359E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 9.570E-01 | |
| FI | Food ingestion rate (kg/day) | 1.359E-01 | |
| WI | Water ingestion rate (L/day) | 6.796E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 81200 | 0.147 | 1.00E+00 | 1.18E+04 | 1.097E+02 | 107.2 |
| Antimony | 3.7 | 0 | 1.00E+00 | 5.36E-01 | NA | NA |
| Arsenic | 48.3 | 0 | 1.60E-02 | 2.47E-01 | 2.460E+00 | 0.1 |
| Barium | 180 | 0.0308 | 2.53E-01 | 6.98E+00 | 2.080E+01 | 0.3 |
| Beryllium | 1.2 | 0 | 4.10E-01 | 7.32E-02 | NA | NA |
| Cadmium | 6 | 0 | 4.48E-01 | 3.99E-01 | 1.450E+00 | 0.3 |
| Chromium | 36.5 | 0.0037 | 3.09E-01 | 1.70E+00 | 1.000E+00 | 1.7 |
| Cobalt | 14.1 | 0 | 1.40E-01 | 3.20E-01 | NA | NA |
| Copper | 337 | 0 | 1.29E+00 | 6.27E+01 | 4.700E+01 | 1.3 |
| Iron | 42600 | 0.336 | 2.40E-02 | 2.66E+02 | NA | NA |
| Lead | 383 | 0 | 1.87E-01 | 1.13E+01 | 3.850E+00 | 2.9 |
| Manganese | 17700 | 0.0947 | 1.00E+00 | 2.56E+03 | 9.770E+02 | 2.6 |
| Mercury | 1.3 | 0 | 1.92E-01 | 3.91E-02 | 4.500E-01 | 0.1 |
| Nickel | 20.3 | 0 | 8.98E-01 | 2.65E+00 | 7.740E+01 | 0.0 |
| Selenium | 0.75 | 0 | 1.55E-01 | 1.86E-02 | 5.000E-01 | 0.0 |
| Thallium | 0.15 | 0 | 1.23E-01 | 3.04E-03 | NA | NA |
| Vanadium | 42.5 | 0.0034 | 1.00E+00 | 6.15E+00 | 1.140E+01 | 0.5 |
| Zinc | 15200 | 0 | 2.32E+00 | 5.04E+03 | 1.450E+01 | 347.7 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.23 | 0 | 1.00E+00 | 3.33E-02 | 8.800E-01 | 0.0 |
| 4,4'-DDE | 0.07 | 0 | 1.00E+00 | 1.01E-02 | 8.800E-01 | 0.0 |
| 4,4'-DDT | 0.2 | 0 | 1.00E+00 | 2.90E-02 | 8.800E-01 | 0.0 |
| alpha-Chlordane | 0.038 | 0 | 1.00E+00 | 5.50E-03 | 2.140E+00 | 0.0 |
| Aroclor-1254 | 0.28 | 0 | 1.00E+00 | 4.05E-02 | 1.800E-01 | 0.2 |
| Aroclor-1260 | 0.4 | 0 | 1.00E+00 | 5.79E-02 | 1.800E-01 | 0.3 |
| Dieldrin | 0.012 | 0 | 1.00E+00 | 1.74E-03 | NA | NA |
| Endosulfan II | 0.02 | 0 | 1.00E+00 | 2.90E-03 | 1.000E+01 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 3.76E-04 | 1.000E-02 | 0.0 |
| Endrin Aldehyde | 0.0094 | 0 | 1.00E+00 | 1.36E-03 | NA | NA |
| Endrin Ketone | 0.0084 | 0 | 1.00E+00 | 1.22E-03 | 1.000E-02 | 0.1 |
| Gamma-Chlordane | 0.045 | 0 | 1.00E+00 | 6.52E-03 | 2.140E+00 | 0.0 |
| Heptachlor | 0.031 | 0 | 1.00E+00 | 4.49E-03 | NA | NA |
| Heptachlor Epoxide | 0.002 | 0 | 1.00E+00 | 2.90E-04 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 2.03E-04 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 1.00E+00 | 9.99E-03 | 1.000E+01 | 0.0 |
| Acenaphthene | 0.43 | 0 | 1.00E+00 | 6.23E-02 | 1.000E+01 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.00E+00 | 4.20E-01 | 1.000E+01 | 0.0 |
| Anthracene | 2.5 | 0 | 1.00E+00 | 3.62E-01 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 1.00E+00 | 7.82E-01 | 1.000E+01 | 0.1 |
| Benzo(a)pyrene | 4.5 | 0 | 1.00E+00 | 6.52E-01 | 1.000E+01 | 0.1 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.00E+00 | 6.23E-01 | 1.000E+01 | 0.1 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.00E+00 | 3.19E-01 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.00E+00 | 6.37E-01 | 1.000E+01 | 0.1 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.04 | 1.00E+00 | 9.55E-02 | 1.100E+00 | 0.1 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 2.17E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 1.88E-01 | 1.000E+01 | 0.0 |
| Chrysene | 4.9 | 0 | 1.00E+00 | 7.09E-01 | 1.000E+01 | 0.1 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 1.00E+00 | 8.40E-02 | 1.000E+01 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 3.33E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 2.75E-02 | 1.100E-01 | 0.3 |
| Fluoranthene | 8.9 | 0 | 1.00E+00 | 1.29E+00 | 1.000E+01 | 0.1 |
| Fluorene | 0.44 | 0 | 1.00E+00 | 6.37E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 1.00E+00 | 3.76E-01 | 1.000E+01 | 0.0 |
| Naphthalene | 0.17 | 0 | 1.00E+00 | 2.46E-02 | 1.000E+01 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 1.00E+00 | 7.53E-03 | NA | NA |
| Phenanthrene | 3.9 | 0 | 1.00E+00 | 5.65E-01 | 1.000E+01 | 0.1 |
| Pyrene | 8.1 | 0 | 1.00E+00 | 1.17E+00 | 1.000E+01 | 0.1 |
| Toluene | 0.027 | 0 | 1.00E+00 | 3.91E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Cm = (((Cs*Bv*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*Bv*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | American Robin | |
|---|---|---|---|
| BAF | Soil to plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 0.0019 | |
| Iv | Rate of vegetation ingestion (kg/day) | 0.00759 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 0.01309 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 6.350E-02 | |
| FI | Food Ingestion Rate (kg/day) | 0.02068 | |
| WI | Water ingestion rate (L/day) | 1.287E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 81200 | 0.147 | 4.00E-03 | 2.00E-01 | 5.82E+03 | 1.097E+02 | 53.0 |
| Antimony | 3.7 | 0 | 2.00E-01 | 1.00E+00 | 9.62E-01 | NA | NA |
| Arsenic | 48.3 | 0 | 1.10E+00 | 5.23E-01 | 1.30E+01 | 2.460E+00 | 5.3 |
| Barium | 180 | 0.0308 | 1.50E-01 | 3.60E-01 | 2.20E+01 | 2.080E+01 | 1.1 |
| Beryllium | 1.2 | 0 | 1.00E-02 | 1.00E+00 | 2.85E-01 | NA | NA |
| Cadmium | 6 | 0 | 3.25E+00 | 4.07E+01 | 5.28E+01 | 1.450E+00 | 36.4 |
| Chromium | 36.5 | 0.0037 | 7.50E-03 | 3.16E+00 | 2.49E+01 | 1.000E+00 | 24.9 |
| Cobalt | 14.1 | 0 | 2.00E-02 | 1.00E+00 | 3.36E+00 | NA | NA |
| Copper | 337 | 0 | 6.25E-01 | 1.53E+00 | 1.42E+02 | 4.700E+01 | 3.0 |
| Iron | 42600 | 0.336 | 4.00E-03 | 1.00E-01 | 2.17E+03 | NA | NA |
| Lead | 383 | 0 | 4.68E-01 | 1.52E+00 | 1.53E+02 | 3.850E+00 | 39.8 |
| Manganese | 17700 | 0.0947 | 2.50E-01 | 1.24E-01 | 1.51E+03 | 9.770E+02 | 1.5 |
| Mercury | 1.3 | 0 | 5.00E+00 | 2.06E+01 | 6.34E+00 | 4.500E-01 | 14.1 |
| Nickel | 20.3 | 0 | 1.41E+00 | 4.73E+00 | 2.38E+01 | 7.740E+01 | 0.3 |
| Selenium | 0.75 | 0 | 3.01E+00 | 1.34E+00 | 5.00E-01 | 5.000E-01 | 1.0 |
| Thallium | 0.15 | 0 | 4.00E-03 | 1.00E+00 | 3.55E-02 | NA | NA |
| Vanadium | 42.5 | 0.0034 | 5.50E-03 | 8.80E-02 | 2.07E+00 | 1.140E+01 | 0.2 |
| Zinc | 15200 | 0 | 1.82E+00 | 1.29E+01 | 4.42E+04 | 1.450E+01 | 3044.9 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.23 | 0 | 1.15E-02 | 2.00E+00 | 1.02E-01 | 8.800E-01 | 0.1 |
| 4,4'-DDE | 0.07 | 0 | 4.80E-03 | 1.06E+01 | 1.55E-01 | 8.800E-01 | 0.2 |
| 4,4'-DDT | 0.2 | 0 | 6.50E-03 | 7.00E-01 | 3.50E-02 | 8.800E-01 | 0.0 |
| alpha-Chlordane | 0.038 | 0 | 8.90E-03 | 3.00E+00 | 2.47E-02 | 2.140E+00 | 0.0 |
| Aroclor-1254 | 0.28 | 0 | 6.80E-03 | 1.59E+01 | 9.27E-01 | 1.800E-01 | 5.1 |
| Aroclor-1260 | 0.4 | 0 | 4.50E-03 | 1.59E+01 | 1.32E+00 | 1.800E-01 | 7.4 |
| Dieldrin | 0.012 | 0 | 3.05E-02 | 8.00E+00 | 2.02E-02 | NA | NA |
| Endosulfan II | 0.02 | 0 | 9.45E-02 | 1.00E+00 | 4.95E-03 | 1.000E+01 | 0.0 |
| Endrin | 0.0026 | 0 | 4.61E-02 | 1.00E+00 | 6.28E-04 | 1.000E-02 | 0.1 |
| Endrin Aldehyde | 0.0094 | 0 | 1.89E-01 | 1.00E+00 | 2.43E-03 | NA | NA |
| Endrin Ketone | 0.0084 | 0 | 1.89E-01 | 1.00E+00 | 2.17E-03 | 1.000E-02 | 0.2 |
| Gamma-Chlordane | 0.045 | 0 | 8.60E-03 | 3.00E+00 | 2.92E-02 | 2.140E+00 | 0.0 |
| Heptachlor | 0.031 | 0 | 9.30E-03 | 1.00E+01 | 6.49E-02 | NA | NA |
| Heptachlor Epoxide | 0.002 | 0 | 4.99E-02 | 1.00E+01 | 4.19E-03 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 4.48E-02 | 1.00E+00 | 3.38E-04 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 2.16E-01 | 2.00E-01 | 6.69E-03 | 1.000E+01 | 0.0 |
| Acenaphthene | 0.43 | 0 | 2.10E-01 | 3.00E-01 | 5.03E-02 | 1.000E+01 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.65E-01 | 2.20E-01 | 2.76E-01 | 1.000E+01 | 0.0 |
| Anthracene | 2.5 | 0 | 9.08E-02 | 3.20E-01 | 2.67E-01 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 1.97E-02 | 2.70E-01 | 4.75E-01 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 4.5 | 0 | 1.14E-02 | 3.40E-01 | 4.56E-01 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.01E-02 | 2.10E-01 | 3.20E-01 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 5.20E-03 | 1.50E-01 | 1.35E-01 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.01E-02 | 2.10E-01 | 3.27E-01 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.04 | 2.30E-03 | 1.00E+00 | 1.59E-01 | 1.100E+00 | 0.1 |
| Butylbenzylphthalate | 0.15 | 0 | 6.17E-02 | 1.00E+00 | 3.65E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 3.26E-01 | 1.00E+00 | 3.58E-01 | 1.000E+01 | 0.0 |
| Chrysene | 4.9 | 0 | 1.97E-02 | 4.40E-01 | 6.03E-01 | 1.000E+01 | 0.1 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 5.30E-03 | 4.90E-01 | 7.63E-02 | 1.000E+01 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.45E-01 | 1.00E+00 | 5.83E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 8.38E-02 | 1.00E+00 | 4.68E-02 | 1.100E-01 | 0.4 |
| Fluoranthene | 8.9 | 0 | 4.25E-02 | 3.70E-01 | 9.90E-01 | 1.000E+01 | 0.1 |
| Fluorene | 0.44 | 0 | 1.43E-01 | 2.00E-01 | 3.88E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 5.60E-03 | 4.10E-01 | 2.99E-01 | 1.000E+01 | 0.0 |
| Naphthalene | 0.17 | 0 | 4.43E-01 | 2.10E-01 | 2.14E-02 | 1.000E+01 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 4.43E-02 | 8.00E+00 | 8.76E-02 | NA | NA |
| Phenanthrene | 3.9 | 0 | 9.08E-02 | 2.80E-01 | 3.84E-01 | 1.000E+01 | 0.0 |
| Pyrene | 8.1 | 0 | 4.31E-02 | 3.90E-01 | 9.35E-01 | 1.000E+01 | 0.1 |
| Toluene | 0.027 | 0 | 9.97E-01 | 1.00E+00 | 9.59E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Soil to plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 2.007E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 4.014E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 6.021E-03 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.960E-02 | |
| FI | Food Ingestion Rate (kg/day) | 1.004E-02 | |
| WI | Water ingestion rate (L/day) | 7.022E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant BAF (mg/kg) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 81200 | 0.147 | 4.00E-03 | 2.00E-01 | 5.89E+03 | 2.147E+00 | 2742.5 |
| Antimony | 3.7 | 0 | 2.00E-01 | 1.00E+00 | 1.33E+00 | 1.390E-01 | 9.5 |
| Arsenic | 48.3 | 0 | 1.10E+00 | 5.23E-01 | 1.92E+01 | 1.401E-01 | 136.7 |
| Barium | 180 | 0.0308 | 1.50E-01 | 3.60E-01 | 2.74E+01 | 1.107E+01 | 2.5 |
| Beryllium | 1.2 | 0 | 1.00E-02 | 1.00E+00 | 3.83E-01 | 1.357E+00 | 0.3 |
| Cadmium | 6 | 0 | 3.25E+00 | 4.07E+01 | 7.91E+01 | 1.983E+00 | 39.9 |
| Chromium | 36.5 | 0.0037 | 7.50E-03 | 3.16E+00 | 3.59E+01 | 5.626E+03 | 0.0 |
| Cobalt | 14.1 | 0 | 2.00E-02 | 1.00E+00 | 4.53E+00 | NA | NA |
| Copper | 337 | 0 | 6.25E-01 | 1.53E+00 | 2.05E+02 | 3.127E+01 | 6.6 |
| Iron | 42600 | 0.336 | 4.00E-03 | 1.00E-01 | 1.78E+03 | NA | NA |
| Lead | 383 | 0 | 4.68E-01 | 1.52E+00 | 2.20E+02 | 1.645E+01 | 13.4 |
| Manganese | 17700 | 0.0947 | 2.50E-01 | 1.24E-01 | 1.76E+03 | 1.809E+02 | 9.7 |
| Mercury | 1.3 | 0 | 5.00E+00 | 2.06E+01 | 9.58E+00 | 2.673E+00 | 3.6 |
| Nickel | 20.3 | 0 | 1.41E+00 | 4.73E+00 | 3.56E+01 | 8.223E+01 | 0.4 |
| Selenium | 0.75 | 0 | 3.01E+00 | 1.34E+00 | 7.79E-01 | 4.111E-01 | 1.9 |
| Thallium | 0.15 | 0 | 4.00E-03 | 1.00E+00 | 4.77E-02 | 1.537E-02 | 3.1 |
| Vanadium | 42.5 | 0.0034 | 5.50E-03 | 8.80E-02 | 1.64E+00 | 4.008E-01 | 4.1 |
| Zinc | 15200 | 0 | 1.82E+00 | 1.29E+01 | 6.60E+04 | 3.289E+02 | 200.7 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant BAF (mg/kg) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.23 | 0 | 1.15E-02 | 2.00E+00 | 1.44E-01 | 1.645E+00 | 0.1 |
| 4,4'-DDE | 0.07 | 0 | 4.80E-03 | 1.06E+01 | 2.29E-01 | 1.645E+00 | 0.1 |
| 4,4'-DDT | 0.2 | 0 | 6.50E-03 | 7.00E-01 | 4.53E-02 | 1.645E+00 | 0.0 |
| alpha-Chlordane | 0.038 | 0 | 8.90E-03 | 3.00E+00 | 3.55E-02 | 5.117E+00 | 0.0 |
| Aroclor-1254 | 0.28 | 0 | 6.80E-03 | 1.59E+01 | 1.37E+00 | 6.251E-02 | 21.9 |
| Aroclor-1260 | 0.4 | 0 | 4.50E-03 | 1.59E+01 | 1.96E+00 | 6.251E-02 | 31.3 |
| Dieldrin | 0.012 | 0 | 3.05E-02 | 8.00E+00 | 2.97E-02 | NA | NA |
| Endosulfan II | 0.02 | 0 | 9.45E-02 | 1.00E+00 | 6.74E-03 | 3.084E-01 | 0.0 |
| Endrin | 0.0026 | 0 | 4.61E-02 | 1.00E+00 | 8.50E-04 | 1.023E-01 | 0.0 |
| Endrin Aldehyde | 0.0094 | 0 | 1.89E-01 | 1.00E+00 | 3.35E-03 | NA | NA |
| Endrin Ketone | 0.0084 | 0 | 1.89E-01 | 1.00E+00 | 2.99E-03 | 1.023E-01 | 0.0 |
| Gamma-Chlordane | 0.045 | 0 | 8.60E-03 | 3.00E+00 | 4.20E-02 | 5.117E+00 | 0.0 |
| Heptachlor | 0.031 | 0 | 9.30E-03 | 1.00E+01 | 9.56E-02 | 2.673E-01 | 0.4 |
| Heptachlor Epoxide | 0.002 | 0 | 4.99E-02 | 1.00E+01 | 6.18E-03 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 4.48E-02 | 1.00E+00 | 4.57E-04 | 8.223E+00 | 0.0 |
| 2-Methylnaphthalene | 0.069 | 0 | 2.16E-01 | 2.00E-01 | 7.99E-03 | 1.446E+00 | 0.0 |
| Acenaphthene | 0.43 | 0 | 2.10E-01 | 3.00E-01 | 6.25E-02 | 1.446E+00 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.65E-01 | 2.20E-01 | 3.24E-01 | 1.446E+00 | 0.2 |
| Anthracene | 2.5 | 0 | 9.08E-02 | 3.20E-01 | 3.18E-01 | 1.446E+00 | 0.2 |
| Benzo(a)anthracene | 5.4 | 0 | 1.97E-02 | 2.70E-01 | 5.25E-01 | 1.446E+00 | 0.4 |
| Benzo(a)pyrene | 4.5 | 0 | 1.14E-02 | 3.40E-01 | 5.27E-01 | 1.112E+00 | 0.5 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.01E-02 | 2.10E-01 | 3.30E-01 | 1.446E+00 | 0.2 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 5.20E-03 | 1.50E-01 | 1.26E-01 | 1.446E+00 | 0.1 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.01E-02 | 2.10E-01 | 3.38E-01 | 1.446E+00 | 0.2 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.04 | 2.30E-03 | 1.00E+00 | 3.47E-01 | 2.035E+01 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 6.17E-02 | 1.00E+00 | 4.95E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 3.26E-01 | 1.00E+00 | 4.99E-01 | 1.446E+00 | 0.3 |
| Chrysene | 4.9 | 0 | 1.97E-02 | 4.40E-01 | 7.32E-01 | 1.446E+00 | 0.5 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 5.30E-03 | 4.90E-01 | 9.39E-02 | 1.446E+00 | 0.1 |
| Dibenzofuran | 0.23 | 0 | 1.45E-01 | 1.00E+00 | 7.98E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 8.38E-02 | 1.00E+00 | 6.36E-02 | 6.118E+02 | 0.0 |
| Fluoranthene | 8.9 | 0 | 4.25E-02 | 3.70E-01 | 1.18E+00 | 1.446E+00 | 0.8 |
| Fluorene | 0.44 | 0 | 1.43E-01 | 2.00E-01 | 4.44E-02 | 1.446E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 5.60E-03 | 4.10E-01 | 3.57E-01 | 1.446E+00 | 0.2 |
| Naphthalene | 0.17 | 0 | 4.43E-01 | 2.10E-01 | 2.81E-02 | 1.446E+00 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 4.43E-02 | 8.00E+00 | 1.29E-01 | NA | NA |
| Phenanthrene | 3.9 | 0 | 9.08E-02 | 2.80E-01 | 4.48E-01 | 1.446E+00 | 0.3 |
| Pyrene | 8.1 | 0 | 4.31E-02 | 3.90E-01 | 1.12E+00 | 1.446E+00 | 0.8 |
| Toluene | 0.027 | 0 | 9.97E-01 | 1.00E+00 | 1.41E-02 | 2.892E+01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*BAF*Iv)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Meadow Vole | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumualtion factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 3.773E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.572E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.700E-02 | |
| FI | Food ingestion rate (kg/day) | 1.572E-02 | |
| WI | Water ingestion rate (L/day) | 1.100E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 81200 | 0.147 | 4.00E-03 | 2.10E+03 | 2.224E+00 | 945.2 |
| Antimony | 3.7 | 0 | 2.00E-01 | 7.66E-01 | 1.441E-01 | 5.3 |
| Arsenic | 48.3 | 0 | 1.10E+00 | 5.03E+01 | 1.452E-01 | 346.6 |
| Barium | 180 | 0.0308 | 1.50E-01 | 2.90E+01 | 1.147E+01 | 2.5 |
| Beryllium | 1.2 | 0 | 1.00E-02 | 3.77E-02 | 1.406E+00 | 0.0 |
| Cadmium | 6 | 0 | 3.25E+00 | 1.82E+01 | 2.055E+00 | 8.8 |
| Chromium | 36.5 | 0.0037 | 7.50E-03 | 1.07E+00 | 5.830E+03 | 0.0 |
| Cobalt | 14.1 | 0 | 2.00E-02 | 5.74E-01 | NA | NA |
| Copper | 337 | 0 | 6.25E-01 | 2.02E+02 | 3.240E+01 | 6.2 |
| Iron | 42600 | 0.336 | 4.00E-03 | 1.10E+03 | NA | NA |
| Lead | 383 | 0 | 4.68E-01 | 1.74E+02 | 1.704E+01 | 10.2 |
| Manganese | 17700 | 0.0947 | 2.50E-01 | 4.48E+03 | 1.875E+02 | 23.9 |
| Mercury | 1.3 | 0 | 5.00E+00 | 6.04E+00 | 2.769E+00 | 2.2 |
| Nickel | 20.3 | 0 | 1.41E+00 | 2.69E+01 | 8.520E+01 | 0.3 |
| Selenium | 0.75 | 0 | 3.01E+00 | 2.11E+00 | 4.260E-01 | 4.9 |
| Thallium | 0.15 | 0 | 4.00E-03 | 3.88E-03 | 1.593E-02 | 0.2 |
| Vanadium | 42.5 | 0.0034 | 5.50E-03 | 1.16E+00 | 4.153E-01 | 2.8 |
| Zinc | 15200 | 0 | 1.82E+00 | 2.59E+04 | 3.408E+02 | 76.0 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.23 | 0 | 1.15E-02 | 7.55E-03 | 1.704E+00 | 0.0 |
| 4,4'-DDE | 0.07 | 0 | 4.80E-03 | 1.86E-03 | 1.704E+00 | 0.0 |
| 4,4'-DDT | 0.2 | 0 | 6.50E-03 | 5.64E-03 | 1.704E+00 | 0.0 |
| alpha-Chlordane | 0.038 | 0 | 8.90E-03 | 1.16E-03 | 5.302E+00 | 0.0 |
| Aroclor-1254 | 0.28 | 0 | 6.80E-03 | 7.97E-03 | 6.478E-02 | 0.1 |
| Aroclor-1260 | 0.4 | 0 | 4.50E-03 | 1.05E-02 | 6.478E-02 | 0.2 |
| Dieldrin | 0.012 | 0 | 3.05E-02 | 6.05E-04 | NA | NA |
| Endosulfan II | 0.02 | 0 | 9.45E-02 | 2.19E-03 | 3.195E-01 | 0.0 |
| Endrin | 0.0026 | 0 | 4.61E-02 | 1.69E-04 | 1.060E-01 | 0.0 |
| Endrin Aldehyde | 0.0094 | 0 | 1.89E-01 | 1.85E-03 | NA | NA |
| Endrin Ketone | 0.0084 | 0 | 1.89E-01 | 1.65E-03 | 1.060E-01 | 0.0 |
| Gamma-Chlordane | 0.045 | 0 | 8.60E-03 | 1.36E-03 | 5.302E+00 | 0.0 |
| Heptachlor | 0.031 | 0 | 9.30E-03 | 9.55E-04 | 2.769E-01 | 0.0 |
| Heptachlor Epoxide | 0.002 | 0 | 4.99E-02 | 1.37E-04 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 4.48E-02 | 8.91E-05 | 8.520E+00 | 0.0 |
| 2-Methylnaphthalene | 0.069 | 0 | 2.16E-01 | 1.53E-02 | 1.498E+00 | 0.0 |
| Acenaphthene | 0.43 | 0 | 2.10E-01 | 9.30E-02 | 1.498E+00 | 0.1 |
| Acenaphthylene | 2.9 | 0 | 1.65E-01 | 5.08E-01 | 1.498E+00 | 0.3 |
| Anthracene | 2.5 | 0 | 9.08E-02 | 2.65E-01 | 1.498E+00 | 0.2 |
| Benzo(a)anthracene | 5.4 | 0 | 1.97E-02 | 2.18E-01 | 1.498E+00 | 0.1 |
| Benzo(a)pyrene | 4.5 | 0 | 1.14E-02 | 1.47E-01 | 1.153E+00 | 0.1 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.01E-02 | 1.36E-01 | 1.498E+00 | 0.1 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 5.20E-03 | 5.94E-02 | 1.498E+00 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.01E-02 | 1.39E-01 | 1.498E+00 | 0.1 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.04 | 2.30E-03 | 4.15E-02 | 2.109E+01 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 6.17E-02 | 1.19E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 3.26E-01 | 4.21E-01 | 1.498E+00 | 0.3 |
| Chrysene | 4.9 | 0 | 1.97E-02 | 1.98E-01 | 1.498E+00 | 0.1 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 5.30E-03 | 1.57E-02 | 1.498E+00 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.45E-01 | 3.59E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 8.38E-02 | 1.89E-02 | 6.339E+02 | 0.0 |
| Fluoranthene | 8.9 | 0 | 4.25E-02 | 5.47E-01 | 1.498E+00 | 0.4 |
| Fluorene | 0.44 | 0 | 1.43E-01 | 6.79E-02 | 1.498E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 5.60E-03 | 7.12E-02 | 1.498E+00 | 0.0 |
| Naphthalene | 0.17 | 0 | 4.43E-01 | 7.33E-02 | 1.498E+00 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 4.43E-02 | 3.28E-03 | NA | NA |
| Phenanthrene | 3.9 | 0 | 9.08E-02 | 4.14E-01 | 1.498E+00 | 0.3 |
| Pyrene | 8.1 | 0 | 4.31E-02 | 5.03E-01 | 1.498E+00 | 0.3 |
| Toluene | 0.027 | 0 | 9.97E-01 | 2.55E-02 | 2.997E+01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Short-Tailed Shrew | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 7.289E-05 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 3.037E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.250E-02 | |
| FI | Food ingestion rate (kg/day) | 3.037E-03 | |
| WI | Water ingestion rate (L/day) | 7.036E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 81200 | 0.147 | 2.00E-01 | 4.42E+03 | 2.402E+00 | 1840.0 |
| Antimony | 3.7 | 0 | 1.00E+00 | 9.21E-01 | 1.556E-01 | 5.9 |
| Arsenic | 48.3 | 0 | 5.23E-01 | 6.42E+00 | 1.568E-01 | 40.9 |
| Barium | 180 | 0.0308 | 3.60E-01 | 1.70E+01 | 1.239E+01 | 1.4 |
| Beryllium | 1.2 | 0 | 1.00E+00 | 2.99E-01 | 1.518E+00 | 0.2 |
| Cadmium | 6 | 0 | 4.07E+01 | 5.94E+01 | 2.219E+00 | 26.7 |
| Chromium | 36.5 | 0.0037 | 3.16E+00 | 2.83E+01 | 6.296E+03 | 0.0 |
| Cobalt | 14.1 | 0 | 1.00E+00 | 3.51E+00 | NA | NA |
| Copper | 337 | 0 | 1.53E+00 | 1.27E+02 | 3.499E+01 | 3.6 |
| Iron | 42600 | 0.336 | 1.00E-01 | 1.29E+03 | NA | NA |
| Lead | 383 | 0 | 1.52E+00 | 1.44E+02 | 1.840E+01 | 7.8 |
| Manganese | 17700 | 0.0947 | 1.24E-01 | 6.37E+02 | 2.024E+02 | 3.1 |
| Mercury | 1.3 | 0 | 2.06E+01 | 6.52E+00 | 2.991E+00 | 2.2 |
| Nickel | 20.3 | 0 | 4.73E+00 | 2.34E+01 | 9.201E+01 | 0.3 |
| Selenium | 0.75 | 0 | 1.34E+00 | 2.49E-01 | 4.601E-01 | 0.5 |
| Thallium | 0.15 | 0 | 1.00E+00 | 3.73E-02 | 1.720E-02 | 2.2 |
| Vanadium | 42.5 | 0.0034 | 8.80E-02 | 1.18E+00 | 4.485E-01 | 2.6 |
| Zinc | 15200 | 0 | 1.29E+01 | 4.77E+04 | 3.681E+02 | 129.6 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.23 | 0 | 2.00E+00 | 1.13E-01 | 1.840E+00 | 0.1 |
| 4,4'-DDE | 0.07 | 0 | 1.06E+01 | 1.81E-01 | 1.840E+00 | 0.1 |
| 4,4'-DDT | 0.2 | 0 | 7.00E-01 | 3.52E-02 | 1.840E+00 | 0.0 |
| alpha-Chlordane | 0.038 | 0 | 3.00E+00 | 2.79E-02 | 5.725E+00 | 0.0 |
| Aroclor-1254 | 0.28 | 0 | 1.59E+01 | 1.08E+00 | 6.995E-02 | 15.5 |
| Aroclor-1260 | 0.4 | 0 | 1.59E+01 | 1.55E+00 | 6.995E-02 | 22.1 |
| Dieldrin | 0.012 | 0 | 8.00E+00 | 2.34E-02 | NA | NA |
| Endosulfan II | 0.02 | 0 | 1.00E+00 | 4.98E-03 | 3.450E-01 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 6.47E-04 | 1.145E-01 | 0.0 |
| Endrin Aldehyde | 0.0094 | 0 | 1.00E+00 | 2.34E-03 | NA | NA |
| Endrin Ketone | 0.0084 | 0 | 1.00E+00 | 2.09E-03 | 1.145E-01 | 0.0 |
| Gamma-Chlordane | 0.045 | 0 | 3.00E+00 | 3.31E-02 | 5.725E+00 | 0.0 |
| Heptachlor | 0.031 | 0 | 1.00E+01 | 7.55E-02 | 2.991E-01 | 0.3 |
| Heptachlor Epoxide | 0.002 | 0 | 1.00E+01 | 4.87E-03 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 3.48E-04 | 9.201E+00 | 0.0 |
| 2-Methylnaphthalene | 0.069 | 0 | 2.00E-01 | 3.76E-03 | 1.618E+00 | 0.0 |
| Acenaphthene | 0.43 | 0 | 3.00E-01 | 3.38E-02 | 1.618E+00 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 2.20E-01 | 1.72E-01 | 1.618E+00 | 0.1 |
| Anthracene | 2.5 | 0 | 3.20E-01 | 2.09E-01 | 1.618E+00 | 0.1 |
| Benzo(a)anthracene | 5.4 | 0 | 2.70E-01 | 3.86E-01 | 1.618E+00 | 0.2 |
| Benzo(a)pyrene | 4.5 | 0 | 3.40E-01 | 3.98E-01 | 1.245E+00 | 0.3 |
| Benzo(b)fluoranthene | 4.3 | 0 | 2.10E-01 | 2.44E-01 | 1.618E+00 | 0.2 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.50E-01 | 9.30E-02 | 1.618E+00 | 0.1 |
| Benzo(k)fluoranthene | 4.4 | 0 | 2.10E-01 | 2.50E-01 | 1.618E+00 | 0.2 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.04 | 1.00E+00 | 3.84E-01 | 2.278E+01 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 3.73E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 3.23E-01 | 1.618E+00 | 0.2 |
| Chrysene | 4.9 | 0 | 4.40E-01 | 5.52E-01 | 1.618E+00 | 0.3 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 4.90E-01 | 7.24E-02 | 1.618E+00 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 5.72E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 4.73E-02 | 6.846E+02 | 0.0 |
| Fluoranthene | 8.9 | 0 | 3.70E-01 | 8.52E-01 | 1.618E+00 | 0.5 |
| Fluorene | 0.44 | 0 | 2.00E-01 | 2.39E-02 | 1.618E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 4.10E-01 | 2.74E-01 | 1.618E+00 | 0.2 |
| Naphthalene | 0.17 | 0 | 2.10E-01 | 9.67E-03 | 1.618E+00 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 8.00E+00 | 1.01E-01 | NA | NA |
| Phenanthrene | 3.9 | 0 | 2.80E-01 | 2.88E-01 | 1.618E+00 | 0.2 |
| Pyrene | 8.1 | 0 | 3.90E-01 | 8.15E-01 | 1.618E+00 | 0.5 |
| Toluene | 0.027 | 0 | 1.00E+00 | 6.72E-03 | 3.236E+01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red Fox | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.360E-02 | |
| Im | Rate of small mammal ingestion (kg/day) | 4.858E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.950E+00 | |
| FI | Food ingestion rate (kg/day) | 4.858E-01 | |
| WI | Water ingestion rate (L/day) | 1.180E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 81200 | 0.147 | 1.00E+00 | 1.37E+04 | 6.129E-01 | 12426.8 |
| Antimony | 3.7 | 0 | 1.00E+00 | 6.26E-01 | 3.969E-02 | 15.8 |
| Arsenic | 48.3 | 0 | 1.60E-02 | 3.50E-01 | 4.001E-02 | 8.7 |
| Barium | 180 | 0.0308 | 2.53E-01 | 8.33E+00 | 3.160E+00 | 2.6 |
| Beryllium | 1.2 | 0 | 4.10E-01 | 8.65E-02 | 3.874E-01 | 0.2 |
| Cadmium | 6 | 0 | 4.48E-01 | 4.70E-01 | 5.661E-01 | 0.8 |
| Chromium | 36.5 | 0.0037 | 3.09E-01 | 2.03E+00 | 1.606E+03 | 0.0 |
| Cobalt | 14.1 | 0 | 1.40E-01 | 3.90E-01 | NA | NA |
| Copper | 337 | 0 | 1.29E+00 | 7.31E+01 | 8.928E+00 | 8.2 |
| Iron | 42600 | 0.336 | 2.40E-02 | 3.65E+02 | NA | NA |
| Lead | 383 | 0 | 1.87E-01 | 1.36E+01 | 4.695E+00 | 2.9 |
| Manganese | 17700 | 0.0947 | 1.00E+00 | 3.00E+03 | 5.165E+01 | 58.0 |
| Mercury | 1.3 | 0 | 1.92E-01 | 4.71E-02 | 7.630E-01 | 0.1 |
| Nickel | 20.3 | 0 | 8.98E-01 | 3.10E+00 | 2.348E+01 | 0.1 |
| Selenium | 0.75 | 0 | 1.55E-01 | 2.26E-02 | 1.174E-01 | 0.2 |
| Thallium | 0.15 | 0 | 1.23E-01 | 3.72E-03 | 4.389E-03 | 0.8 |
| Vanadium | 42.5 | 0.0034 | 1.00E+00 | 7.19E+00 | 1.144E-01 | 62.9 |
| Zinc | 15200 | 0 | 2.32E+00 | 5.87E+03 | 9.390E+01 | 62.5 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX**
**CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.23 | 0 | 1.00E+00 | 3.89E-02 | 4.695E-01 | 0.1 |
| 4,4'-DDE | 0.07 | 0 | 1.00E+00 | 1.18E-02 | 4.695E-01 | 0.0 |
| 4,4'-DDT | 0.2 | 0 | 1.00E+00 | 3.39E-02 | 4.695E-01 | 0.1 |
| alpha-Chlordane | 0.038 | 0 | 1.00E+00 | 6.43E-03 | 1.461E+00 | 0.0 |
| Aroclor-1254 | 0.28 | 0 | 1.00E+00 | 4.74E-02 | 1.068E-01 | 0.4 |
| Aroclor-1260 | 0.4 | 0 | 1.00E+00 | 6.77E-02 | 1.068E-01 | 0.6 |
| Dieldrin | 0.012 | 0 | 1.00E+00 | 2.03E-03 | NA | NA |
| Endosulfan II | 0.02 | 0 | 1.00E+00 | 3.39E-03 | 8.803E-02 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 4.40E-04 | 2.922E-02 | 0.0 |
| Endrin Aldehyde | 0.0094 | 0 | 1.00E+00 | 1.59E-03 | NA | NA |
| Endrin Ketone | 0.0084 | 0 | 1.00E+00 | 1.42E-03 | 2.922E-02 | 0.0 |
| Gamma-Chlordane | 0.045 | 0 | 1.00E+00 | 7.62E-03 | 1.461E+00 | 0.0 |
| Heptachlor | 0.031 | 0 | 1.00E+00 | 5.25E-03 | 7.630E-02 | 0.1 |
| Heptachlor Epoxide | 0.002 | 0 | 1.00E+00 | 3.39E-04 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 2.37E-04 | 2.348E+00 | 0.0 |
| 2-Methylnaphthalene | 0.069 | 0 | 1.00E+00 | 1.17E-02 | 4.128E-01 | 0.0 |
| Acenaphthene | 0.43 | 0 | 1.00E+00 | 7.28E-02 | 4.128E-01 | 0.2 |
| Acenaphthylene | 2.9 | 0 | 1.00E+00 | 4.91E-01 | 4.128E-01 | 1.2 |
| Anthracene | 2.5 | 0 | 1.00E+00 | 4.23E-01 | 4.128E-01 | 1.0 |
| Benzo(a)anthracene | 5.4 | 0 | 1.00E+00 | 9.14E-01 | 4.128E-01 | 2.2 |
| Benzo(a)pyrene | 4.5 | 0 | 1.00E+00 | 7.62E-01 | 3.176E-01 | 2.4 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.00E+00 | 7.28E-01 | 4.128E-01 | 1.8 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.00E+00 | 3.72E-01 | 4.128E-01 | 0.9 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.00E+00 | 7.45E-01 | 4.128E-01 | 1.8 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.04 | 1.00E+00 | 1.10E-01 | 5.811E+00 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 2.54E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 2.20E-01 | 4.128E-01 | 0.5 |
| Chrysene | 4.9 | 0 | 1.00E+00 | 8.29E-01 | 4.128E-01 | 2.0 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 1.00E+00 | 9.82E-02 | 4.128E-01 | 0.2 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 3.89E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 3.22E-02 | 1.747E+02 | 0.0 |
| Fluoranthene | 8.9 | 0 | 1.00E+00 | 1.51E+00 | 4.128E-01 | 3.6 |
| Fluorene | 0.44 | 0 | 1.00E+00 | 7.45E-02 | 4.128E-01 | 0.2 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 1.00E+00 | 4.40E-01 | 4.128E-01 | 1.1 |
| Naphthalene | 0.17 | 0 | 1.00E+00 | 2.88E-02 | 4.128E-01 | 0.1 |
| Pentachlorophenol | 0.052 | 0 | 1.00E+00 | 8.80E-03 | NA | NA |
| Phenanthrene | 3.9 | 0 | 1.00E+00 | 6.60E-01 | 4.128E-01 | 1.6 |
| Pyrene | 8.1 | 0 | 1.00E+00 | 1.37E+00 | 4.128E-01 | 3.3 |
| Toluene | 0.027 | 0 | 1.00E+00 | 4.57E-03 | 8.257E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | American Woodcock | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.317E-02 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.266E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.644E-01 | |
| FI | Food ingestion rate (kg/day) | 1.266E-01 | |
| WI | Water ingestion rate (L/day) | 1.760E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10178.6275 | 0.11325 | 2.00E-01 | 2.38E+03 | 1.097E+03 | 2.2 |
| Antimony | 1.5492 | 0 | 1.00E+00 | 1.32E+00 | NA | NA |
| Arsenic | 5.5618 | 0 | 5.23E-01 | 2.69E+00 | 7.380E+00 | 0.4 |
| Barium | 27.0441 | 0.0169 | 3.60E-01 | 9.66E+00 | 4.170E+01 | 0.2 |
| Beryllium | 0.1925 | 0 | 1.00E+00 | 1.64E-01 | NA | NA |
| Cadmium | 0.9329 | 0 | 4.07E+01 | 2.93E+01 | 2.000E+01 | 1.5 |
| Chromium | 11.7422 | 0.002675 | 3.16E+00 | 2.95E+01 | 5.000E+00 | 5.9 |
| Cobalt | 2.1485 | 0 | 1.00E+00 | 1.83E+00 | NA | NA |
| Copper | 23.8549 | 0 | 1.53E+00 | 3.00E+01 | 6.170E+01 | 0.5 |
| Iron | 10906.0784 | 0.2041 | 1.00E-01 | 1.71E+03 | NA | NA |
| Lead | 41.3784 | 0 | 1.52E+00 | 5.18E+01 | 3.850E+01 | 1.3 |
| Manganese | 500.1451 | 0.0491 | 1.24E-01 | 8.78E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.1332 | 0 | 2.06E+01 | 2.13E+00 | 9.000E-01 | 2.4 |
| Nickel | 3.7912 | 0 | 4.73E+00 | 1.41E+01 | 1.070E+02 | 0.1 |
| Selenium | 0.203 | 0 | 1.34E+00 | 2.26E-01 | 1.000E+00 | 0.2 |
| Thallium | 0.15 | 0 | 1.00E+00 | 1.28E-01 | NA | NA |
| Vanadium | 15.9735 | 0.002325 | 8.80E-02 | 2.36E+00 | 1.140E+02 | 0.0 |
| Zinc | 406.5725 | 0 | 1.29E+01 | 4.07E+03 | 1.310E+02 | 31.1 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Conservative Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0117156 | 0 | 2.00E+00 | 1.90E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0088786 | 0 | 1.06E+01 | 7.32E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0167122 | 0 | 7.00E-01 | 1.03E-02 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0028514 | 0 | 3.00E+00 | 6.82E-03 | 1.070E+01 | 0.0 |
| Aroclor-1254 | 0.04656 | 0 | 1.59E+01 | 5.74E-01 | 1.800E+00 | 0.3 |
| Aroclor-1260 | 0.04855 | 0 | 1.59E+01 | 5.99E-01 | 1.800E+00 | 0.3 |
| Dieldrin | 0.004278 | 0 | 8.00E+00 | 2.67E-02 | NA | NA |
| Endosulfan II | 0.004098 | 0 | 1.00E+00 | 3.48E-03 | 1.000E+02 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 2.21E-03 | 1.000E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 1.00E+00 | 3.22E-03 | NA | NA |
| Endrin Ketone | 0.0037 | 0 | 1.00E+00 | 3.15E-03 | 1.000E-01 | 0.0 |
| Gamma-Chlordane | 0.0029398 | 0 | 3.00E+00 | 7.03E-03 | 1.070E+01 | 0.0 |
| Heptachlor | 0.002472 | 0 | 1.00E+01 | 1.92E-02 | NA | NA |
| Heptachlor Epoxide | 0.001863 | 0 | 1.00E+01 | 1.45E-02 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 1.19E-03 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 2.00E-01 | 1.62E-02 | 1.000E+02 | 0.0 |
| Acenaphthene | 0.43 | 0 | 3.00E-01 | 1.34E-01 | 1.000E+02 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 2.20E-01 | 7.23E-01 | 1.000E+02 | 0.0 |
| Anthracene | 2.5 | 0 | 3.20E-01 | 8.16E-01 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 2.70E-01 | 1.56E+00 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 4.5 | 0 | 3.40E-01 | 1.54E+00 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 2.10E-01 | 1.04E+00 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.50E-01 | 4.30E-01 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 2.10E-01 | 1.06E+00 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.0205 | 1.00E+00 | 5.46E-01 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 1.28E-01 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 1.11E+00 | 1.000E+02 | 0.0 |
| Chrysene | 4.9 | 0 | 4.40E-01 | 2.05E+00 | 1.000E+02 | 0.0 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 4.90E-01 | 2.65E-01 | 1.000E+02 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 1.96E-01 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 1.62E-01 | 1.100E+00 | 0.1 |
| Fluoranthene | 8.9 | 0 | 3.70E-01 | 3.25E+00 | 1.000E+02 | 0.0 |
| Fluorene | 0.44 | 0 | 2.00E-01 | 1.03E-01 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 4.10E-01 | 1.03E+00 | 1.000E+02 | 0.0 |
| Naphthalene | 0.17 | 0 | 2.10E-01 | 4.11E-02 | 1.000E+02 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 8.00E+00 | 3.24E-01 | NA | NA |
| Phenanthrene | 3.9 | 0 | 2.80E-01 | 1.15E+00 | 1.000E+02 | 0.0 |
| Pyrene | 8.1 | 0 | 3.90E-01 | 3.08E+00 | 1.000E+02 | 0.0 |
| Toluene | 0.027 | 0 | 1.00E+00 | 2.30E-02 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*BAF*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Bobwhite Quail | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.378E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.378E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.767E-01 | |
| FI | Food ingestion rate (kg/day) | 1.378E-02 | |
| WI | Water ingestion rate (L/day) | 2.297E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10178.6275 | 0.11325 | 4.00E-03 | 8.26E+01 | 1.097E+03 | 0.1 |
| Antimony | 1.5492 | 0 | 2.00E-01 | 3.63E-02 | NA | NA |
| Arsenic | 5.5618 | 0 | 1.10E+00 | 5.22E-01 | 7.380E+00 | 0.1 |
| Barium | 27.0441 | 0.0169 | 1.50E-01 | 5.30E-01 | 4.170E+01 | 0.0 |
| Beryllium | 0.1925 | 0 | 1.00E-02 | 1.65E-03 | NA | NA |
| Cadmium | 0.9329 | 0 | 3.25E+00 | 2.44E-01 | 2.000E+01 | 0.0 |
| Chromium | 11.7422 | 0.002675 | 7.50E-03 | 9.88E-02 | 5.000E+00 | 0.0 |
| Cobalt | 2.1485 | 0 | 2.00E-02 | 2.01E-02 | NA | NA |
| Copper | 23.8549 | 0 | 6.25E-01 | 1.35E+00 | 6.170E+01 | 0.0 |
| Iron | 10906.0784 | 0.2041 | 4.00E-03 | 8.85E+01 | NA | NA |
| Lead | 41.3784 | 0 | 4.68E-01 | 1.83E+00 | 3.850E+01 | 0.0 |
| Manganese | 500.1451 | 0.0491 | 2.50E-01 | 1.37E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.1332 | 0 | 5.00E+00 | 5.30E-02 | 9.000E-01 | 0.1 |
| Nickel | 3.7912 | 0 | 1.41E+00 | 4.47E-01 | 1.070E+02 | 0.0 |
| Selenium | 0.203 | 0 | 3.01E+00 | 4.93E-02 | 1.000E+00 | 0.0 |
| Thallium | 0.15 | 0 | 4.00E-03 | 1.22E-03 | NA | NA |
| Vanadium | 15.9735 | 0.002325 | 5.50E-03 | 1.32E-01 | 1.140E+02 | 0.0 |
| Zinc | 406.5725 | 0 | 1.82E+00 | 6.09E+01 | 1.310E+02 | 0.5 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0117156 | 0 | 1.15E-02 | 1.02E-04 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0088786 | 0 | 4.80E-03 | 7.26E-05 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0167122 | 0 | 6.50E-03 | 1.39E-04 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0028514 | 0 | 8.90E-03 | 2.42E-05 | 1.070E+01 | 0.0 |
| Aroclor-1254 | 0.04656 | 0 | 6.80E-03 | 3.88E-04 | 1.800E+00 | 0.0 |
| Aroclor-1260 | 0.04855 | 0 | 4.50E-03 | 3.96E-04 | 1.800E+00 | 0.0 |
| Dieldrin | 0.004278 | 0 | 3.05E-02 | 4.35E-05 | NA | NA |
| Endosulfan II | 0.004098 | 0 | 9.45E-02 | 6.22E-05 | 1.000E+02 | 0.0 |
| Endrin | 0.0026 | 0 | 4.61E-02 | 2.96E-05 | 1.000E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 1.89E-01 | 8.53E-05 | NA | NA |
| Endrin Ketone | 0.0037 | 0 | 1.89E-01 | 8.33E-05 | 1.000E-01 | 0.0 |
| Gamma-Chlordane | 0.0029398 | 0 | 8.60E-03 | 2.49E-05 | 1.070E+01 | 0.0 |
| Heptachlor | 0.002472 | 0 | 9.30E-03 | 2.11E-05 | NA | NA |
| Heptachlor Epoxide | 0.001863 | 0 | 4.99E-02 | 2.18E-05 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 4.48E-02 | 1.58E-05 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 2.16E-01 | 1.70E-03 | 1.000E+02 | 0.0 |
| Acenaphthene | 0.43 | 0 | 2.10E-01 | 1.04E-02 | 1.000E+02 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.65E-01 | 6.00E-02 | 1.000E+02 | 0.0 |
| Anthracene | 2.5 | 0 | 9.08E-02 | 3.72E-02 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 1.97E-02 | 5.04E-02 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 4.5 | 0 | 1.14E-02 | 3.91E-02 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.01E-02 | 3.69E-02 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 5.20E-03 | 1.81E-02 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.01E-02 | 3.78E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.0205 | 2.30E-03 | 7.77E-03 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 6.17E-02 | 1.89E-03 | NA | NA |
| Carbazole | 1.3 | 0 | 3.26E-01 | 4.32E-02 | 1.000E+02 | 0.0 |
| Chrysene | 4.9 | 0 | 1.97E-02 | 4.57E-02 | 1.000E+02 | 0.0 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 5.30E-03 | 4.76E-03 | 1.000E+02 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.45E-01 | 4.39E-03 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 8.38E-02 | 2.72E-03 | 1.100E+00 | 0.0 |
| Fluoranthene | 8.9 | 0 | 4.25E-02 | 9.89E-02 | 1.000E+02 | 0.0 |
| Fluorene | 0.44 | 0 | 1.43E-01 | 8.33E-03 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 5.60E-03 | 2.14E-02 | 1.000E+02 | 0.0 |
| Naphthalene | 0.17 | 0 | 4.43E-01 | 7.19E-03 | 1.000E+02 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 4.43E-02 | 5.85E-04 | NA | NA |
| Phenanthrene | 3.9 | 0 | 9.08E-02 | 5.80E-02 | 1.000E+02 | 0.0 |
| Pyrene | 8.1 | 0 | 4.31E-02 | 9.04E-02 | 1.000E+02 | 0.0 |
| Toluene | 0.027 | 0 | 9.97E-01 | 2.31E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Marsh Wren | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.818E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 2.818E-03 | |
| HR | Home range size (acres) | Lookup | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.000E-02 | |
| FI | Food ingestion rate (kg/day) | 2.818E-03 | |
| WI | Water ingestion rate (L/day) | 2.697E-03 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10178.6275 | 0.11325 | 2.00E-01 | 8.60E+02 | 1.097E+03 | 0.8 |
| Antimony | 1.5492 | 0 | 1.00E+00 | 4.80E-01 | NA | NA |
| Arsenic | 5.5618 | 0 | 5.23E-01 | 9.76E-01 | 7.380E+00 | 0.1 |
| Barium | 27.0441 | 0.0169 | 3.60E-01 | 3.51E+00 | 4.170E+01 | 0.1 |
| Beryllium | 0.1925 | 0 | 1.00E+00 | 5.97E-02 | NA | NA |
| Cadmium | 0.9329 | 0 | 4.07E+01 | 1.07E+01 | 2.000E+01 | 0.5 |
| Chromium | 11.7422 | 0.002675 | 3.16E+00 | 1.08E+01 | 5.000E+00 | 2.2 |
| Cobalt | 2.1485 | 0 | 1.00E+00 | 6.66E-01 | NA | NA |
| Copper | 23.8549 | 0 | 1.53E+00 | 1.10E+01 | 6.170E+01 | 0.2 |
| Iron | 10906.0784 | 0.2041 | 1.00E-01 | 6.15E+02 | NA | NA |
| Lead | 41.3784 | 0 | 1.52E+00 | 1.89E+01 | 3.850E+01 | 0.5 |
| Manganese | 500.1451 | 0.0491 | 1.24E-01 | 3.16E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.1332 | 0 | 2.06E+01 | 7.78E-01 | 9.000E-01 | 0.9 |
| Nickel | 3.7912 | 0 | 4.73E+00 | 5.16E+00 | 1.070E+02 | 0.0 |
| Selenium | 0.203 | 0 | 1.34E+00 | 8.24E-02 | 1.000E+00 | 0.1 |
| Thallium | 0.15 | 0 | 1.00E+00 | 4.65E-02 | NA | NA |
| Vanadium | 15.9735 | 0.002325 | 8.80E-02 | 8.47E-01 | 1.140E+02 | 0.0 |
| Zinc | 406.5725 | 0 | 1.29E+01 | 1.49E+03 | 1.310E+02 | 11.4 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0117156 | 0 | 2.00E+00 | 6.93E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0088786 | 0 | 1.06E+01 | 2.68E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0167122 | 0 | 7.00E-01 | 3.77E-03 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0028514 | 0 | 3.00E+00 | 2.49E-03 | 1.070E+01 | 0.0 |
| Aroclor-1254 | 0.04656 | 0 | 1.59E+01 | 2.10E-01 | 1.800E+00 | 0.1 |
| Aroclor-1260 | 0.04855 | 0 | 1.59E+01 | 2.19E-01 | 1.800E+00 | 0.1 |
| Dieldrin | 0.004278 | 0 | 8.00E+00 | 9.76E-03 | NA | NA |
| Endosulfan II | 0.004098 | 0 | 1.00E+00 | 1.27E-03 | 1.000E+02 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 8.06E-04 | 1.000E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 1.00E+00 | 1.17E-03 | NA | NA |
| Endrin Ketone | 0.0037 | 0 | 1.00E+00 | 1.15E-03 | 1.000E-01 | 0.0 |
| Gamma-Chlordane | 0.0029398 | 0 | 3.00E+00 | 2.57E-03 | 1.070E+01 | 0.0 |
| Heptachlor | 0.002472 | 0 | 1.00E+01 | 7.03E-03 | NA | NA |
| Heptachlor Epoxide | 0.001863 | 0 | 1.00E+01 | 5.30E-03 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 4.34E-04 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 2.00E-01 | 5.83E-03 | 1.000E+02 | 0.0 |
| Acenaphthene | 0.43 | 0 | 3.00E-01 | 4.85E-02 | 1.000E+02 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 2.20E-01 | 2.61E-01 | 1.000E+02 | 0.0 |
| Anthracene | 2.5 | 0 | 3.20E-01 | 2.96E-01 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 2.70E-01 | 5.63E-01 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 4.5 | 0 | 3.40E-01 | 5.58E-01 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 2.10E-01 | 3.76E-01 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.50E-01 | 1.55E-01 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 2.10E-01 | 3.84E-01 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.0205 | 1.00E+00 | 2.04E-01 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 4.65E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 4.03E-01 | 1.000E+02 | 0.0 |
| Chrysene | 4.9 | 0 | 4.40E-01 | 7.46E-01 | 1.000E+02 | 0.0 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 4.90E-01 | 9.64E-02 | 1.000E+02 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 7.13E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 5.89E-02 | 1.100E+00 | 0.1 |
| Fluoranthene | 8.9 | 0 | 3.70E-01 | 1.18E+00 | 1.000E+02 | 0.0 |
| Fluorene | 0.44 | 0 | 2.00E-01 | 3.72E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 4.10E-01 | 3.74E-01 | 1.000E+02 | 0.0 |
| Naphthalene | 0.17 | 0 | 2.10E-01 | 1.48E-02 | 1.000E+02 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 8.00E+00 | 1.19E-01 | NA | NA |
| Phenanthrene | 3.9 | 0 | 2.80E-01 | 4.18E-01 | 1.000E+02 | 0.0 |
| Pyrene | 8.1 | 0 | 3.90E-01 | 1.12E+00 | 1.000E+02 | 0.0 |
| Toluene | 0.027 | 0 | 1.00E+00 | 8.37E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red-Tailed Hawk | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.222E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 1.111E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.126E+00 | |
| FI | Food ingestion rate (kg/day) | 1.111E-01 | |
| WI | Water ingestion rate (L/day) | 6.388E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10178.6275 | 0.11325 | 1.00E+00 | 1.02E+03 | 1.097E+03 | 0.9 |
| Antimony | 1.5492 | 0 | 1.00E+00 | 1.56E-01 | NA | NA |
| Arsenic | 5.5618 | 0 | 1.60E-02 | 1.98E-02 | 7.380E+00 | 0.0 |
| Barium | 27.0441 | 0.0169 | 2.53E-01 | 7.29E-01 | 4.170E+01 | 0.0 |
| Beryllium | 0.1925 | 0 | 4.10E-01 | 8.17E-03 | NA | NA |
| Cadmium | 0.9329 | 0 | 4.48E-01 | 4.31E-02 | 2.000E+01 | 0.0 |
| Chromium | 11.7422 | 0.002675 | 3.09E-01 | 3.81E-01 | 5.000E+00 | 0.1 |
| Cobalt | 2.1485 | 0 | 1.40E-01 | 3.39E-02 | NA | NA |
| Copper | 23.8549 | 0 | 1.29E+00 | 3.08E+00 | 6.170E+01 | 0.0 |
| Iron | 10906.0784 | 0.2041 | 2.40E-02 | 4.74E+01 | NA | NA |
| Lead | 41.3784 | 0 | 1.87E-01 | 8.45E-01 | 3.850E+01 | 0.0 |
| Manganese | 500.1451 | 0.0491 | 1.00E+00 | 5.03E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.1332 | 0 | 1.92E-01 | 2.79E-03 | 9.000E-01 | 0.0 |
| Nickel | 3.7912 | 0 | 8.98E-01 | 3.43E-01 | 1.070E+02 | 0.0 |
| Selenium | 0.203 | 0 | 1.55E-01 | 3.51E-03 | 1.000E+00 | 0.0 |
| Thallium | 0.15 | 0 | 1.23E-01 | 2.11E-03 | NA | NA |
| Vanadium | 15.9735 | 0.002325 | 1.00E+00 | 1.61E+00 | 1.140E+02 | 0.0 |
| Zinc | 406.5725 | 0 | 2.32E+00 | 9.37E+01 | 1.310E+02 | 0.7 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0117156 | 0 | 1.00E+00 | 1.18E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0088786 | 0 | 1.00E+00 | 8.94E-04 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0167122 | 0 | 1.00E+00 | 1.68E-03 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0028514 | 0 | 1.00E+00 | 2.87E-04 | 1.070E+01 | 0.0 |
| Aroclor-1254 | 0.04656 | 0 | 1.00E+00 | 4.69E-03 | 1.800E+00 | 0.0 |
| Aroclor-1260 | 0.04855 | 0 | 1.00E+00 | 4.89E-03 | 1.800E+00 | 0.0 |
| Dieldrin | 0.004278 | 0 | 1.00E+00 | 4.31E-04 | NA | NA |
| Endosulfan II | 0.004098 | 0 | 1.00E+00 | 4.12E-04 | 1.000E+02 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 2.62E-04 | 1.000E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 1.00E+00 | 3.81E-04 | NA | NA |
| Endrin Ketone | 0.0037 | 0 | 1.00E+00 | 3.72E-04 | 1.000E-01 | 0.0 |
| Gamma-Chlordane | 0.0029398 | 0 | 1.00E+00 | 2.96E-04 | 1.070E+01 | 0.0 |
| Heptachlor | 0.002472 | 0 | 1.00E+00 | 2.49E-04 | NA | NA |
| Heptachlor Epoxide | 0.001863 | 0 | 1.00E+00 | 1.87E-04 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 1.41E-04 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 1.00E+00 | 6.94E-03 | 1.000E+02 | 0.0 |
| Acenaphthene | 0.43 | 0 | 1.00E+00 | 4.33E-02 | 1.000E+02 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.00E+00 | 2.92E-01 | 1.000E+02 | 0.0 |
| Anthracene | 2.5 | 0 | 1.00E+00 | 2.52E-01 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 1.00E+00 | 5.43E-01 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 4.5 | 0 | 1.00E+00 | 4.53E-01 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.00E+00 | 4.33E-01 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.00E+00 | 2.21E-01 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.00E+00 | 4.43E-01 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.0205 | 1.00E+00 | 6.56E-02 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 1.51E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 1.31E-01 | 1.000E+02 | 0.0 |
| Chrysene | 4.9 | 0 | 1.00E+00 | 4.93E-01 | 1.000E+02 | 0.0 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 1.00E+00 | 5.84E-02 | 1.000E+02 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 2.31E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 1.91E-02 | 1.100E+00 | 0.0 |
| Fluoranthene | 8.9 | 0 | 1.00E+00 | 8.96E-01 | 1.000E+02 | 0.0 |
| Fluorene | 0.44 | 0 | 1.00E+00 | 4.43E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 1.00E+00 | 2.62E-01 | 1.000E+02 | 0.0 |
| Naphthalene | 0.17 | 0 | 1.00E+00 | 1.71E-02 | 1.000E+02 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 1.00E+00 | 5.23E-03 | NA | NA |
| Phenanthrene | 3.9 | 0 | 1.00E+00 | 3.93E-01 | 1.000E+02 | 0.0 |
| Pyrene | 8.1 | 0 | 1.00E+00 | 8.15E-01 | 1.000E+02 | 0.0 |
| Toluene | 0.027 | 0 | 1.00E+00 | 2.72E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | American Robin | |
|---|---|---|---|
| BAF | Plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 1.490E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 2.075E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.026E-02 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 7.730E-02 | |
| FI | Food Ingestion Rate (kg/day) | 1.603E-02 | |
| WI | Water ingestion rate (L/day) | 1.062E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 10178.6275 | 0.11325 | 4.00E-03 | 2.00E-01 | 4.68E+02 | 1.097E+03 | 0.4 |
| Antimony | 1.5492 | 0 | 2.00E-01 | 1.00E+00 | 2.44E-01 | NA | NA |
| Arsenic | 5.5618 | 0 | 1.10E+00 | 5.23E-01 | 6.58E-01 | 7.380E+00 | 0.1 |
| Barium | 27.0441 | 0.0169 | 1.50E-01 | 3.60E-01 | 1.93E+00 | 4.170E+01 | 0.0 |
| Beryllium | 0.1925 | 0 | 1.00E-02 | 1.00E+00 | 2.93E-02 | NA | NA |
| Cadmium | 0.9329 | 0 | 3.25E+00 | 4.07E+01 | 5.14E+00 | 2.000E+01 | 0.3 |
| Chromium | 11.7422 | 0.002675 | 7.50E-03 | 3.16E+00 | 5.16E+00 | 5.000E+00 | 1.0 |
| Cobalt | 2.1485 | 0 | 2.00E-02 | 1.00E+00 | 3.28E-01 | NA | NA |
| Copper | 23.8549 | 0 | 6.25E-01 | 1.53E+00 | 5.71E+00 | 6.170E+01 | 0.1 |
| Iron | 10906.0784 | 0.2041 | 4.00E-03 | 1.00E-01 | 3.56E+02 | NA | NA |
| Lead | 41.3784 | 0 | 4.68E-01 | 1.52E+00 | 9.68E+00 | 3.850E+01 | 0.3 |
| Manganese | 500.1451 | 0.0491 | 2.50E-01 | 1.24E-01 | 2.12E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.1332 | 0 | 5.00E+00 | 2.06E+01 | 3.85E-01 | 9.000E-01 | 0.4 |
| Nickel | 3.7912 | 0 | 1.41E+00 | 4.73E+00 | 2.60E+00 | 1.070E+02 | 0.0 |
| Selenium | 0.203 | 0 | 3.01E+00 | 1.34E+00 | 5.64E-02 | 1.000E+00 | 0.1 |
| Thallium | 0.15 | 0 | 4.00E-03 | 1.00E+00 | 2.28E-02 | NA | NA |
| Vanadium | 15.9735 | 0.002325 | 5.50E-03 | 8.80E-02 | 4.97E-01 | 1.140E+02 | 0.0 |
| Zinc | 406.5725 | 0 | 1.82E+00 | 1.29E+01 | 7.24E+02 | 1.310E+02 | 5.5 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant Transfer Coefficient (Bv) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.0117156 | 0 | 1.15E-02 | 2.00E+00 | 3.34E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0088786 | 0 | 4.80E-03 | 1.06E+01 | 1.27E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0167122 | 0 | 6.50E-03 | 7.00E-01 | 1.88E-03 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0028514 | 0 | 8.90E-03 | 3.00E+00 | 1.19E-03 | 1.070E+01 | 0.0 |
| Aroclor-1254 | 0.04656 | 0 | 6.80E-03 | 1.59E+01 | 9.93E-02 | 1.800E+00 | 0.1 |
| Aroclor-1260 | 0.04855 | 0 | 4.50E-03 | 1.59E+01 | 1.04E-01 | 1.800E+00 | 0.1 |
| Dieldrin | 0.004278 | 0 | 3.05E-02 | 8.00E+00 | 4.63E-03 | NA | NA |
| Endosulfan II | 0.004098 | 0 | 9.45E-02 | 1.00E+00 | 6.34E-04 | 1.000E+02 | 0.0 |
| Endrin | 0.0026 | 0 | 4.61E-02 | 1.00E+00 | 3.99E-04 | 1.000E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 1.89E-01 | 1.00E+00 | 5.95E-04 | NA | NA |
| Endrin Ketone | 0.0037 | 0 | 1.89E-01 | 1.00E+00 | 5.81E-04 | 1.000E-01 | 0.0 |
| Gamma-Chlordane | 0.0029398 | 0 | 8.60E-03 | 3.00E+00 | 1.23E-03 | 1.070E+01 | 0.0 |
| Heptachlor | 0.002472 | 0 | 9.30E-03 | 1.00E+01 | 3.33E-03 | NA | NA |
| Heptachlor Epoxide | 0.001863 | 0 | 4.99E-02 | 1.00E+01 | 2.51E-03 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 4.48E-02 | 1.00E+00 | 2.15E-04 | NA | NA |
| 2-Methylnaphthalene | 0.069 | 0 | 2.16E-01 | 2.00E-01 | 3.56E-03 | 1.000E+02 | 0.0 |
| Acenaphthene | 0.43 | 0 | 2.10E-01 | 3.00E-01 | 2.78E-02 | 1.000E+02 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.65E-01 | 2.20E-01 | 1.53E-01 | 1.000E+02 | 0.0 |
| Anthracene | 2.5 | 0 | 9.08E-02 | 3.20E-01 | 1.61E-01 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 1.97E-02 | 2.70E-01 | 3.01E-01 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 4.5 | 0 | 1.14E-02 | 3.40E-01 | 2.91E-01 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.01E-02 | 2.10E-01 | 2.04E-01 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 5.20E-03 | 1.50E-01 | 8.65E-02 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.01E-02 | 2.10E-01 | 2.09E-01 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.0205 | 2.30E-03 | 1.00E+00 | 1.00E-01 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 6.17E-02 | 1.00E+00 | 2.31E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 3.26E-01 | 1.00E+00 | 2.09E-01 | 1.000E+02 | 0.0 |
| Chrysene | 4.9 | 0 | 1.97E-02 | 4.40E-01 | 3.83E-01 | 1.000E+02 | 0.0 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 5.30E-03 | 4.90E-01 | 4.90E-02 | 1.000E+02 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.45E-01 | 1.00E+00 | 3.59E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 8.38E-02 | 1.00E+00 | 2.93E-02 | 1.100E+00 | 0.0 |
| Fluoranthene | 8.9 | 0 | 4.25E-02 | 3.70E-01 | 6.19E-01 | 1.000E+02 | 0.0 |
| Fluorene | 0.44 | 0 | 1.43E-01 | 2.00E-01 | 2.19E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 5.60E-03 | 4.10E-01 | 1.92E-01 | 1.000E+02 | 0.0 |
| Naphthalene | 0.17 | 0 | 4.43E-01 | 2.10E-01 | 1.00E-02 | 1.000E+02 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 4.43E-02 | 8.00E+00 | 5.63E-02 | NA | NA |
| Phenanthrene | 3.9 | 0 | 9.08E-02 | 2.80E-01 | 2.30E-01 | 1.000E+02 | 0.0 |
| Pyrene | 8.1 | 0 | 4.31E-02 | 3.90E-01 | 5.85E-01 | 1.000E+02 | 0.0 |
| Toluene | 0.027 | 0 | 9.97E-01 | 1.00E+00 | 4.83E-03 | NA | NA |
| Endrin | 0.0026 | 0 | 2.24E-02 | 1.00E+00 | 3.97E-04 | 1.000E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 2.24E-02 | 1.00E+00 | 5.78E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Short-Tailed Shrew | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 4.663E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.943E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.152E-01 | |
| FI | Food ingestion rate (kg/day) | 1.943E-02 | |
| WI | Water ingestion rate (L/day) | 8.621E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10178.6275 | 0.11325 | 2.00E-01 | 2.06E+02 | 1.179E+01 | 17.5 |
| Antimony | 1.5492 | 0 | 1.00E+00 | 1.43E-01 | 7.638E-01 | 0.2 |
| Arsenic | 5.5618 | 0 | 5.23E-01 | 2.75E-01 | 7.700E-01 | 0.4 |
| Barium | 27.0441 | 0.0169 | 3.60E-01 | 9.45E-01 | 2.236E+01 | 0.0 |
| Beryllium | 0.1925 | 0 | 1.00E+00 | 1.78E-02 | 7.454E+00 | 0.0 |
| Cadmium | 0.9329 | 0 | 4.07E+01 | 3.43E+00 | 1.089E+01 | 0.3 |
| Chromium | 11.7422 | 0.002675 | 3.16E+00 | 3.38E+00 | 3.091E+04 | 0.0 |
| Cobalt | 2.1485 | 0 | 1.00E+00 | 1.99E-01 | NA | NA |
| Copper | 23.8549 | 0 | 1.53E+00 | 3.35E+00 | 2.223E+01 | 0.2 |
| Iron | 10906.0784 | 0.2041 | 1.00E-01 | 1.22E+02 | NA | NA |
| Lead | 41.3784 | 0 | 1.52E+00 | 5.78E+00 | 9.035E+01 | 0.1 |
| Manganese | 500.1451 | 0.0491 | 1.24E-01 | 6.70E+00 | 3.207E+02 | 0.0 |
| Mercury | 0.1332 | 0 | 2.06E+01 | 2.48E-01 | 1.468E+01 | 0.0 |
| Nickel | 3.7912 | 0 | 4.73E+00 | 1.63E+00 | 9.035E+01 | 0.0 |
| Selenium | 0.203 | 0 | 1.34E+00 | 2.50E-02 | 3.727E-01 | 0.1 |
| Thallium | 0.15 | 0 | 1.00E+00 | 1.39E-02 | 8.445E-02 | 0.2 |
| Vanadium | 15.9735 | 0.002325 | 8.80E-02 | 1.62E-01 | 2.202E+00 | 0.1 |
| Zinc | 406.5725 | 0 | 1.29E+01 | 4.74E+02 | 3.614E+02 | 1.3 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0117156 | 0 | 2.00E+00 | 2.14E-03 | 9.035E+00 | 0.0 |
| 4,4'-DDE | 0.0088786 | 0 | 1.06E+01 | 8.52E-03 | 9.035E+00 | 0.0 |
| 4,4'-DDT | 0.0167122 | 0 | 7.00E-01 | 1.09E-03 | 9.035E+00 | 0.0 |
| alpha-Chlordane | 0.0028514 | 0 | 3.00E+00 | 7.79E-04 | 5.622E+00 | 0.0 |
| Aroclor-1254 | 0.04656 | 0 | 1.59E+01 | 6.70E-02 | 3.434E-01 | 0.2 |
| Aroclor-1260 | 0.04855 | 0 | 1.59E+01 | 6.99E-02 | 3.434E-01 | 0.2 |
| Dieldrin | 0.004278 | 0 | 8.00E+00 | 3.10E-03 | NA | NA |
| Endosulfan II | 0.004098 | 0 | 1.00E+00 | 3.79E-04 | 1.694E+00 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 2.40E-04 | 5.622E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 1.00E+00 | 3.50E-04 | NA | NA |
| Endrin Ketone | 0.0037 | 0 | 1.00E+00 | 3.42E-04 | 5.622E-01 | 0.0 |
| Gamma-Chlordane | 0.0029398 | 0 | 3.00E+00 | 8.03E-04 | 5.622E+00 | 0.0 |
| Heptachlor | 0.002472 | 0 | 1.00E+01 | 2.24E-03 | 1.468E+00 | 0.0 |
| Heptachlor Epoxide | 0.001863 | 0 | 1.00E+01 | 1.69E-03 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 1.29E-04 | 9.035E+00 | 0.0 |
| 2-Methylnaphthalene | 0.069 | 0 | 2.00E-01 | 1.40E-03 | 1.589E+00 | 0.0 |
| Acenaphthene | 0.43 | 0 | 3.00E-01 | 1.26E-02 | 1.589E+00 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 2.20E-01 | 6.39E-02 | 1.589E+00 | 0.0 |
| Anthracene | 2.5 | 0 | 3.20E-01 | 7.77E-02 | 1.589E+00 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 2.70E-01 | 1.43E-01 | 1.589E+00 | 0.1 |
| Benzo(a)pyrene | 4.5 | 0 | 3.40E-01 | 1.48E-01 | 6.111E+00 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 2.10E-01 | 9.09E-02 | 1.589E+00 | 0.1 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.50E-01 | 3.46E-02 | 1.589E+00 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 2.10E-01 | 9.30E-02 | 1.589E+00 | 0.1 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.0205 | 1.00E+00 | 6.74E-02 | 1.118E+02 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 1.39E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 1.20E-01 | 1.589E+00 | 0.1 |
| Chrysene | 4.9 | 0 | 4.40E-01 | 2.05E-01 | 1.589E+00 | 0.1 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 4.90E-01 | 2.69E-02 | 1.589E+00 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 2.13E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 1.76E-02 | 1.120E+03 | 0.0 |
| Fluoranthene | 8.9 | 0 | 3.70E-01 | 3.17E-01 | 1.589E+00 | 0.2 |
| Fluorene | 0.44 | 0 | 2.00E-01 | 8.90E-03 | 1.589E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 4.10E-01 | 1.02E-01 | 1.589E+00 | 0.1 |
| Naphthalene | 0.17 | 0 | 2.10E-01 | 3.59E-03 | 1.589E+00 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 8.00E+00 | 3.77E-02 | NA | NA |
| Phenanthrene | 3.9 | 0 | 2.80E-01 | 1.07E-01 | 1.589E+00 | 0.1 |
| Pyrene | 8.1 | 0 | 3.90E-01 | 3.03E-01 | 1.589E+00 | 0.2 |
| Toluene | 0.027 | 0 | 1.00E+00 | 2.50E-03 | 1.589E+02 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*BAF*Iv)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Meadow Vole | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.366E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 9.858E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 3.286E-02 | |
| FI | Food ingestion rate (kg/day) | 9.858E-03 | |
| WI | Water ingestion rate (L/day) | 6.901E-03 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10178.6275 | 0.11325 | 4.00E-03 | 8.55E+01 | 1.887E+01 | 4.5 |
| Antimony | 1.5492 | 0 | 2.00E-01 | 1.04E-01 | 1.222E+00 | 0.1 |
| Arsenic | 5.5618 | 0 | 1.10E+00 | 1.88E+00 | 1.232E+00 | 1.5 |
| Barium | 27.0441 | 0.0169 | 1.50E-01 | 1.42E+00 | 3.577E+01 | 0.0 |
| Beryllium | 0.1925 | 0 | 1.00E-02 | 1.96E-03 | 1.192E+01 | 0.0 |
| Cadmium | 0.9329 | 0 | 3.25E+00 | 9.16E-01 | 1.743E+01 | 0.1 |
| Chromium | 11.7422 | 0.002675 | 7.50E-03 | 1.12E-01 | 4.945E+04 | 0.0 |
| Cobalt | 2.1485 | 0 | 2.00E-02 | 2.84E-02 | NA | NA |
| Copper | 23.8549 | 0 | 6.25E-01 | 4.64E+00 | 3.556E+01 | 0.1 |
| Iron | 10906.0784 | 0.2041 | 4.00E-03 | 9.17E+01 | NA | NA |
| Lead | 41.3784 | 0 | 4.68E-01 | 6.11E+00 | 1.445E+02 | 0.0 |
| Manganese | 500.1451 | 0.0491 | 2.50E-01 | 4.11E+01 | 5.131E+02 | 0.1 |
| Mercury | 0.1332 | 0 | 5.00E+00 | 2.01E-01 | 2.349E+01 | 0.0 |
| Nickel | 3.7912 | 0 | 1.41E+00 | 1.63E+00 | 1.445E+02 | 0.0 |
| Selenium | 0.203 | 0 | 3.01E+00 | 1.85E-01 | 5.962E-01 | 0.3 |
| Thallium | 0.15 | 0 | 4.00E-03 | 1.26E-03 | 1.351E-01 | 0.0 |
| Vanadium | 15.9735 | 0.002325 | 5.50E-03 | 1.42E-01 | 3.522E+00 | 0.0 |
| Zinc | 406.5725 | 0 | 1.82E+00 | 2.25E+02 | 5.781E+02 | 0.4 |
| | Arithmatic Mean | Arithmatic Mean | | | | |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0117156 | 0 | 1.15E-02 | 1.25E-04 | 1.445E+01 | 0.0 |
| 4,4'-DDE | 0.0088786 | 0 | 4.80E-03 | 7.67E-05 | 1.445E+01 | 0.0 |
| 4,4'-DDT | 0.0167122 | 0 | 6.50E-03 | 1.53E-04 | 1.445E+01 | 0.0 |
| alpha-Chlordane | 0.0028514 | 0 | 8.90E-03 | 2.81E-05 | 8.993E+00 | 0.0 |
| Aroclor-1254 | 0.04656 | 0 | 6.80E-03 | 4.30E-04 | 5.494E-01 | 0.0 |
| Aroclor-1260 | 0.04855 | 0 | 4.50E-03 | 4.15E-04 | 5.494E-01 | 0.0 |
| Dieldrin | 0.004278 | 0 | 3.05E-02 | 6.99E-05 | NA | NA |
| Endosulfan II | 0.004098 | 0 | 9.45E-02 | 1.46E-04 | 2.710E+00 | 0.0 |
| Endrin | 0.0026 | 0 | 4.61E-02 | 5.47E-05 | 8.993E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 1.89E-01 | 2.42E-04 | NA | NA |
| Endrin Ketone | 0.0037 | 0 | 1.89E-01 | 2.36E-04 | 8.993E-01 | 0.0 |
| Gamma-Chlordane | 0.0029398 | 0 | 8.60E-03 | 2.88E-05 | 8.993E+00 | 0.0 |
| Heptachlor | 0.002472 | 0 | 9.30E-03 | 2.47E-05 | 2.349E+00 | 0.0 |
| Heptachlor Epoxide | 0.001863 | 0 | 4.99E-02 | 4.13E-05 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 4.48E-02 | 2.89E-05 | 1.445E+01 | 0.0 |
| 2-Methylnaphthalene | 0.069 | 0 | 2.16E-01 | 4.96E-03 | 2.541E+00 | 0.0 |
| Acenaphthene | 0.43 | 0 | 2.10E-01 | 3.02E-02 | 2.541E+00 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.65E-01 | 1.65E-01 | 2.541E+00 | 0.1 |
| Anthracene | 2.5 | 0 | 9.08E-02 | 8.61E-02 | 2.541E+00 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 1.97E-02 | 7.08E-02 | 2.541E+00 | 0.0 |
| Benzo(a)pyrene | 4.5 | 0 | 1.14E-02 | 4.78E-02 | 9.775E+00 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.01E-02 | 4.40E-02 | 2.541E+00 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 5.20E-03 | 1.93E-02 | 2.541E+00 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.01E-02 | 4.50E-02 | 2.541E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.0205 | 2.30E-03 | 9.35E-03 | 1.789E+02 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 6.17E-02 | 3.86E-03 | NA | NA |
| Carbazole | 1.3 | 0 | 3.26E-01 | 1.36E-01 | 2.541E+00 | 0.1 |
| Chrysene | 4.9 | 0 | 1.97E-02 | 6.42E-02 | 2.541E+00 | 0.0 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 5.30E-03 | 5.10E-03 | 2.541E+00 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.45E-01 | 1.16E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 8.38E-02 | 6.14E-03 | 1.792E+03 | 0.0 |
| Fluoranthene | 8.9 | 0 | 4.25E-02 | 1.78E-01 | 2.541E+00 | 0.1 |
| Fluorene | 0.44 | 0 | 1.43E-01 | 2.20E-02 | 2.541E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 5.60E-03 | 2.31E-02 | 2.541E+00 | 0.0 |
| Naphthalene | 0.17 | 0 | 4.43E-01 | 2.38E-02 | 2.541E+00 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 4.43E-02 | 1.07E-03 | NA | NA |
| Phenanthrene | 3.9 | 0 | 9.08E-02 | 1.34E-01 | 2.541E+00 | 0.1 |
| Pyrene | 8.1 | 0 | 4.31E-02 | 1.63E-01 | 2.541E+00 | 0.1 |
| Toluene | 0.027 | 0 | 9.97E-01 | 8.27E-03 | 2.541E+02 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red Fox | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 8.762E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 3.129E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 4.535E+00 | |
| FI | Food ingestion rate (kg/day) | 3.129E-01 | |
| WI | Water ingestion rate (L/day) | 1.134E-01 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10178.6275 | 0.11325 | 1.00E+00 | 7.22E+02 | 5.504E+00 | 131.2 |
| Antimony | 1.5492 | 0 | 1.00E+00 | 1.10E-01 | 3.565E-01 | 0.3 |
| Arsenic | 5.5618 | 0 | 1.60E-02 | 1.69E-02 | 3.593E-01 | 0.0 |
| Barium | 27.0441 | 0.0169 | 2.53E-01 | 5.25E-01 | 1.044E+01 | 0.1 |
| Beryllium | 0.1925 | 0 | 4.10E-01 | 5.82E-03 | 3.479E+00 | 0.0 |
| Cadmium | 0.9329 | 0 | 4.48E-01 | 3.06E-02 | 5.084E+00 | 0.0 |
| Chromium | 11.7422 | 0.002675 | 3.09E-01 | 2.73E-01 | 1.443E+04 | 0.0 |
| Cobalt | 2.1485 | 0 | 1.40E-01 | 2.49E-02 | NA | NA |
| Copper | 23.8549 | 0 | 1.29E+00 | 2.17E+00 | 1.037E+01 | 0.2 |
| Iron | 10906.0784 | 0.2041 | 2.40E-02 | 3.91E+01 | NA | NA |
| Lead | 41.3784 | 0 | 1.87E-01 | 6.14E-01 | 4.217E+01 | 0.0 |
| Manganese | 500.1451 | 0.0491 | 1.00E+00 | 3.55E+01 | 1.497E+02 | 0.2 |
| Mercury | 0.1332 | 0 | 1.92E-01 | 2.02E-03 | 6.853E+00 | 0.0 |
| Nickel | 3.7912 | 0 | 8.98E-01 | 2.42E-01 | 4.217E+01 | 0.0 |
| Selenium | 0.203 | 0 | 1.55E-01 | 2.56E-03 | 1.739E-01 | 0.0 |
| Thallium | 0.15 | 0 | 1.23E-01 | 1.56E-03 | 3.941E-02 | 0.0 |
| Vanadium | 15.9735 | 0.002325 | 1.00E+00 | 1.13E+00 | 1.028E+00 | 1.1 |
| Zinc | 406.5725 | 0 | 2.32E+00 | 6.58E+01 | 1.687E+02 | 0.4 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0117156 | 0 | 1.00E+00 | 8.31E-04 | 4.217E+00 | 0.0 |
| 4,4'-DDE | 0.0088786 | 0 | 1.00E+00 | 6.30E-04 | 4.217E+00 | 0.0 |
| 4,4'-DDT | 0.0167122 | 0 | 1.00E+00 | 1.19E-03 | 4.217E+00 | 0.0 |
| alpha-Chlordane | 0.0028514 | 0 | 1.00E+00 | 2.02E-04 | 2.624E+00 | 0.0 |
| Aroclor-1254 | 0.04656 | 0 | 1.00E+00 | 3.30E-03 | 4.728E-01 | 0.0 |
| Aroclor-1260 | 0.04855 | 0 | 1.00E+00 | 3.44E-03 | 4.728E-01 | 0.0 |
| Dieldrin | 0.004278 | 0 | 1.00E+00 | 3.03E-04 | NA | NA |
| Endosulfan II | 0.004098 | 0 | 1.00E+00 | 2.91E-04 | 7.906E-01 | 0.0 |
| Endrin | 0.0026 | 0 | 1.00E+00 | 1.84E-04 | 2.624E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 1.00E+00 | 2.69E-04 | NA | NA |
| Endrin Ketone | 0.0037 | 0 | 1.00E+00 | 2.62E-04 | 2.624E-01 | 0.0 |
| Gamma-Chlordane | 0.0029398 | 0 | 1.00E+00 | 2.09E-04 | 2.624E+00 | 0.0 |
| Heptachlor | 0.002472 | 0 | 1.00E+00 | 1.75E-04 | 6.853E-01 | 0.0 |
| Heptachlor Epoxide | 0.001863 | 0 | 1.00E+00 | 1.32E-04 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 1.00E+00 | 9.93E-05 | 4.217E+00 | 0.0 |
| 2-Methylnaphthalene | 0.069 | 0 | 1.00E+00 | 4.89E-03 | 7.415E-01 | 0.0 |
| Acenaphthene | 0.43 | 0 | 1.00E+00 | 3.05E-02 | 7.415E-01 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.00E+00 | 2.06E-01 | 7.415E-01 | 0.3 |
| Anthracene | 2.5 | 0 | 1.00E+00 | 1.77E-01 | 7.415E-01 | 0.2 |
| Benzo(a)anthracene | 5.4 | 0 | 1.00E+00 | 3.83E-01 | 7.415E-01 | 0.5 |
| Benzo(a)pyrene | 4.5 | 0 | 1.00E+00 | 3.19E-01 | 2.852E+00 | 0.1 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.00E+00 | 3.05E-01 | 7.415E-01 | 0.4 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 1.00E+00 | 1.56E-01 | 7.415E-01 | 0.2 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.00E+00 | 3.12E-01 | 7.415E-01 | 0.4 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.0205 | 1.00E+00 | 4.59E-02 | 5.219E+01 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 1.00E+00 | 1.06E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 1.00E+00 | 9.22E-02 | 7.415E-01 | 0.1 |
| Chrysene | 4.9 | 0 | 1.00E+00 | 3.48E-01 | 7.415E-01 | 0.5 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 1.00E+00 | 4.11E-02 | 7.415E-01 | 0.1 |
| Dibenzofuran | 0.23 | 0 | 1.00E+00 | 1.63E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 1.00E+00 | 1.35E-02 | 5.228E+02 | 0.0 |
| Fluoranthene | 8.9 | 0 | 1.00E+00 | 6.31E-01 | 7.415E-01 | 0.9 |
| Fluorene | 0.44 | 0 | 1.00E+00 | 3.12E-02 | 7.415E-01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 1.00E+00 | 1.84E-01 | 7.415E-01 | 0.2 |
| Naphthalene | 0.17 | 0 | 1.00E+00 | 1.21E-02 | 7.415E-01 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 1.00E+00 | 3.69E-03 | NA | NA |
| Phenanthrene | 3.9 | 0 | 1.00E+00 | 2.77E-01 | 7.415E-01 | 0.4 |
| Pyrene | 8.1 | 0 | 1.00E+00 | 5.75E-01 | 7.415E-01 | 0.8 |
| Toluene | 0.027 | 0 | 1.00E+00 | 1.92E-03 | 7.415E+01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE**
**LESS CONSERVATIVE ASSUMPTIONS**
**SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Soil to plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 1.038E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 2.075E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 3.113E-03 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.533E-02 | |
| FI | Food Ingestion Rate (kg/day) | 5.188E-03 | |
| WI | Water ingestion rate (L/day) | 7.112E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 10178.6275 | 0.11325 | 4.00E-03 | 2.00E-01 | 2.95E+02 | 2.013E+01 | 14.7 |
| Antimony | 1.5492 | 0 | 2.00E-01 | 1.00E+00 | 2.22E-01 | 1.304E+00 | 0.2 |
| Arsenic | 5.5618 | 0 | 1.10E+00 | 5.23E-01 | 8.83E-01 | 1.314E+00 | 0.7 |
| Barium | 27.0441 | 0.0169 | 1.50E-01 | 3.60E-01 | 1.69E+00 | 3.817E+01 | 0.0 |
| Beryllium | 0.1925 | 0 | 1.00E-02 | 1.00E+00 | 2.46E-02 | 1.272E+01 | 0.0 |
| Cadmium | 0.9329 | 0 | 3.25E+00 | 4.07E+01 | 4.92E+00 | 1.860E+01 | 0.3 |
| Chromium | 11.7422 | 0.002675 | 7.50E-03 | 3.16E+00 | 4.63E+00 | 5.277E+04 | 0.0 |
| Cobalt | 2.1485 | 0 | 2.00E-02 | 1.00E+00 | 2.76E-01 | NA | NA |
| Copper | 23.8549 | 0 | 6.25E-01 | 1.53E+00 | 5.81E+00 | 3.795E+01 | 0.2 |
| Iron | 10906.0784 | 0.2041 | 4.00E-03 | 1.00E-01 | 1.83E+02 | NA | NA |
| Lead | 41.3784 | 0 | 4.68E-01 | 1.52E+00 | 9.49E+00 | 1.542E+02 | 0.1 |
| Manganese | 500.1451 | 0.0491 | 2.50E-01 | 1.24E-01 | 2.00E+01 | 5.475E+02 | 0.0 |
| Mercury | 0.1332 | 0 | 5.00E+00 | 2.06E+01 | 3.93E-01 | 2.507E+01 | 0.0 |
| Nickel | 3.7912 | 0 | 1.41E+00 | 4.73E+00 | 2.66E+00 | 1.542E+02 | 0.0 |
| Selenium | 0.203 | 0 | 3.01E+00 | 1.34E+00 | 8.43E-02 | 6.362E-01 | 0.1 |
| Thallium | 0.15 | 0 | 4.00E-03 | 1.00E+00 | 1.91E-02 | 1.442E-01 | 0.1 |
| Vanadium | 15.9735 | 0.002325 | 5.50E-03 | 8.80E-02 | 2.52E-01 | 3.759E+00 | 0.1 |
| Zinc | 406.5725 | 0 | 1.82E+00 | 1.29E+01 | 7.06E+02 | 6.169E+02 | 1.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
LESS CONSERVATIVE ASSUMPTIONS
SITE 4 - BURNING PAD RESIDUE LANDFILL, PROPER
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.0117156 | 0 | 1.15E-02 | 2.00E+00 | 2.94E-03 | 1.542E+01 | 0.0 |
| 4,4'-DDE | 0.0088786 | 0 | 4.80E-03 | 1.06E+01 | 1.16E-02 | 1.542E+01 | 0.0 |
| 4,4'-DDT | 0.0167122 | 0 | 6.50E-03 | 7.00E-01 | 1.51E-03 | 1.542E+01 | 0.0 |
| alpha-Chlordane | 0.0028514 | 0 | 8.90E-03 | 3.00E+00 | 1.06E-03 | 9.597E+00 | 0.0 |
| Aroclor-1254 | 0.04656 | 0 | 6.80E-03 | 1.59E+01 | 9.12E-02 | 5.863E-01 | 0.2 |
| Aroclor-1260 | 0.04855 | 0 | 4.50E-03 | 1.59E+01 | 9.51E-02 | 5.863E-01 | 0.2 |
| Dieldrin | 0.004278 | 0 | 3.05E-02 | 8.00E+00 | 4.23E-03 | NA | NA |
| Endosulfan II | 0.004098 | 0 | 9.45E-02 | 1.00E+00 | 5.52E-04 | 2.892E+00 | 0.0 |
| Endrin | 0.0026 | 0 | 4.61E-02 | 1.00E+00 | 3.40E-04 | 9.597E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 1.89E-01 | 1.00E+00 | 5.40E-04 | NA | NA |
| Endrin Ketone | 0.0037 | 0 | 1.89E-01 | 1.00E+00 | 5.27E-04 | 9.597E-01 | 0.0 |
| Gamma-Chlordane | 0.0029398 | 0 | 8.60E-03 | 3.00E+00 | 1.10E-03 | 9.597E+00 | 0.0 |
| Heptachlor | 0.002472 | 0 | 9.30E-03 | 1.00E+01 | 3.05E-03 | 2.507E+00 | 0.0 |
| Heptachlor Epoxide | 0.001863 | 0 | 4.99E-02 | 1.00E+01 | 2.30E-03 | NA | NA |
| Methoxychlor | 0.0014 | 0 | 4.48E-02 | 1.00E+00 | 1.83E-04 | 1.542E+01 | 0.0 |
| 2-Methylnaphthalene | 0.069 | 0 | 2.16E-01 | 2.00E-01 | 3.20E-03 | 2.712E+00 | 0.0 |
| Acenaphthene | 0.43 | 0 | 2.10E-01 | 3.00E-01 | 2.50E-02 | 2.712E+00 | 0.0 |
| Acenaphthylene | 2.9 | 0 | 1.65E-01 | 2.20E-01 | 1.30E-01 | 2.712E+00 | 0.0 |
| Anthracene | 2.5 | 0 | 9.08E-02 | 3.20E-01 | 1.27E-01 | 2.712E+00 | 0.0 |
| Benzo(a)anthracene | 5.4 | 0 | 1.97E-02 | 2.70E-01 | 2.10E-01 | 2.712E+00 | 0.1 |
| Benzo(a)pyrene | 4.5 | 0 | 1.14E-02 | 3.40E-01 | 2.11E-01 | 1.043E+01 | 0.0 |
| Benzo(b)fluoranthene | 4.3 | 0 | 1.01E-02 | 2.10E-01 | 1.32E-01 | 2.712E+00 | 0.0 |
| Benzo(g,h,i)perylene | 2.2 | 0 | 5.20E-03 | 1.50E-01 | 5.05E-02 | 2.712E+00 | 0.0 |
| Benzo(k)fluoranthene | 4.4 | 0 | 1.01E-02 | 2.10E-01 | 1.35E-01 | 2.712E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.64 | 0.0205 | 2.30E-03 | 1.00E+00 | 1.39E-01 | 1.909E+02 | 0.0 |
| Butylbenzylphthalate | 0.15 | 0 | 6.17E-02 | 1.00E+00 | 1.98E-02 | NA | NA |
| Carbazole | 1.3 | 0 | 3.26E-01 | 1.00E+00 | 2.00E-01 | 2.712E+00 | 0.1 |
| Chrysene | 4.9 | 0 | 1.97E-02 | 4.40E-01 | 2.93E-01 | 2.712E+00 | 0.1 |
| Dibenz(a,h)anthracene | 0.58 | 0 | 5.30E-03 | 4.90E-01 | 3.75E-02 | 2.712E+00 | 0.0 |
| Dibenzofuran | 0.23 | 0 | 1.45E-01 | 1.00E+00 | 3.19E-02 | NA | NA |
| Di-n-butylphthalate | 0.19 | 0 | 8.38E-02 | 1.00E+00 | 2.54E-02 | 1.912E+03 | 0.0 |
| Fluoranthene | 8.9 | 0 | 4.25E-02 | 3.70E-01 | 4.72E-01 | 2.712E+00 | 0.2 |
| Fluorene | 0.44 | 0 | 1.43E-01 | 2.00E-01 | 1.78E-02 | 2.712E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 2.6 | 0 | 5.60E-03 | 4.10E-01 | 1.43E-01 | 2.712E+00 | 0.1 |
| Naphthalene | 0.17 | 0 | 4.43E-01 | 2.10E-01 | 1.12E-02 | 2.712E+00 | 0.0 |
| Pentachlorophenol | 0.052 | 0 | 4.43E-02 | 8.00E+00 | 5.15E-02 | NA | NA |
| Phenanthrene | 3.9 | 0 | 9.08E-02 | 2.80E-01 | 1.79E-01 | 2.712E+00 | 0.1 |
| Pyrene | 8.1 | 0 | 4.31E-02 | 3.90E-01 | 4.50E-01 | 2.712E+00 | 0.2 |
| Toluene | 0.027 | 0 | 9.97E-01 | 1.00E+00 | 5.63E-03 | 2.712E+02 | 0.0 |
| Endrin | 0.0026 | 0 | 2.24E-02 | 1.00E+00 | 3.35E-04 | 9.597E-01 | 0.0 |
| Endrin Aldehyde | 0.003788 | 0 | 2.24E-02 | 1.00E+00 | 4.88E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

# APPENDIX L.3
# TERRESTRIAL RECEPTOR MODELS, SITE 21

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*BAF*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | American Woodcock | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.730E-02 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.663E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.270E-01 | |
| FI | Food ingestion rate (kg/day) | 1.663E-01 | |
| WI | Water ingestion rate (L/day) | 2.113E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 43300 | 0.147 | 2.00E-01 | 1.72E+04 | 1.097E+02 | 157.1 |
| Arsenic | 11.6 | 0 | 5.23E-01 | 9.53E+00 | 2.460E+00 | 3.9 |
| Barium | 26.9 | 0.0308 | 3.60E-01 | 1.64E+01 | 2.080E+01 | 0.8 |
| Beryllium | 0.34 | 0 | 1.00E+00 | 4.92E-01 | NA | NA |
| Cadmium | 38.4 | 0 | 4.07E+01 | 2.05E+03 | 1.450E+00 | 1414.8 |
| Chromium | 32.3 | 0.0037 | 3.16E+00 | 1.38E+02 | 1.000E+00 | 138.2 |
| Cobalt | 4.1 | 0 | 1.00E+00 | 5.93E+00 | NA | NA |
| Copper | 61.9 | 0 | 1.53E+00 | 1.33E+02 | 4.700E+01 | 2.8 |
| Iron | 31100 | 0.336 | 1.00E-01 | 8.31E+03 | NA | NA |
| Lead | 43 | 0 | 1.52E+00 | 9.16E+01 | 3.850E+00 | 23.8 |
| Manganese | 1310 | 0.0947 | 1.24E-01 | 3.91E+02 | 9.770E+02 | 0.4 |
| Mercury | 4.4 | 0 | 2.06E+01 | 1.19E+02 | 4.500E-01 | 265.5 |
| Nickel | 10.5 | 0 | 4.73E+00 | 6.65E+01 | 7.740E+01 | 0.9 |
| Selenium | 1.2 | 0 | 1.34E+00 | 2.27E+00 | 5.000E-01 | 4.5 |
| Silver | 1.2 | 0 | 1.00E+00 | 1.73E+00 | NA | NA |
| Thallium | 1.8 | 0 | 1.00E+00 | 2.60E+00 | NA | NA |
| Vanadium | 49.4 | 0.0034 | 8.80E-02 | 1.24E+01 | 1.140E+01 | 1.1 |
| Zinc | 6780 | 0 | 1.29E+01 | 1.15E+05 | 1.450E+01 | 7956.9 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 2.00E+00 | 5.24E-01 | 8.800E-01 | 0.6 |
| 4,4'-DDE | 0.039 | 0 | 1.06E+01 | 5.47E-01 | 8.800E-01 | 0.6 |
| 4,4'-DDT | 0.033 | 0 | 7.00E-01 | 3.47E-02 | 8.800E-01 | 0.0 |
| Aldrin | 0.02 | 0 | 1.00E+00 | 2.89E-02 | NA | NA |
| alpha-Chlordane | 0.015 | 0 | 3.00E+00 | 6.10E-02 | 2.140E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 8.00E+00 | 4.88E-01 | NA | NA |
| Endrin | 0.051 | 0 | 1.00E+00 | 7.37E-02 | 1.000E-02 | 7.4 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 1.37E-03 | 1.000E-02 | 0.1 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 1.00E+00 | 3.18E-02 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 3.00E+00 | 5.28E-02 | 2.140E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 1.00E+01 | 2.91E-01 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+01 | 4.50E-03 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 4.05E-03 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 2.20E-01 | 4.67E-02 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 2.70E-01 | 9.80E-02 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 3.40E-01 | 8.14E-02 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 0.91 | 0 | 2.10E-01 | 3.74E-01 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.50E-01 | 3.66E-02 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 2.10E-01 | 9.05E-02 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0.04 | 1.00E+00 | 3.83E-01 | 1.100E+00 | 0.3 |
| Butylbenzylphthalate | 1.4 | 0 | 1.00E+00 | 2.02E+00 | NA | NA |
| Chrysene | 0.26 | 0 | 4.40E-01 | 1.85E-01 | 1.000E+01 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 5.20E-01 | 1.100E-01 | 4.7 |
| Fluoranthene | 0.27 | 0 | 3.70E-01 | 1.68E-01 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 4.10E-01 | 8.75E-02 | 1.000E+01 | 0.0 |
| Pyrene | 0.26 | 0 | 3.90E-01 | 1.68E-01 | 1.000E+01 | 0.0 |
| Styrene | 0.001 | 0 | 1.00E+00 | 1.45E-03 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 4.34E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL**
**CONSERVATIVE ASSUMPTIONS**
**SITE 21 - BATTERY AND DRUM DISPOSAL AREA**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*BAF*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Bobwhite Quail | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.803E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.803E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area-to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.540E-01 | |
| FI | Food ingestion rate (kg/day) | 1.803E-02 | |
| WI | Water ingestion rate (L/day) | 2.521E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 43300 | 0.147 | 4.00E-03 | 5.27E+02 | 1.097E+02 | 4.8 |
| Arsenic | 11.6 | 0 | 1.10E+00 | 1.63E+00 | 2.460E+00 | 0.7 |
| Barium | 26.9 | 0.0308 | 1.50E-01 | 7.93E-01 | 2.080E+01 | 0.0 |
| Beryllium | 0.34 | 0 | 1.00E-02 | 4.38E-03 | NA | NA |
| Cadmium | 38.4 | 0 | 3.25E+00 | 1.51E+01 | 1.450E+00 | 10.4 |
| Chromium | 32.3 | 0.0037 | 7.50E-03 | 4.07E-01 | 1.000E+00 | 0.4 |
| Cobalt | 4.1 | 0 | 2.00E-02 | 5.76E-02 | NA | NA |
| Copper | 61.9 | 0 | 6.25E-01 | 5.25E+00 | 4.700E+01 | 0.1 |
| Iron | 31100 | 0.336 | 4.00E-03 | 3.79E+02 | NA | NA |
| Lead | 43 | 0 | 4.68E-01 | 2.86E+00 | 3.850E+00 | 0.7 |
| Manganese | 1310 | 0.0947 | 2.50E-01 | 5.37E+01 | 9.770E+02 | 0.1 |
| Mercury | 4.4 | 0 | 5.00E+00 | 2.63E+00 | 4.500E-01 | 5.8 |
| Nickel | 10.5 | 0 | 1.41E+00 | 1.86E+00 | 7.740E+01 | 0.0 |
| Selenium | 1.2 | 0 | 3.01E+00 | 4.37E-01 | 5.000E-01 | 0.9 |
| Silver | 1.2 | 0 | 4.00E-01 | 7.03E-02 | NA | NA |
| Thallium | 1.8 | 0 | 4.00E-03 | 2.19E-02 | NA | NA |
| Vanadium | 49.4 | 0.0034 | 5.50E-03 | 6.11E-01 | 1.140E+01 | 0.1 |
| Zinc | 6780 | 0 | 1.82E+00 | 1.52E+03 | 1.450E+01 | 105.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 1.15E-02 | 2.48E-03 | 8.800E-01 | 0.0 |
| 4,4'-DDE | 0.039 | 0 | 4.80E-03 | 4.79E-04 | 8.800E-01 | 0.0 |
| 4,4'-DDT | 0.033 | 0 | 6.50E-03 | 4.12E-04 | 8.800E-01 | 0.0 |
| Aldrin | 0.02 | 0 | 6.80E-03 | 2.50E-04 | NA | NA |
| alpha-Chlordane | 0.015 | 0 | 8.90E-03 | 1.91E-04 | 2.140E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 3.05E-02 | 7.03E-04 | NA | NA |
| Endrin | 0.051 | 0 | 4.61E-02 | 8.72E-04 | 1.000E-02 | 0.1 |
| Endrin Ketone | 0.00095 | 0 | 1.89E-01 | 3.21E-05 | 1.000E-02 | 0.0 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 2.70E-01 | 9.54E-04 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 8.60E-03 | 1.65E-04 | 2.140E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 9.30E-03 | 2.82E-04 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 4.99E-02 | 5.97E-06 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 4.48E-02 | 4.75E-05 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 1.65E-01 | 3.42E-03 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.97E-02 | 2.80E-03 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.14E-02 | 1.83E-03 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 0.91 | 0 | 1.01E-02 | 1.17E-02 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 5.20E-03 | 1.36E-03 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.01E-02 | 2.84E-03 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0.04 | 2.30E-03 | 9.66E-03 | 1.100E+00 | 0.0 |
| Butylbenzylphthalate | 1.4 | 0 | 6.17E-02 | 2.65E-02 | NA | NA |
| Chrysene | 0.26 | 0 | 1.97E-02 | 3.64E-03 | 1.000E+01 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 8.38E-02 | 7.75E-03 | 1.100E-01 | 0.1 |
| Fluoranthene | 0.27 | 0 | 4.25E-02 | 4.51E-03 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 5.60E-03 | 1.61E-03 | 1.000E+01 | 0.0 |
| Pyrene | 0.26 | 0 | 4.31E-02 | 4.36E-03 | 1.000E+01 | 0.0 |
| Styrene | 0.001 | 0 | 7.74E-01 | 1.02E-04 | NA | NA |
| Toluene | 0.003 | 0 | 9.97E-01 | 3.85E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 21 - BATTERY AND DRUM DISPOSAL AREA**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Marsh Wren | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.961E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 2.961E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 9.400E-03 | |
| FI | Food ingestion rate (kg/day) | 2.961E-03 | |
| WI | Water ingestion rate (L/day) | 2.804E-03 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 43300 | 0.147 | 2.00E-01 | 4.09E+03 | 1.097E+02 | 37.3 |
| Arsenic | 11.6 | 0 | 5.23E-01 | 2.28E+00 | 2.460E+00 | 0.9 |
| Barium | 26.9 | 0.0308 | 3.60E-01 | 3.91E+00 | 2.080E+01 | 0.2 |
| Beryllium | 0.34 | 0 | 1.00E+00 | 1.18E-01 | NA | NA |
| Cadmium | 38.4 | 0 | 4.07E+01 | 4.93E+02 | 1.450E+00 | 340.2 |
| Chromium | 32.3 | 0.0037 | 3.16E+00 | 3.32E+01 | 1.000E+00 | 33.2 |
| Cobalt | 4.1 | 0 | 1.00E+00 | 1.42E+00 | NA | NA |
| Copper | 61.9 | 0 | 1.53E+00 | 3.18E+01 | 4.700E+01 | 0.7 |
| Iron | 31100 | 0.336 | 1.00E-01 | 1.96E+03 | NA | NA |
| Lead | 43 | 0 | 1.52E+00 | 2.20E+01 | 3.850E+00 | 5.7 |
| Manganese | 1310 | 0.0947 | 1.24E-01 | 9.25E+01 | 9.770E+02 | 0.1 |
| Mercury | 4.4 | 0 | 2.06E+01 | 2.87E+01 | 4.500E-01 | 63.8 |
| Nickel | 10.5 | 0 | 4.73E+00 | 1.60E+01 | 7.740E+01 | 0.2 |
| Selenium | 1.2 | 0 | 1.34E+00 | 5.44E-01 | 5.000E-01 | 1.1 |
| Silver | 1.2 | 0 | 1.00E+00 | 4.16E-01 | NA | NA |
| Thallium | 1.8 | 0 | 1.00E+00 | 6.24E-01 | NA | NA |
| Vanadium | 49.4 | 0.0034 | 8.80E-02 | 2.93E+00 | 1.140E+01 | 0.3 |
| Zinc | 6780 | 0 | 1.29E+01 | 2.77E+04 | 1.450E+01 | 1913.1 |

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 21 - BATTERY AND DRUM DISPOSAL AREA**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 2.00E+00 | 1.26E-01 | 8.800E-01 | 0.1 |
| 4,4'-DDE | 0.039 | 0 | 1.06E+01 | 1.31E-01 | 8.800E-01 | 0.1 |
| 4,4'-DDT | 0.033 | 0 | 7.00E-01 | 8.32E-03 | 8.800E-01 | 0.0 |
| Aldrin | 0.02 | 0 | 1.00E+00 | 6.93E-03 | NA | NA |
| alpha-Chlordane | 0.015 | 0 | 3.00E+00 | 1.46E-02 | 2.140E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 8.00E+00 | 1.17E-01 | NA | NA |
| Endrin | 0.051 | 0 | 1.00E+00 | 1.77E-02 | 1.000E-02 | 1.8 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 3.29E-04 | 1.000E-02 | 0.0 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 1.00E+00 | 7.62E-03 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 3.00E+00 | 1.27E-02 | 2.140E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 1.00E+01 | 7.00E-02 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+01 | 1.08E-03 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 9.70E-04 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 2.20E-01 | 1.11E-02 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 2.70E-01 | 2.33E-02 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 3.40E-01 | 1.94E-02 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 0.91 | 0 | 2.10E-01 | 8.89E-02 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.50E-01 | 8.66E-03 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 2.10E-01 | 2.15E-02 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0.04 | 1.00E+00 | 1.02E-01 | 1.100E+00 | 0.1 |
| Butylbenzylphthalate | 1.4 | 0 | 1.00E+00 | 4.85E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 4.40E-01 | 4.42E-02 | 1.000E+01 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 1.25E-01 | 1.100E-01 | 1.1 |
| Fluoranthene | 0.27 | 0 | 3.70E-01 | 4.00E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 4.10E-01 | 2.09E-02 | 1.000E+01 | 0.0 |
| Pyrene | 0.26 | 0 | 3.90E-01 | 4.01E-02 | 1.000E+01 | 0.0 |
| Styrene | 0.001 | 0 | 1.00E+00 | 3.46E-04 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 1.04E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red-Tailed Hawk | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.717E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 1.359E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 9.570E-01 | |
| FI | Food ingestion rate (kg/day) | 1.359E-01 | |
| WI | Water ingestion rate (L/day) | 6.796E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 6424.1053 | 0.147 | 1.00E+00 | 9.30E+02 | 1.097E+02 | 8.5 |
| Arsenic | 11.6 | 0 | 1.60E-02 | 5.93E-02 | 2.460E+00 | 0.0 |
| Barium | 26.9 | 0.0308 | 2.53E-01 | 1.04E+00 | 2.080E+01 | 0.1 |
| Beryllium | 0.34 | 0 | 4.10E-01 | 2.08E-02 | NA | NA |
| Cadmium | 38.4 | 0 | 4.48E-01 | 2.55E+00 | 1.450E+00 | 1.8 |
| Chromium | 32.3 | 0.0037 | 3.09E-01 | 1.51E+00 | 1.000E+00 | 1.5 |
| Cobalt | 4.1 | 0 | 1.40E-01 | 9.31E-02 | NA | NA |
| Copper | 61.9 | 0 | 1.29E+00 | 1.15E+01 | 4.700E+01 | 0.2 |
| Iron | 31100 | 0.336 | 2.40E-02 | 1.94E+02 | NA | NA |
| Lead | 43 | 0 | 1.87E-01 | 1.26E+00 | 3.850E+00 | 0.3 |
| Manganese | 1310 | 0.0947 | 1.00E+00 | 1.90E+02 | 9.770E+02 | 0.2 |
| Mercury | 4.4 | 0 | 1.92E-01 | 1.32E-01 | 4.500E-01 | 0.3 |
| Nickel | 10.5 | 0 | 8.98E-01 | 1.37E+00 | 7.740E+01 | 0.0 |
| Selenium | 1.2 | 0 | 1.55E-01 | 2.98E-02 | 5.000E-01 | 0.1 |
| Silver | 1.2 | 0 | 1.00E+00 | 1.74E-01 | NA | NA |
| Thallium | 1.8 | 0 | 1.23E-01 | 3.65E-02 | NA | NA |
| Vanadium | 49.4 | 0.0034 | 1.00E+00 | 7.15E+00 | 1.140E+01 | 0.6 |
| Zinc | 6780 | 0 | 2.32E+00 | 2.25E+03 | 1.450E+01 | 155.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 1.00E+00 | 2.75E-02 | 8.800E-01 | 0.0 |
| 4,4'-DDE | 0.039 | 0 | 1.00E+00 | 5.65E-03 | 8.800E-01 | 0.0 |
| 4,4'-DDT | 0.033 | 0 | 1.00E+00 | 4.78E-03 | 8.800E-01 | 0.0 |
| Aldrin | 0.02 | 0 | 1.00E+00 | 2.90E-03 | NA | NA |
| alpha-Chlordane | 0.015 | 0 | 1.00E+00 | 2.17E-03 | 2.140E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 1.00E+00 | 6.66E-03 | NA | NA |
| Endrin | 0.051 | 0 | 1.00E+00 | 7.38E-03 | 1.000E-02 | 0.7 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 1.38E-04 | 1.000E-02 | 0.0 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 1.00E+00 | 3.19E-03 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 1.00E+00 | 1.88E-03 | 2.140E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 1.00E+00 | 3.19E-03 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+00 | 4.92E-05 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 4.05E-04 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 1.00E+00 | 1.59E-02 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.00E+00 | 2.90E-02 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.00E+00 | 2.03E-02 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 0.91 | 0 | 1.00E+00 | 1.32E-01 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.00E+00 | 1.59E-02 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.00E+00 | 3.19E-02 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0.04 | 1.00E+00 | 4.05E-02 | 1.100E+00 | 0.0 |
| Butylbenzylphthalate | 1.4 | 0 | 1.00E+00 | 2.03E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 1.00E+00 | 3.76E-02 | 1.000E+01 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 5.21E-02 | 1.100E-01 | 0.5 |
| Fluoranthene | 0.27 | 0 | 1.00E+00 | 3.91E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 1.00E+00 | 1.88E-02 | 1.000E+01 | 0.0 |
| Pyrene | 0.26 | 0 | 1.00E+00 | 3.76E-02 | 1.000E+01 | 0.0 |
| Styrene | 0.001 | 0 | 1.00E+00 | 1.45E-04 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 4.34E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 1.00E+00 | 2.75E-02 | 8.800E-01 | 0.0 |
| 4,4'-DDE | 0.039 | 0 | 1.00E+00 | 5.65E-03 | 8.800E-01 | 0.0 |
| 4,4'-DDT | 0.033 | 0 | 1.00E+00 | 4.78E-03 | 8.800E-01 | 0.0 |
| Aldrin | 0.02 | 0 | 1.00E+00 | 2.90E-03 | NA | NA |
| alpha-Chlordane | 0.015 | 0 | 1.00E+00 | 2.17E-03 | 2.140E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 1.00E+00 | 6.66E-03 | NA | NA |
| Endrin | 0.051 | 0 | 1.00E+00 | 7.38E-03 | 1.000E-02 | 0.7 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 1.38E-04 | 1.000E-02 | 0.0 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 1.00E+00 | 3.19E-03 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 1.00E+00 | 1.88E-03 | 2.140E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 1.00E+00 | 3.19E-03 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+00 | 4.92E-05 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 4.05E-04 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 1.00E+00 | 1.59E-02 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.00E+00 | 2.90E-02 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.00E+00 | 2.03E-02 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 0.91 | 0 | 1.00E+00 | 1.32E-01 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.00E+00 | 1.59E-02 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.00E+00 | 3.19E-02 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0.04 | 1.00E+00 | 4.05E-02 | 1.100E+00 | 0.0 |
| Butylbenzylphthalate | 1.4 | 0 | 1.00E+00 | 2.03E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 1.00E+00 | 3.76E-02 | 1.000E+01 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 5.21E-02 | 1.100E-01 | 0.5 |
| Fluoranthene | 0.27 | 0 | 1.00E+00 | 3.91E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 1.00E+00 | 1.88E-02 | 1.000E+01 | 0.0 |
| Pyrene | 0.26 | 0 | 1.00E+00 | 3.76E-02 | 1.000E+01 | 0.0 |
| Styrene | 0.001 | 0 | 1.00E+00 | 1.45E-04 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 4.34E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN**
**CONSERVATIVE ASSUMPTIONS**
**SITE 21 - BATTERY AND DRUM DISPOSAL AREA**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Robin | |
|---|---|---|---|
| BAF | Soil to plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 0.0019 | |
| Iv | Rate of vegetation ingestion (kg/day) | 0.00759 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 0.01309 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 6.350E-02 | |
| FI | Food Ingestion Rate (kg/day) | 0.02068 | |
| WI | Water ingestion rate (L/day) | 1.287E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 43300 | 0.147 | 4.00E-03 | 2.00E-01 | 3.10E+03 | 1.097E+02 | 28.3 |
| Arsenic | 11.6 | 0 | 1.10E+00 | 5.23E-01 | 3.13E+00 | 2.460E+00 | 1.3 |
| Barium | 26.9 | 0.0308 | 1.50E-01 | 3.60E-01 | 3.29E+00 | 2.080E+01 | 0.2 |
| Beryllium | 0.34 | 0 | 1.00E-02 | 1.00E+00 | 8.07E-02 | NA | NA |
| Cadmium | 38.4 | 0 | 3.25E+00 | 4.07E+01 | 3.38E+02 | 1.450E+00 | 233.2 |
| Chromium | 32.3 | 0.0037 | 7.50E-03 | 3.16E+00 | 2.20E+01 | 1.000E+00 | 22.0 |
| Cobalt | 4.1 | 0 | 2.00E-02 | 1.00E+00 | 9.78E-01 | NA | NA |
| Copper | 61.9 | 0 | 6.25E-01 | 1.53E+00 | 2.60E+01 | 4.700E+01 | 0.6 |
| Iron | 31100 | 0.336 | 4.00E-03 | 1.00E-01 | 1.59E+03 | NA | NA |
| Lead | 43 | 0 | 4.68E-01 | 1.52E+00 | 1.72E+01 | 3.850E+00 | 4.5 |
| Manganese | 1310 | 0.0947 | 2.50E-01 | 1.24E-01 | 1.12E+02 | 9.770E+02 | 0.1 |
| Mercury | 4.4 | 0 | 5.00E+00 | 2.06E+01 | 2.15E+01 | 4.500E-01 | 47.7 |
| Nickel | 10.5 | 0 | 1.41E+00 | 4.73E+00 | 1.23E+01 | 7.740E+01 | 0.2 |
| Selenium | 1.2 | 0 | 3.01E+00 | 1.34E+00 | 7.99E-01 | 5.000E-01 | 1.6 |
| Silver | 1.2 | 0 | 4.00E-01 | 1.00E+00 | 3.41E-01 | NA | NA |
| Thallium | 1.8 | 0 | 4.00E-03 | 1.00E+00 | 4.26E-01 | NA | NA |
| Vanadium | 49.4 | 0.0034 | 5.50E-03 | 8.80E-02 | 2.41E+00 | 1.140E+01 | 0.2 |
| Zinc | 6780 | 0 | 1.82E+00 | 1.29E+01 | 1.97E+04 | 1.450E+01 | 1358.2 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant Transfer Coefficient (Bv) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 1.15E-02 | 2.00E+00 | 8.43E-02 | 8.800E-01 | 0.1 |
| 4,4'-DDE | 0.039 | 0 | 4.80E-03 | 1.06E+01 | 8.64E-02 | 8.800E-01 | 0.1 |
| 4,4'-DDT | 0.033 | 0 | 6.50E-03 | 7.00E-01 | 5.77E-03 | 8.800E-01 | 0.0 |
| Aldrin | 0.02 | 0 | 6.80E-03 | 1.00E+00 | 4.74E-03 | NA | NA |
| alpha-Chlordane | 0.015 | 0 | 8.90E-03 | 3.00E+00 | 9.74E-03 | 2.140E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 3.05E-02 | 8.00E+00 | 7.74E-02 | NA | NA |
| Endrin | 0.051 | 0 | 4.61E-02 | 1.00E+00 | 1.23E-02 | 1.000E-02 | 1.2 |
| Endrin Ketone | 0.00095 | 0 | 1.89E-01 | 1.00E+00 | 2.46E-04 | 1.000E-02 | 0.0 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 2.70E-01 | 1.00E+00 | 5.90E-03 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 8.60E-03 | 3.00E+00 | 8.44E-03 | 2.140E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 9.30E-03 | 1.00E+01 | 4.60E-02 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 4.99E-02 | 1.00E+01 | 7.13E-04 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 4.48E-02 | 1.00E+00 | 6.76E-04 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 1.65E-01 | 2.20E-01 | 1.05E-02 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.97E-02 | 2.70E-01 | 1.76E-02 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.14E-02 | 3.40E-01 | 1.42E-02 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 0.91 | 0 | 1.01E-02 | 2.10E-01 | 6.77E-02 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 5.20E-03 | 1.50E-01 | 6.76E-03 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.01E-02 | 2.10E-01 | 1.64E-02 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0.04 | 2.30E-03 | 1.00E+00 | 6.96E-02 | 1.100E+00 | 0.1 |
| Butylbenzylphthalate | 1.4 | 0 | 6.17E-02 | 1.00E+00 | 3.41E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 1.97E-02 | 4.40E-01 | 3.20E-02 | 1.000E+01 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 8.38E-02 | 1.00E+00 | 8.86E-02 | 1.100E-01 | 0.8 |
| Fluoranthene | 0.27 | 0 | 4.25E-02 | 3.70E-01 | 3.00E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 5.60E-03 | 4.10E-01 | 1.50E-02 | 1.000E+01 | 0.0 |
| Pyrene | 0.26 | 0 | 4.31E-02 | 3.90E-01 | 3.00E-02 | 1.000E+01 | 0.0 |
| Styrene | 0.001 | 0 | 7.74E-01 | 1.00E+00 | 3.29E-04 | NA | NA |
| Toluene | 0.003 | 0 | 9.97E-01 | 1.00E+00 | 1.07E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE**
**CONSERVATIVE ASSUMPTIONS**
**SITE 21 - BATTERY AND DRUM DISPOSAL AREA**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Cm = (((Cs*Bv*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*Bv*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Soil to plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 2.007E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 4.014E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 6.021E-03 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.960E-02 | |
| FI | Food Ingestion Rate (kg/day) | 1.004E-02 | |
| WI | Water ingestion rate (L/day) | 7.022E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 43300 | 0.147 | 4.00E-03 | 2.00E-01 | 3.14E+03 | 2.147E+00 | 1462.6 |
| Arsenic | 11.6 | 0 | 1.10E+00 | 5.23E-01 | 4.60E+00 | 1.401E-01 | 32.8 |
| Barium | 26.9 | 0.0308 | 1.50E-01 | 3.60E-01 | 4.19E+00 | 1.107E+01 | 0.4 |
| Beryllium | 0.34 | 0 | 1.00E-02 | 1.00E+00 | 1.09E-01 | 1.357E+00 | 0.1 |
| Cadmium | 38.4 | 0 | 3.25E+00 | 4.07E+01 | 5.06E+02 | 1.983E+00 | 255.2 |
| Chromium | 32.3 | 0.0037 | 7.50E-03 | 3.16E+00 | 3.18E+01 | 5.626E+03 | 0.0 |
| Cobalt | 4.1 | 0 | 2.00E-02 | 1.00E+00 | 1.32E+00 | NA | NA |
| Copper | 61.9 | 0 | 6.25E-01 | 1.53E+00 | 3.77E+01 | 3.127E+01 | 1.2 |
| Iron | 31100 | 0.336 | 4.00E-03 | 1.00E-01 | 1.30E+03 | NA | NA |
| Lead | 43 | 0 | 4.68E-01 | 1.52E+00 | 2.47E+01 | 1.645E+01 | 1.5 |
| Manganese | 1310 | 0.0947 | 2.50E-01 | 1.24E-01 | 1.31E+02 | 1.809E+02 | 0.7 |
| Mercury | 4.4 | 0 | 5.00E+00 | 2.06E+01 | 3.24E+01 | 2.673E+00 | 12.1 |
| Nickel | 10.5 | 0 | 1.41E+00 | 4.73E+00 | 1.84E+01 | 8.223E+01 | 0.2 |
| Selenium | 1.2 | 0 | 3.01E+00 | 1.34E+00 | 1.25E+00 | 4.111E-01 | 3.0 |
| Silver | 1.2 | 0 | 4.00E-01 | 1.00E+00 | 4.79E-01 | NA | NA |
| Thallium | 1.8 | 0 | 4.00E-03 | 1.00E+00 | 5.73E-01 | 1.537E-02 | 37.3 |
| Vanadium | 49.4 | 0.0034 | 5.50E-03 | 8.80E-02 | 1.91E+00 | 4.008E-01 | 4.8 |
| Zinc | 6780 | 0 | 1.82E+00 | 1.29E+01 | 2.94E+04 | 3.289E+02 | 89.5 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 1.15E-02 | 2.00E+00 | 1.19E-01 | 1.645E+00 | 0.1 |
| 4,4'-DDE | 0.039 | 0 | 4.80E-03 | 1.06E+01 | 1.27E-01 | 1.645E+00 | 0.1 |
| 4,4'-DDT | 0.033 | 0 | 6.50E-03 | 7.00E-01 | 7.48E-03 | 1.645E+00 | 0.0 |
| Aldrin | 0.02 | 0 | 6.80E-03 | 1.00E+00 | 6.38E-03 | 4.111E-01 | 0.0 |
| alpha-Chlordane | 0.015 | 0 | 8.90E-03 | 3.00E+00 | 1.40E-02 | 5.117E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 3.05E-02 | 8.00E+00 | 1.14E-01 | NA | NA |
| Endrin | 0.051 | 0 | 4.61E-02 | 1.00E+00 | 1.67E-02 | 1.023E-01 | 0.2 |
| Endrin Ketone | 0.00095 | 0 | 1.89E-01 | 1.00E+00 | 3.38E-04 | 1.023E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 2.70E-01 | 1.00E+00 | 8.20E-03 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 8.60E-03 | 3.00E+00 | 1.21E-02 | 5.117E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 9.30E-03 | 1.00E+01 | 6.78E-02 | 2.673E-01 | 0.3 |
| Heptachlor Epoxide | 0.00034 | 0 | 4.99E-02 | 1.00E+01 | 1.05E-03 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 4.48E-02 | 1.00E+00 | 9.15E-04 | 8.223E+00 | 0.0 |
| Acenaphthylene | 0.11 | 0 | 1.65E-01 | 2.20E-01 | 1.23E-02 | 1.446E+00 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.97E-02 | 2.70E-01 | 1.94E-02 | 1.446E+00 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.14E-02 | 3.40E-01 | 1.64E-02 | 1.112E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.91 | 0 | 1.01E-02 | 2.10E-01 | 6.99E-02 | 1.446E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 5.20E-03 | 1.50E-01 | 6.31E-03 | 1.446E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.01E-02 | 2.10E-01 | 1.69E-02 | 1.446E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0.04 | 2.30E-03 | 1.00E+00 | 2.26E-01 | 2.035E+01 | 0.0 |
| Butylbenzylphthalate | 1.4 | 0 | 6.17E-02 | 1.00E+00 | 4.62E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 1.97E-02 | 4.40E-01 | 3.89E-02 | 1.446E+00 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 8.38E-02 | 1.00E+00 | 1.20E-01 | 6.118E+02 | 0.0 |
| Fluoranthene | 0.27 | 0 | 4.25E-02 | 3.70E-01 | 3.58E-02 | 1.446E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 5.60E-03 | 4.10E-01 | 1.79E-02 | 1.446E+00 | 0.0 |
| Pyrene | 0.26 | 0 | 4.31E-02 | 3.90E-01 | 3.61E-02 | 1.446E+00 | 0.0 |
| Styrene | 0.001 | 0 | 7.74E-01 | 1.00E+00 | 4.76E-04 | NA | NA |
| Toluene | 0.003 | 0 | 9.97E-01 | 1.00E+00 | 1.56E-03 | 2.892E+01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX**
**CONSERVATIVE ASSUMPTIONS**
**SITE 21 - BATTERY AND DRUM DISPOSAL AREA**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red Fox | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.360E-02 | |
| Im | Rate of small mammal ingestion (kg/day) | 4.858E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.950E+00 | |
| FI | Food ingestion rate (kg/day) | 4.858E-01 | |
| WI | Water ingestion rate (L/day) | 1.180E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 43300 | 0.147 | 1.00E+00 | 7.33E+03 | 6.129E-01 | 11959.1 |
| Arsenic | 11.6 | 0 | 1.60E-02 | 8.40E-02 | 4.001E-02 | 2.1 |
| Barium | 26.9 | 0.0308 | 2.53E-01 | 1.25E+00 | 3.160E+00 | 0.4 |
| Beryllium | 0.34 | 0 | 4.10E-01 | 2.45E-02 | 3.874E-01 | 0.1 |
| Cadmium | 38.4 | 0 | 4.48E-01 | 3.01E+00 | 5.661E-01 | 5.3 |
| Chromium | 32.3 | 0.0037 | 3.09E-01 | 1.79E+00 | 1.606E+03 | 0.0 |
| Cobalt | 4.1 | 0 | 1.40E-01 | 1.13E-01 | NA | NA |
| Copper | 61.9 | 0 | 1.29E+00 | 1.34E+01 | 8.928E+00 | 1.5 |
| Iron | 31100 | 0.336 | 2.40E-02 | 2.66E+02 | NA | NA |
| Lead | 43 | 0 | 1.87E-01 | 1.52E+00 | 4.695E+00 | 0.3 |
| Manganese | 1310 | 0.0947 | 1.00E+00 | 2.22E+02 | 5.165E+01 | 4.3 |
| Mercury | 4.4 | 0 | 1.92E-01 | 1.59E-01 | 7.630E-01 | 0.2 |
| Nickel | 10.5 | 0 | 8.98E-01 | 1.60E+00 | 2.348E+01 | 0.1 |
| Selenium | 1.2 | 0 | 1.55E-01 | 3.62E-02 | 1.174E-01 | 0.3 |
| Silver | 1.2 | 0 | 1.00E+00 | 2.03E-01 | NA | NA |
| Thallium | 1.8 | 0 | 1.23E-01 | 4.47E-02 | 4.389E-03 | 10.2 |
| Vanadium | 49.4 | 0.0034 | 1.00E+00 | 8.36E+00 | 1.144E-01 | 73.1 |
| Zinc | 6780 | 0 | 2.32E+00 | 2.62E+03 | 9.390E+01 | 27.9 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 1.00E+00 | 3.22E-02 | 4.695E-01 | 0.1 |
| 4,4'-DDE | 0.039 | 0 | 1.00E+00 | 6.60E-03 | 4.695E-01 | 0.0 |
| 4,4'-DDT | 0.033 | 0 | 1.00E+00 | 5.59E-03 | 4.695E-01 | 0.0 |
| Aldrin | 0.02 | 0 | 1.00E+00 | 3.39E-03 | 1.174E-01 | 0.0 |
| alpha-Chlordane | 0.015 | 0 | 1.00E+00 | 2.54E-03 | 1.461E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 1.00E+00 | 7.79E-03 | NA | NA |
| Endrin | 0.051 | 0 | 1.00E+00 | 8.63E-03 | 2.922E-02 | 0.3 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 1.61E-04 | 2.922E-02 | 0.0 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 1.00E+00 | 3.72E-03 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 1.00E+00 | 2.20E-03 | 1.461E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 1.00E+00 | 3.72E-03 | 7.630E-02 | 0.0 |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+00 | 5.76E-05 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 4.74E-04 | 2.348E+00 | 0.0 |
| Acenaphthylene | 0.11 | 0 | 1.00E+00 | 1.86E-02 | 4.128E-01 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.00E+00 | 3.39E-02 | 4.128E-01 | 0.1 |
| Benzo(a)pyrene | 0.14 | 0 | 1.00E+00 | 2.37E-02 | 3.176E-01 | 0.1 |
| Benzo(b)fluoranthene | 0.91 | 0 | 1.00E+00 | 1.54E-01 | 4.128E-01 | 0.4 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.00E+00 | 1.86E-02 | 4.128E-01 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.00E+00 | 3.72E-02 | 4.128E-01 | 0.1 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0 | 1.00E+00 | 4.40E-02 | 5.811E+00 | 0.0 |
| Butylbenzylphthalate | 1.4 | 0 | 1.00E+00 | 2.37E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 1.00E+00 | 4.40E-02 | 4.128E-01 | 0.1 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 6.09E-02 | 1.747E+02 | 0.0 |
| Fluoranthene | 0.27 | 0 | 1.00E+00 | 4.57E-02 | 4.128E-01 | 0.1 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 1.00E+00 | 2.20E-02 | 4.128E-01 | 0.1 |
| Pyrene | 0.26 | 0 | 1.00E+00 | 4.40E-02 | 4.128E-01 | 0.1 |
| Styrene | 0.001 | 0 | 1.00E+00 | 1.69E-04 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 5.08E-04 | 8.257E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Short-Tailed Shrew | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 7.289E-05 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 3.037E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.250E-02 | |
| FI | Food ingestion rate (kg/day) | 3.037E-03 | |
| WI | Water ingestion rate (L/day) | 7.036E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| Inorganic Compounds | | | | | | |
| Aluminum | 43300 | 0.147 | 2.00E-01 | 2.36E+03 | 2.402E+00 | 981.3 |
| Arsenic | 11.6 | 0 | 5.23E-01 | 1.54E+00 | 1.568E-01 | 9.8 |
| Barium | 26.9 | 0.0308 | 3.60E-01 | 2.68E+00 | 1.239E+01 | 0.2 |
| Beryllium | 0.34 | 0 | 1.00E+00 | 8.46E-02 | 1.518E+00 | 0.1 |
| Cadmium | 38.4 | 0 | 4.07E+01 | 3.80E+02 | 2.219E+00 | 171.2 |
| Chromium | 32.3 | 0.0037 | 3.16E+00 | 2.50E+01 | 6.296E+03 | 0.0 |
| Cobalt | 4.1 | 0 | 1.00E+00 | 1.02E+00 | NA | NA |
| Copper | 61.9 | 0 | 1.53E+00 | 2.34E+01 | 3.499E+01 | 0.7 |
| Iron | 31100 | 0.336 | 1.00E-01 | 9.39E+02 | NA | NA |
| Lead | 43 | 0 | 1.52E+00 | 1.62E+01 | 1.840E+01 | 0.9 |
| Manganese | 1310 | 0.0947 | 1.24E-01 | 4.76E+01 | 2.024E+02 | 0.2 |
| Mercury | 4.4 | 0 | 2.06E+01 | 2.21E+01 | 2.991E+00 | 7.4 |
| Nickel | 10.5 | 0 | 4.73E+00 | 1.21E+01 | 9.201E+01 | 0.1 |
| Selenium | 1.2 | 0 | 1.34E+00 | 3.98E-01 | 4.601E-01 | 0.9 |
| Silver | 1.2 | 0 | 1.00E+00 | 2.99E-01 | NA | NA |
| Thallium | 1.8 | 0 | 1.00E+00 | 4.48E-01 | 1.720E-02 | 26.0 |
| Vanadium | 49.4 | 0.0034 | 8.80E-02 | 1.36E+00 | 4.485E-01 | 3.0 |
| Zinc | 6780 | 0 | 1.29E+01 | 2.13E+04 | 3.681E+02 | 57.8 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 2.00E+00 | 9.34E-02 | 4.695E-01 | 0.2 |
| 4,4'-DDE | 0.039 | 0 | 1.06E+01 | 1.01E-01 | 4.695E-01 | 0.2 |
| 4,4'-DDT | 0.033 | 0 | 7.00E-01 | 5.80E-03 | 4.695E-01 | 0.0 |
| Aldrin | 0.02 | 0 | 1.00E+00 | 4.98E-03 | 1.174E-01 | 0.0 |
| alpha-Chlordane | 0.015 | 0 | 3.00E+00 | 1.10E-02 | 1.461E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 8.00E+00 | 8.97E-02 | NA | NA |
| Endrin | 0.051 | 0 | 1.00E+00 | 1.27E-02 | 2.922E-02 | 0.4 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 2.36E-04 | 2.922E-02 | 0.0 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 1.00E+00 | 5.47E-03 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 3.00E+00 | 9.55E-03 | 1.461E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 1.00E+01 | 5.36E-02 | 7.630E-02 | 0.7 |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+01 | 8.28E-04 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 6.97E-04 | 2.348E+00 | 0.0 |
| Acenaphthylene | 0.11 | 0 | 2.20E-01 | 6.52E-03 | 4.128E-01 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 2.70E-01 | 1.43E-02 | 4.128E-01 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 3.40E-01 | 1.24E-02 | 3.176E-01 | 0.0 |
| Benzo(b)fluoranthene | 0.91 | 0 | 2.10E-01 | 5.17E-02 | 4.128E-01 | 0.1 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.50E-01 | 4.65E-03 | 4.128E-01 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 2.10E-01 | 1.25E-02 | 4.128E-01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0.04 | 1.00E+00 | 2.90E-01 | 5.811E+00 | 0.0 |
| Butylbenzylphthalate | 1.4 | 0 | 1.00E+00 | 3.48E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 4.40E-01 | 2.93E-02 | 4.128E-01 | 0.1 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 8.96E-02 | 1.747E+02 | 0.0 |
| Fluoranthene | 0.27 | 0 | 3.70E-01 | 2.58E-02 | 4.128E-01 | 0.1 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 4.10E-01 | 1.37E-02 | 4.128E-01 | 0.0 |
| Pyrene | 0.26 | 0 | 3.90E-01 | 2.62E-02 | 4.128E-01 | 0.1 |
| Styrene | 0.001 | 0 | 1.00E+00 | 2.49E-04 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 7.46E-04 | 8.257E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Bv*Iv)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Meadow Vole | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 3.773E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.572E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.700E-02 | |
| FI | Food ingestion rate (kg/day) | 1.572E-02 | |
| WI | Water ingestion rate (L/day) | 1.100E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| Inorganic Compounds | | | | | | |
| Aluminum | 43300 | 0.147 | 4.00E-03 | 1.12E+03 | 2.224E+00 | 504.0 |
| Arsenic | 11.6 | 0 | 1.10E+00 | 1.21E+01 | 1.452E-01 | 83.2 |
| Barium | 26.9 | 0.0308 | 1.50E-01 | 4.35E+00 | 1.147E+01 | 0.4 |
| Beryllium | 0.34 | 0 | 1.00E-02 | 1.07E-02 | 1.406E+00 | 0.0 |
| Cadmium | 38.4 | 0 | 3.25E+00 | 1.16E+02 | 2.055E+00 | 56.6 |
| Chromium | 32.3 | 0.0037 | 7.50E-03 | 9.43E-01 | 5.830E+03 | 0.0 |
| Cobalt | 4.1 | 0 | 2.00E-02 | 1.67E-01 | NA | NA |
| Copper | 61.9 | 0 | 6.25E-01 | 3.71E+01 | 3.240E+01 | 1.1 |
| Iron | 31100 | 0.336 | 4.00E-03 | 8.05E+02 | NA | NA |
| Lead | 43 | 0 | 4.68E-01 | 1.96E+01 | 1.704E+01 | 1.1 |
| Manganese | 1310 | 0.0947 | 2.50E-01 | 3.32E+02 | 1.875E+02 | 1.8 |
| Mercury | 4.4 | 0 | 5.00E+00 | 2.04E+01 | 2.769E+00 | 7.4 |
| Nickel | 10.5 | 0 | 1.41E+00 | 1.39E+01 | 8.520E+01 | 0.2 |
| Selenium | 1.2 | 0 | 3.01E+00 | 3.37E+00 | 4.260E-01 | 7.9 |
| Silver | 1.2 | 0 | 4.00E-01 | 4.70E-01 | NA | NA |
| Thallium | 1.8 | 0 | 4.00E-03 | 4.66E-02 | 1.593E-02 | 2.9 |
| Vanadium | 49.4 | 0.0034 | 5.50E-03 | 1.35E+00 | 4.153E-01 | 3.3 |
| Zinc | 6780 | 0 | 1.82E+00 | 1.16E+04 | 3.408E+02 | 33.9 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE
CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.19 | 0 | 1.15E-02 | 6.24E-03 | 1.704E+00 | 0.0 |
| 4,4'-DDE | 0.039 | 0 | 4.80E-03 | 1.04E-03 | 1.704E+00 | 0.0 |
| 4,4'-DDT | 0.033 | 0 | 6.50E-03 | 9.31E-04 | 1.704E+00 | 0.0 |
| Aldrin | 0.02 | 0 | 6.80E-03 | 5.70E-04 | 4.260E-01 | 0.0 |
| alpha-Chlordane | 0.015 | 0 | 8.90E-03 | 4.56E-04 | 5.302E+00 | 0.0 |
| Dieldrin | 0.046 | 0 | 3.05E-02 | 2.32E-03 | NA | NA |
| Endrin | 0.051 | 0 | 4.61E-02 | 3.31E-03 | 1.060E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.89E-01 | 1.87E-04 | 1.060E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.022 | 0 | 2.70E-01 | 5.99E-03 | NA | NA |
| Gamma-Chlordane | 0.013 | 0 | 8.60E-03 | 3.92E-04 | 5.302E+00 | 0.0 |
| Heptachlor | 0.022 | 0 | 9.30E-03 | 6.77E-04 | 2.769E-01 | 0.0 |
| Heptachlor Epoxide | 0.00034 | 0 | 4.99E-02 | 2.32E-05 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 4.48E-02 | 1.78E-04 | 8.520E+00 | 0.0 |
| Acenaphthylene | 0.11 | 0 | 1.65E-01 | 1.93E-02 | 1.498E+00 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.97E-02 | 8.08E-03 | 1.498E+00 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.14E-02 | 4.58E-03 | 1.153E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.91 | 0 | 1.01E-02 | 2.87E-02 | 1.498E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 5.20E-03 | 2.97E-03 | 1.498E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.01E-02 | 6.94E-03 | 1.498E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.26 | 0.04 | 2.30E-03 | 3.22E-02 | 2.109E+01 | 0.0 |
| Butylbenzylphthalate | 1.4 | 0 | 6.17E-02 | 1.11E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 1.97E-02 | 1.05E-02 | 1.498E+00 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 8.38E-02 | 3.59E-02 | 6.339E+02 | 0.0 |
| Fluoranthene | 0.27 | 0 | 4.25E-02 | 1.66E-02 | 1.498E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 5.60E-03 | 3.56E-03 | 1.498E+00 | 0.0 |
| Pyrene | 0.26 | 0 | 4.31E-02 | 1.61E-02 | 1.498E+00 | 0.0 |
| Styrene | 0.001 | 0 | 7.74E-01 | 7.38E-04 | NA | NA |
| Toluene | 0.003 | 0 | 9.97E-01 | 2.83E-03 | 2.997E+01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*BAF*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | American Woodcock | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.317E-02 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.266E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.644E-01 | |
| FI | Food ingestion rate (kg/day) | 1.266E-01 | |
| WI | Water ingestion rate (L/day) | 1.760E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 6424.1053 | 0.11325 | 2.00E-01 | 1.50E+03 | 1.097E+03 | 1.4 |
| Arsenic | 2.4882 | 0 | 5.23E-01 | 1.20E+00 | 7.380E+00 | 0.2 |
| Barium | 12.6684 | 0.0169 | 3.60E-01 | 4.53E+00 | 4.170E+01 | 0.1 |
| Beryllium | 0.1495 | 0 | 1.00E+00 | 1.27E-01 | NA | NA |
| Cadmium | 3.8774 | 0 | 4.07E+01 | 1.22E+02 | 2.000E+01 | 6.1 |
| Chromium | 8.2763 | 0.002675 | 3.16E+00 | 2.08E+01 | 5.000E+00 | 4.2 |
| Cobalt | 1.0782 | 0 | 1.00E+00 | 9.17E-01 | NA | NA |
| Copper | 10.7045 | 0 | 1.53E+00 | 1.35E+01 | 6.170E+01 | 0.2 |
| Iron | 6779.4737 | 0.2041 | 1.00E-01 | 1.06E+03 | NA | NA |
| Lead | 16.4105 | 0 | 1.52E+00 | 2.05E+01 | 3.850E+01 | 0.5 |
| Manganese | 134.5053 | 0.0491 | 1.24E-01 | 2.36E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.5995 | 0 | 2.06E+01 | 9.57E+00 | 9.000E-01 | 10.6 |
| Nickel | 2.8263 | 0 | 4.73E+00 | 1.05E+01 | 1.070E+02 | 0.1 |
| Selenium | 0.3495 | 0 | 1.34E+00 | 3.89E-01 | 1.000E+00 | 0.4 |
| Silver | 0.28 | 0 | 1.00E+00 | 2.38E-01 | NA | NA |
| Thallium | 0.3718 | 0 | 1.00E+00 | 3.16E-01 | NA | NA |
| Vanadium | 10.5289 | 0.002325 | 8.80E-02 | 1.56E+00 | 1.140E+02 | 0.0 |
| Zinc | 522.9316 | 0 | 1.29E+01 | 5.23E+03 | 1.310E+02 | 39.9 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 2.00E+00 | 2.21E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 1.06E+01 | 3.15E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 7.00E-01 | 3.04E-03 | 8.800E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 1.00E+00 | 2.28E-03 | NA | NA |
| alpha-Chlordane | 0.0020658 | 0 | 3.00E+00 | 4.94E-03 | 1.070E+01 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 8.00E+00 | 3.54E-02 | NA | NA |
| Endrin | 0.0063684 | 0 | 1.00E+00 | 5.41E-03 | 1.000E-01 | 0.1 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 8.08E-04 | 1.000E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 1.00E+00 | 2.46E-03 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 3.00E+00 | 4.71E-03 | 1.070E+01 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 1.00E+01 | 2.25E-02 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+01 | 2.65E-03 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 2.38E-03 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 2.20E-01 | 2.74E-02 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 2.70E-01 | 5.76E-02 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 3.40E-01 | 4.79E-02 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.3307895 | 0 | 2.10E-01 | 8.00E-02 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.50E-01 | 2.15E-02 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 2.10E-01 | 5.32E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1947895 | 0.0205 | 1.00E+00 | 1.68E-01 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.3925263 | 0 | 1.00E+00 | 3.34E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 4.40E-01 | 1.09E-01 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 3.06E-01 | 1.100E+00 | 0.3 |
| Fluoranthene | 0.27 | 0 | 3.70E-01 | 9.85E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 4.10E-01 | 5.15E-02 | 1.000E+02 | 0.0 |
| Pyrene | 0.26 | 0 | 3.90E-01 | 9.89E-02 | 1.000E+02 | 0.0 |
| Styrene | 0.001 | 0 | 1.00E+00 | 8.50E-04 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 2.55E-03 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Bobwhite Quail | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| Br | Vegetation (fruit) biotransfer factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.378E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.378E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.767E-01 | |
| FI | Food ingestion rate (kg/day) | 1.378E-02 | |
| WI | Water ingestion rate (L/day) | 2.297E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant Transfer Coefficient (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 6424.1053 | 0.11325 | 4.00E-03 | 5.21E+01 | 1.097E+03 | 0.0 |
| Arsenic | 2.4882 | 0 | 1.10E+00 | 2.33E-01 | 7.380E+00 | 0.0 |
| Barium | 12.6684 | 0.0169 | 1.50E-01 | 2.49E-01 | 4.170E+01 | 0.0 |
| Beryllium | 0.1495 | 0 | 1.00E-02 | 1.28E-03 | NA | NA |
| Cadmium | 3.8774 | 0 | 3.25E+00 | 1.01E+00 | 2.000E+01 | 0.1 |
| Chromium | 8.2763 | 0.002675 | 7.50E-03 | 6.97E-02 | 5.000E+00 | 0.0 |
| Cobalt | 1.0782 | 0 | 2.00E-02 | 1.01E-02 | NA | NA |
| Copper | 10.7045 | 0 | 6.25E-01 | 6.05E-01 | 6.170E+01 | 0.0 |
| Iron | 6779.4737 | 0.2041 | 4.00E-03 | 5.50E+01 | NA | NA |
| Lead | 16.4105 | 0 | 4.68E-01 | 7.27E-01 | 3.850E+01 | 0.0 |
| Manganese | 134.5053 | 0.0491 | 2.50E-01 | 3.68E+00 | 9.770E+03 | 0.0 |
| Mercury | 0.5995 | 0 | 5.00E+00 | 2.38E-01 | 9.000E-01 | 0.3 |
| Nickel | 2.8263 | 0 | 1.41E+00 | 3.33E-01 | 1.070E+02 | 0.0 |
| Selenium | 0.3495 | 0 | 3.01E+00 | 8.48E-02 | 1.000E+00 | 0.1 |
| Silver | 0.28 | 0 | 4.00E-01 | 1.09E-02 | NA | NA |
| Thallium | 0.3718 | 0 | 4.00E-03 | 3.02E-03 | NA | NA |
| Vanadium | 10.5289 | 0.002325 | 5.50E-03 | 8.69E-02 | 1.140E+02 | 0.0 |
| Zinc | 522.9316 | 0 | 1.82E+00 | 7.83E+01 | 1.310E+02 | 0.6 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant Transfer Coefficient (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 1.15E-02 | 1.19E-04 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 4.80E-03 | 3.13E-05 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 6.50E-03 | 4.08E-05 | 8.800E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 6.80E-03 | 2.23E-05 | NA | NA |
| alpha-Chlordane | 0.0020658 | 0 | 8.90E-03 | 1.75E-05 | 1.070E+01 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 3.05E-02 | 5.78E-05 | NA | NA |
| Endrin | 0.0063684 | 0 | 4.61E-02 | 7.26E-05 | 1.000E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.89E-01 | 2.14E-05 | 1.000E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 2.70E-01 | 8.36E-05 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 8.60E-03 | 1.67E-05 | 1.070E+01 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 9.30E-03 | 2.47E-05 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 4.99E-02 | 3.98E-06 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 4.48E-02 | 3.16E-05 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 1.65E-01 | 2.28E-03 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.97E-02 | 1.87E-03 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.14E-02 | 1.22E-03 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.3307895 | 0 | 1.01E-02 | 2.84E-03 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 5.20E-03 | 9.03E-04 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.01E-02 | 1.89E-03 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1947895 | 0.0205 | 2.30E-03 | 4.22E-03 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.3925263 | 0 | 6.17E-02 | 4.95E-03 | NA | NA |
| Chrysene | 0.26 | 0 | 1.97E-02 | 2.43E-03 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 8.38E-02 | 5.16E-03 | 1.100E+00 | 0.0 |
| Fluoranthene | 0.27 | 0 | 4.25E-02 | 3.00E-03 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 5.60E-03 | 1.07E-03 | 1.000E+02 | 0.0 |
| Pyrene | 0.26 | 0 | 4.31E-02 | 2.90E-03 | 1.000E+02 | 0.0 |
| Styrene | 0.001 | 0 | 7.74E-01 | 6.82E-05 | NA | NA |
| Toluene | 0.003 | 0 | 9.97E-01 | 2.57E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Marsh Wren | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.818E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 2.818E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.000E-02 | |
| FI | Food ingestion rate (kg/day) | 2.818E-03 | |
| WI | Water ingestion rate (L/day) | 2.697E-03 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 6424.1053 | 0.11325 | 2.00E-01 | 543.0519824 | 1097 | 0.5 |
| Arsenic | 2.4882 | 0 | 5.23E-01 | 0.436773624 | 7.38 | 0.1 |
| Barium | 12.6684 | 0.0169 | 3.60E-01 | 1.646517998 | 41.7 | 0.0 |
| Beryllium | 0.1495 | 0 | 1.00E+00 | 0.04633583 | NA | NA |
| Cadmium | 3.8774 | 0 | 4.07E+01 | 44.56330407 | 20 | 2.2 |
| Chromium | 8.2763 | 0.002675 | 3.16E+00 | 7.607543391 | 5 | 1.5 |
| Cobalt | 1.0782 | 0 | 1.00E+00 | 0.334175868 | NA | NA |
| Copper | 10.7045 | 0 | 1.53E+00 | 4.919301259 | 61.7 | 0.1 |
| Iron | 6779.4737 | 0.2041 | 1.00E-01 | 382.0952283 | NA | NA |
| Lead | 16.4105 | 0 | 1.52E+00 | 7.499904536 | 38.5 | 0.2 |
| Manganese | 134.5053 | 0.0491 | 1.24E-01 | 8.502514152 | 9770 | 0.0 |
| Mercury | 0.5995 | 0 | 2.06E+01 | 3.50164054 | 0.9 | 3.9 |
| Nickel | 2.8263 | 0 | 4.73E+00 | 3.846346996 | 107 | 0.0 |
| Selenium | 0.3495 | 0 | 1.34E+00 | 0.141805392 | 1 | 0.1 |
| Silver | 0.28 | 0 | 1.00E+00 | 0.086782826 | NA | NA |
| Thallium | 0.3718 | 0 | 1.00E+00 | 0.115235195 | NA | NA |
| Vanadium | 10.5289 | 0.002325 | 8.80E-02 | 0.558356904 | 114 | 0.0 |
| Zinc | 522.9316 | 0 | 1.29E+01 | 1913.978741 | 131 | 14.6 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 2.00E+00 | 8.07E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 1.06E+01 | 1.15E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 7.00E-01 | 1.11E-03 | 8.800E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 1.00E+00 | 8.31E-04 | NA | NA |
| alpha-Chlordane | 0.0020658 | 0 | 3.00E+00 | 1.80E-03 | 1.070E+01 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 8.00E+00 | 1.30E-02 | NA | NA |
| Endrin | 0.0063684 | 0 | 1.00E+00 | 1.97E-03 | 1.000E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 2.94E-04 | 1.000E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 1.00E+00 | 8.96E-04 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 3.00E+00 | 1.72E-03 | 1.070E+01 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 1.00E+01 | 8.23E-03 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+01 | 9.68E-04 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 8.68E-04 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 2.20E-01 | 9.92E-03 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 2.70E-01 | 2.09E-02 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 3.40E-01 | 1.74E-02 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.3307895 | 0 | 2.10E-01 | 2.89E-02 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.50E-01 | 7.75E-03 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 2.10E-01 | 1.92E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1947895 | 0.0205 | 1.00E+00 | 6.59E-02 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.3925263 | 0 | 1.00E+00 | 1.22E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 4.40E-01 | 3.96E-02 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 1.12E-01 | 1.100E+00 | 0.1 |
| Fluoranthene | 0.27 | 0 | 3.70E-01 | 3.58E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 4.10E-01 | 1.87E-02 | 1.000E+02 | 0.0 |
| Pyrene | 0.26 | 0 | 3.90E-01 | 3.59E-02 | 1.000E+02 | 0.0 |
| Styrene | 0.001 | 0 | 1.00E+00 | 3.10E-04 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 9.30E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red-Tailed Hawk | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.222E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 1.111E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.126E+00 | |
| FI | Food ingestion rate (kg/day) | 1.111E-01 | |
| WI | Water ingestion rate (L/day) | 6.388E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 6424.1053 | 0.11325 | 1.00E+00 | 6.47E+02 | 1.097E+03 | 0.6 |
| Arsenic | 2.4882 | 0 | 1.60E-02 | 8.84E-03 | 7.380E+00 | 0.0 |
| Barium | 12.6684 | 0.0169 | 2.53E-01 | 3.42E-01 | 4.170E+01 | 0.0 |
| Beryllium | 0.1495 | 0 | 4.10E-01 | 6.34E-03 | NA | NA |
| Cadmium | 3.8774 | 0 | 4.48E-01 | 1.79E-01 | 2.000E+01 | 0.0 |
| Chromium | 8.2763 | 0.002675 | 3.09E-01 | 2.69E-01 | 5.000E+00 | 0.1 |
| Cobalt | 1.0782 | 0 | 1.40E-01 | 1.70E-02 | NA | NA |
| Copper | 10.7045 | 0 | 1.29E+00 | 1.38E+00 | 6.170E+01 | 0.0 |
| Iron | 6779.4737 | 0.2041 | 2.40E-02 | 2.94E+01 | NA | NA |
| Lead | 16.4105 | 0 | 1.87E-01 | 3.35E-01 | 3.850E+01 | 0.0 |
| Manganese | 134.5053 | 0.0491 | 1.00E+00 | 1.35E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.5995 | 0 | 1.92E-01 | 1.25E-02 | 9.000E-01 | 0.0 |
| Nickel | 2.8263 | 0 | 8.98E-01 | 2.56E-01 | 1.070E+02 | 0.0 |
| Selenium | 0.3495 | 0 | 1.55E-01 | 6.03E-03 | 1.000E+00 | 0.0 |
| Silver | 0.28 | 0 | 1.00E+00 | 2.82E-02 | NA | NA |
| Thallium | 0.3718 | 0 | 1.23E-01 | 5.24E-03 | NA | NA |
| Vanadium | 10.5289 | 0.002325 | 1.00E+00 | 1.06E+00 | 1.140E+02 | 0.0 |
| Zinc | 522.9316 | 0 | 2.32E+00 | 1.21E+02 | 1.310E+02 | 0.9 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 1.00E+00 | 1.37E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 1.00E+00 | 3.85E-04 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 1.00E+00 | 4.94E-04 | 8.800E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 1.00E+00 | 2.70E-04 | NA | NA |
| alpha-Chlordane | 0.0020658 | 0 | 1.00E+00 | 2.08E-04 | 1.070E+01 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 1.00E+00 | 5.71E-04 | NA | NA |
| Endrin | 0.0063684 | 0 | 1.00E+00 | 6.41E-04 | 1.000E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 9.56E-05 | 1.000E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 1.00E+00 | 2.91E-04 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 1.00E+00 | 1.98E-04 | 1.070E+01 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 1.00E+00 | 2.91E-04 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+00 | 3.42E-05 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 2.82E-04 | NA | NA |
| Acenaphthylene | 0.0095737 | 0 | 1.00E+00 | 9.64E-04 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 1.0095737 | 0 | 1.00E+00 | 1.02E-01 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 2.0095737 | 0 | 1.00E+00 | 2.02E-01 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 3.0095737 | 0 | 1.00E+00 | 3.03E-01 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 4.0095737 | 0 | 1.00E+00 | 4.04E-01 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 5.0095737 | 0 | 1.00E+00 | 5.04E-01 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 6.0095737 | 0 | 1.00E+00 | 6.05E-01 | 1.100E+01 | 0.1 |
| Butylbenzylphthalate | 7.0095737 | 0 | 1.00E+00 | 7.05E-01 | NA | NA |
| Chrysene | 8.0095737 | 0 | 1.00E+00 | 8.06E-01 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 9.0095737 | 0 | 1.00E+00 | 9.07E-01 | 1.100E+00 | 0.8 |
| Fluoranthene | 10.0095737 | 0 | 1.00E+00 | 1.01E+00 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 11.0095737 | 0 | 1.00E+00 | 1.11E+00 | 1.000E+02 | 0.0 |
| Pyrene | 12.0095737 | 0 | 1.00E+00 | 1.21E+00 | 1.000E+02 | 0.0 |
| Styrene | 13.0095737 | 0 | 1.00E+00 | 1.31E+00 | NA | NA |
| Toluene | 14.0095737 | 0 | 1.00E+00 | 1.41E+00 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Plant Bioaccumulation Factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 1.490E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 2.075E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.026E-02 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 7.730E-02 | |
| FI | Food Ingestion Rate (kg/day) | 1.603E-02 | |
| WI | Water ingestion rate (L/day) | 1.062E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 6424.1053 | 0.11325 | 4.00E-03 | 2.00E-01 | 2.95E+02 | 1.097E+03 | 0.3 |
| Arsenic | 2.4882 | 0 | 1.10E+00 | 5.23E-01 | 2.94E-01 | 7.380E+00 | 0.0 |
| Barium | 12.6684 | 0.0169 | 1.50E-01 | 3.60E-01 | 9.03E-01 | 4.170E+01 | 0.0 |
| Beryllium | 0.1495 | 0 | 1.00E-02 | 1.00E+00 | 2.28E-02 | NA | NA |
| Cadmium | 3.8774 | 0 | 3.25E+00 | 4.07E+01 | 2.14E+01 | 2.000E+01 | 1.1 |
| Chromium | 8.2763 | 0.002675 | 7.50E-03 | 3.16E+00 | 3.64E+00 | 5.000E+00 | 0.7 |
| Cobalt | 1.0782 | 0 | 2.00E-02 | 1.00E+00 | 1.65E-01 | NA | NA |
| Copper | 10.7045 | 0 | 6.25E-01 | 1.53E+00 | 2.56E+00 | 6.170E+01 | 0.0 |
| Iron | 6779.4737 | 0.2041 | 4.00E-03 | 1.00E-01 | 2.21E+02 | NA | NA |
| Lead | 16.4105 | 0 | 4.68E-01 | 1.52E+00 | 3.84E+00 | 3.850E+01 | 0.1 |
| Manganese | 134.5053 | 0.0491 | 2.50E-01 | 1.24E-01 | 5.72E+00 | 9.770E+03 | 0.0 |
| Mercury | 0.5995 | 0 | 5.00E+00 | 2.06E+01 | 1.73E+00 | 9.000E-01 | 1.9 |
| Nickel | 2.8263 | 0 | 1.41E+00 | 4.73E+00 | 1.94E+00 | 1.070E+02 | 0.0 |
| Selenium | 0.3495 | 0 | 3.01E+00 | 1.34E+00 | 9.72E-02 | 1.000E+00 | 0.1 |
| Silver | 0.28 | 0 | 4.00E-01 | 1.00E+00 | 4.56E-02 | NA | NA |
| Thallium | 0.3718 | 0 | 4.00E-03 | 1.00E+00 | 5.66E-02 | NA | NA |
| Vanadium | 10.5289 | 0.002325 | 5.50E-03 | 8.80E-02 | 3.28E-01 | 1.140E+02 | 0.0 |
| Zinc | 522.9316 | 0 | 1.82E+00 | 1.29E+01 | 9.31E+02 | 1.310E+02 | 7.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant Transfer Coefficient (Bv) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 1.15E-02 | 2.00E+00 | 3.89E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 4.80E-03 | 1.06E+01 | 5.46E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 6.50E-03 | 7.00E-01 | 5.52E-04 | 8.800E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 6.80E-03 | 1.00E+00 | 4.08E-04 | NA | NA |
| alpha-Chlordane | 0.0020658 | 0 | 8.90E-03 | 3.00E+00 | 8.63E-04 | 1.070E+01 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 3.05E-02 | 8.00E+00 | 6.14E-03 | NA | NA |
| Endrin | 0.0063684 | 0 | 4.61E-02 | 1.00E+00 | 9.76E-04 | 1.000E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.89E-01 | 1.00E+00 | 1.49E-04 | 1.000E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 2.70E-01 | 1.00E+00 | 4.61E-04 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 8.60E-03 | 3.00E+00 | 8.24E-04 | 1.070E+01 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 9.30E-03 | 1.00E+01 | 3.90E-03 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 4.99E-02 | 1.00E+01 | 4.58E-04 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 4.48E-02 | 1.00E+00 | 4.29E-04 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 1.65E-01 | 2.20E-01 | 5.82E-03 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.97E-02 | 2.70E-01 | 1.11E-02 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.14E-02 | 3.40E-01 | 9.06E-03 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.3307895 | 0 | 1.01E-02 | 2.10E-01 | 1.57E-02 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 5.20E-03 | 1.50E-01 | 4.33E-03 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.01E-02 | 2.10E-01 | 1.04E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1947895 | 0.0205 | 2.30E-03 | 1.00E+00 | 3.24E-02 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.3925263 | 0 | 6.17E-02 | 1.00E+00 | 6.03E-02 | NA | NA |
| Chrysene | 0.26 | 0 | 1.97E-02 | 4.40E-01 | 2.03E-02 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 8.38E-02 | 1.00E+00 | 5.56E-02 | 1.100E+00 | 0.1 |
| Fluoranthene | 0.27 | 0 | 4.25E-02 | 3.70E-01 | 1.88E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 5.60E-03 | 4.10E-01 | 9.60E-03 | 1.000E+02 | 0.0 |
| Pyrene | 0.26 | 0 | 4.31E-02 | 3.90E-01 | 1.88E-02 | 1.000E+02 | 0.0 |
| Styrene | 0.001 | 0 | 7.74E-01 | 1.00E+00 | 1.73E-04 | NA | NA |
| Toluene | 0.003 | 0 | 9.97E-01 | 1.00E+00 | 5.36E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 2.00E+00 | 8.07E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 1.06E+01 | 1.15E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 7.00E-01 | 1.11E-03 | 8.800E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 1.00E+00 | 8.31E-04 | NA | NA |
| alpha-Chlordane | 0.0020658 | 0 | 3.00E+00 | 1.80E-03 | 1.070E+01 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 8.00E+00 | 1.30E-02 | NA | NA |
| Endrin | 0.0063684 | 0 | 1.00E+00 | 1.97E-03 | 1.000E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 2.94E-04 | 1.000E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 1.00E+00 | 8.96E-04 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 3.00E+00 | 1.72E-03 | 1.070E+01 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 1.00E+01 | 8.23E-03 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+01 | 9.68E-04 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 8.68E-04 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 2.20E-01 | 9.92E-03 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 2.70E-01 | 2.09E-02 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 3.40E-01 | 1.74E-02 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.3307895 | 0 | 2.10E-01 | 2.89E-02 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.50E-01 | 7.75E-03 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 2.10E-01 | 1.92E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1947895 | 0.0205 | 1.00E+00 | 6.59E-02 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.3925263 | 0 | 1.00E+00 | 1.22E-01 | NA | NA |
| Chrysene | 0.26 | 0 | 4.40E-01 | 3.96E-02 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 1.12E-01 | 1.100E+00 | 0.1 |
| Fluoranthene | 0.27 | 0 | 3.70E-01 | 3.58E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 4.10E-01 | 1.87E-02 | 1.000E+02 | 0.0 |
| Pyrene | 0.26 | 0 | 3.90E-01 | 3.59E-02 | 1.000E+02 | 0.0 |
| Styrene | 0.001 | 0 | 1.00E+00 | 3.10E-04 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 9.30E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red-Tailed Hawk | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.222E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 1.111E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.126E+00 | |
| FI | Food ingestion rate (kg/day) | 1.111E-01 | |
| WI | Water ingestion rate (L/day) | 6.388E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 6424.1053 | 0.11325 | 1.00E+00 | 6.47E+02 | 1.097E+03 | 0.6 |
| Arsenic | 2.4882 | 0 | 1.60E-02 | 8.84E-03 | 7.380E+00 | 0.0 |
| Barium | 12.6684 | 0.0169 | 2.53E-01 | 3.42E-01 | 4.170E+01 | 0.0 |
| Beryllium | 0.1495 | 0 | 4.10E-01 | 6.34E-03 | NA | NA |
| Cadmium | 3.8774 | 0 | 4.48E-01 | 1.79E-01 | 2.000E+01 | 0.0 |
| Chromium | 8.2763 | 0.002675 | 3.09E-01 | 2.69E-01 | 5.000E+00 | 0.1 |
| Cobalt | 1.0782 | 0 | 1.40E-01 | 1.70E-02 | NA | NA |
| Copper | 10.7045 | 0 | 1.29E+00 | 1.38E+00 | 6.170E+01 | 0.0 |
| Iron | 6779.4737 | 0.2041 | 2.40E-02 | 2.94E+01 | NA | NA |
| Lead | 16.4105 | 0 | 1.87E-01 | 3.35E-01 | 3.850E+01 | 0.0 |
| Manganese | 134.5053 | 0.0491 | 1.00E+00 | 1.35E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.5995 | 0 | 1.92E-01 | 1.25E-02 | 9.000E-01 | 0.0 |
| Nickel | 2.8263 | 0 | 8.98E-01 | 2.56E-01 | 1.070E+02 | 0.0 |
| Selenium | 0.3495 | 0 | 1.55E-01 | 6.03E-03 | 1.000E+00 | 0.0 |
| Silver | 0.28 | 0 | 1.00E+00 | 2.82E-02 | NA | NA |
| Thallium | 0.3718 | 0 | 1.23E-01 | 5.24E-03 | NA | NA |
| Vanadium | 10.5289 | 0.002325 | 1.00E+00 | 1.06E+00 | 1.140E+02 | 0.0 |
| Zinc | 522.9316 | 0 | 2.32E+00 | 1.21E+02 | 1.310E+02 | 0.9 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 1.00E+00 | 1.37E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 1.00E+00 | 3.85E-04 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 1.00E+00 | 4.94E-04 | 8.800E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 1.00E+00 | 2.70E-04 | NA | NA |
| alpha-Chlordane | 0.0020658 | 0 | 1.00E+00 | 2.08E-04 | 1.070E+01 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 1.00E+00 | 5.71E-04 | NA | NA |
| Endrin | 0.0063684 | 0 | 1.00E+00 | 6.41E-04 | 1.000E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 9.56E-05 | 1.000E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 1.00E+00 | 2.91E-04 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 1.00E+00 | 1.98E-04 | 1.070E+01 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 1.00E+00 | 2.91E-04 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+00 | 3.42E-05 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 2.82E-04 | NA | NA |
| Acenaphthylene | 0.0095737 | 0 | 1.00E+00 | 9.64E-04 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 1.0095737 | 0 | 1.00E+00 | 1.02E-01 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 2.0095737 | 0 | 1.00E+00 | 2.02E-01 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 3.0095737 | 0 | 1.00E+00 | 3.03E-01 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 4.0095737 | 0 | 1.00E+00 | 4.04E-01 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 5.0095737 | 0 | 1.00E+00 | 5.04E-01 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 6.0095737 | 0 | 1.00E+00 | 6.05E-01 | 1.100E+01 | 0.1 |
| Butylbenzylphthalate | 7.0095737 | 0 | 1.00E+00 | 7.05E-01 | NA | NA |
| Chrysene | 8.0095737 | 0 | 1.00E+00 | 8.06E-01 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 9.0095737 | 0 | 1.00E+00 | 9.07E-01 | 1.100E+00 | 0.8 |
| Fluoranthene | 10.0095737 | 0 | 1.00E+00 | 1.01E+00 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 11.0095737 | 0 | 1.00E+00 | 1.11E+00 | 1.000E+02 | 0.0 |
| Pyrene | 12.0095737 | 0 | 1.00E+00 | 1.21E+00 | 1.000E+02 | 0.0 |
| Styrene | 13.0095737 | 0 | 1.00E+00 | 1.31E+00 | NA | NA |
| Toluene | 14.0095737 | 0 | 1.00E+00 | 1.41E+00 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Plant Bioaccumulation Factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 1.490E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 2.075E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.026E-02 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 7.730E-02 | |
| FI | Food Ingestion Rate (kg/day) | 1.603E-02 | |
| WI | Water ingestion rate (L/day) | 1.062E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 6424.1053 | 0.11325 | 4.00E-03 | 2.00E-01 | 2.95E+02 | 1.097E+03 | 0.3 |
| Arsenic | 2.4882 | 0 | 1.10E+00 | 5.23E-01 | 2.94E-01 | 7.380E+00 | 0.0 |
| Barium | 12.6684 | 0.0169 | 1.50E-01 | 3.60E-01 | 9.03E-01 | 4.170E+01 | 0.0 |
| Beryllium | 0.1495 | 0 | 1.00E-02 | 1.00E+00 | 2.28E-02 | NA | NA |
| Cadmium | 3.8774 | 0 | 3.25E+00 | 4.07E+01 | 2.14E+01 | 2.000E+01 | 1.1 |
| Chromium | 8.2763 | 0.002675 | 7.50E-03 | 3.16E+00 | 3.64E+00 | 5.000E+00 | 0.7 |
| Cobalt | 1.0782 | 0 | 2.00E-02 | 1.00E+00 | 1.65E-01 | NA | NA |
| Copper | 10.7045 | 0 | 6.25E-01 | 1.53E+00 | 2.56E+00 | 6.170E+01 | 0.0 |
| Iron | 6779.4737 | 0.2041 | 4.00E-03 | 1.00E-01 | 2.21E+02 | NA | NA |
| Lead | 16.4105 | 0 | 4.68E-01 | 1.52E+00 | 3.84E+00 | 3.850E+01 | 0.1 |
| Manganese | 134.5053 | 0.0491 | 2.50E-01 | 1.24E-01 | 5.72E+00 | 9.770E+03 | 0.0 |
| Mercury | 0.5995 | 0 | 5.00E+00 | 2.06E+01 | 1.73E+00 | 9.000E-01 | 1.9 |
| Nickel | 2.8263 | 0 | 1.41E+00 | 4.73E+00 | 1.94E+00 | 1.070E+02 | 0.0 |
| Selenium | 0.3495 | 0 | 3.01E+00 | 1.34E+00 | 9.72E-02 | 1.000E+00 | 0.1 |
| Silver | 0.28 | 0 | 4.00E-01 | 1.00E+00 | 4.56E-02 | NA | NA |
| Thallium | 0.3718 | 0 | 4.00E-03 | 1.00E+00 | 5.66E-02 | NA | NA |
| Vanadium | 10.5289 | 0.002325 | 5.50E-03 | 8.80E-02 | 3.28E-01 | 1.140E+02 | 0.0 |
| Zinc | 522.9316 | 0 | 1.82E+00 | 1.29E+01 | 9.31E+02 | 1.310E+02 | 7.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil to Plant Transfer Coefficient (Bv) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 1.15E-02 | 2.00E+00 | 3.89E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 4.80E-03 | 1.06E+01 | 5.46E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 6.50E-03 | 7.00E-01 | 5.52E-04 | 8.800E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 6.80E-03 | 1.00E+00 | 4.08E-04 | NA | NA |
| alpha-Chlordane | 0.0020658 | 0 | 8.90E-03 | 3.00E+00 | 8.63E-04 | 1.070E+01 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 3.05E-02 | 8.00E+00 | 6.14E-03 | NA | NA |
| Endrin | 0.0063684 | 0 | 4.61E-02 | 1.00E+00 | 9.76E-04 | 1.000E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.89E-01 | 1.00E+00 | 1.49E-04 | 1.000E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 2.70E-01 | 1.00E+00 | 4.61E-04 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 8.60E-03 | 3.00E+00 | 8.24E-04 | 1.070E+01 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 9.30E-03 | 1.00E+01 | 3.90E-03 | NA | NA |
| Heptachlor Epoxide | 0.00034 | 0 | 4.99E-02 | 1.00E+01 | 4.58E-04 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 4.48E-02 | 1.00E+00 | 4.29E-04 | NA | NA |
| Acenaphthylene | 0.11 | 0 | 1.65E-01 | 2.20E-01 | 5.82E-03 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.97E-02 | 2.70E-01 | 1.11E-02 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.14E-02 | 3.40E-01 | 9.06E-03 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.3307895 | 0 | 1.01E-02 | 2.10E-01 | 1.57E-02 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 5.20E-03 | 1.50E-01 | 4.33E-03 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.01E-02 | 2.10E-01 | 1.04E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1947895 | 0.0205 | 2.30E-03 | 1.00E+00 | 3.24E-02 | 1.100E+01 | 0.0 |
| Butylbenzylphthalate | 0.3925263 | 0 | 6.17E-02 | 1.00E+00 | 6.03E-02 | NA | NA |
| Chrysene | 0.26 | 0 | 1.97E-02 | 4.40E-01 | 2.03E-02 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 8.38E-02 | 1.00E+00 | 5.56E-02 | 1.100E+00 | 0.1 |
| Fluoranthene | 0.27 | 0 | 4.25E-02 | 3.70E-01 | 1.88E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 5.60E-03 | 4.10E-01 | 9.60E-03 | 1.000E+02 | 0.0 |
| Pyrene | 0.26 | 0 | 4.31E-02 | 3.90E-01 | 1.88E-02 | 1.000E+02 | 0.0 |
| Styrene | 0.001 | 0 | 7.74E-01 | 1.00E+00 | 1.73E-04 | NA | NA |
| Toluene | 0.003 | 0 | 9.97E-01 | 1.00E+00 | 5.36E-04 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 1.00E+00 | 9.68E-04 | 4.695E-01 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 1.00E+00 | 2.71E-04 | 4.695E-01 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 1.00E+00 | 3.48E-04 | 4.695E-01 | 0.0 |
| Aldrin | 0.0026816 | 0 | 1.00E+00 | 1.90E-04 | 1.174E-01 | 0.0 |
| alpha-Chlordane | 0.0020658 | 0 | 1.00E+00 | 1.47E-04 | 1.461E+00 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 1.00E+00 | 4.03E-04 | NA | NA |
| Endrin | 0.0063684 | 0 | 1.00E+00 | 4.52E-04 | 2.922E-02 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.00E+00 | 6.74E-05 | 2.922E-02 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 1.00E+00 | 2.05E-04 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 1.00E+00 | 1.40E-04 | 1.461E+00 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 1.00E+00 | 2.05E-04 | 7.630E-02 | 0.0 |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+00 | 2.41E-05 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 1.99E-04 | 2.348E+00 | 0.0 |
| Acenaphthylene | 0.11 | 0 | 1.00E+00 | 7.80E-03 | 4.128E-01 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.00E+00 | 1.42E-02 | 4.128E-01 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.00E+00 | 9.93E-03 | 3.176E-01 | 0.0 |
| Benzo(b)fluoranthene | 0.3307895 | 0 | 1.00E+00 | 2.35E-02 | 4.128E-01 | 0.1 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 1.00E+00 | 7.80E-03 | 4.128E-01 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.00E+00 | 1.56E-02 | 4.128E-01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1947895 | 0 | 1.00E+00 | 1.38E-02 | 5.811E+00 | 0.0 |
| Butylbenzylphthalate | 0.3925263 | 0 | 1.00E+00 | 2.78E-02 | NA | NA |
| Chrysene | 0.26 | 0 | 1.00E+00 | 1.84E-02 | 4.128E-01 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 2.55E-02 | 1.747E+02 | 0.0 |
| Fluoranthene | 0.27 | 0 | 1.00E+00 | 1.92E-02 | 4.128E-01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 1.00E+00 | 9.22E-03 | 4.128E-01 | 0.0 |
| Pyrene | 0.26 | 0 | 1.00E+00 | 1.84E-02 | 4.128E-01 | 0.0 |
| Styrene | 0.001 | 0 | 1.00E+00 | 7.09E-05 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 2.13E-04 | 8.257E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Short-Tailed Shrew | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 4.663E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.943E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | #N/A |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.152E-01 | |
| FI | Food ingestion rate (kg/day) | 1.943E-02 | |
| WI | Water ingestion rate (L/day) | 8.621E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 6424.1053 | 0.11325 | 2.00E-01 | 1.30E+02 | 1.179E+01 | 11.0 |
| Arsenic | 2.4882 | 0 | 5.23E-01 | 1.23E-01 | 7.700E-01 | 0.2 |
| Barium | 12.6684 | 0.0169 | 3.60E-01 | 4.46E-01 | 2.236E+01 | 0.0 |
| Beryllium | 0.1495 | 0 | 1.00E+00 | 1.38E-02 | 7.454E+00 | 0.0 |
| Cadmium | 3.8774 | 0 | 4.07E+01 | 1.43E+01 | 1.089E+01 | 1.3 |
| Chromium | 8.2763 | 0.002675 | 3.16E+00 | 2.38E+00 | 3.091E+04 | 0.0 |
| Cobalt | 1.0782 | 0 | 1.00E+00 | 9.97E-02 | NA | NA |
| Copper | 10.7045 | 0 | 1.53E+00 | 1.50E+00 | 2.223E+01 | 0.1 |
| Iron | 6779.4737 | 0.2041 | 1.00E-01 | 7.60E+01 | NA | NA |
| Lead | 16.4105 | 0 | 1.52E+00 | 2.29E+00 | 9.035E+01 | 0.0 |
| Manganese | 134.5053 | 0.0491 | 1.24E-01 | 1.82E+00 | 3.207E+02 | 0.0 |
| Mercury | 0.5995 | 0 | 2.06E+01 | 1.12E+00 | 1.468E+01 | 0.1 |
| Nickel | 2.8263 | 0 | 4.73E+00 | 1.21E+00 | 9.035E+01 | 0.0 |
| Selenium | 0.3495 | 0 | 1.34E+00 | 4.31E-02 | 3.727E-01 | 0.1 |
| Silver | 0.28 | 0 | 1.00E+00 | 2.59E-02 | NA | NA |
| Thallium | 0.3718 | 0 | 1.00E+00 | 3.44E-02 | 8.445E-02 | 0.4 |
| Vanadium | 10.5289 | 0.002325 | 8.80E-02 | 1.07E-01 | 2.202E+00 | 0.0 |
| Zinc | 522.9316 | 0 | 1.29E+01 | 6.10E+02 | 3.614E+02 | 1.7 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 2.00E+00 | 2.49E-03 | 9.035E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 1.06E+01 | 3.67E-03 | 9.035E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 7.00E-01 | 3.21E-04 | 9.035E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 1.00E+00 | 2.48E-04 | 1.129E+00 | 0.0 |
| alpha-Chlordane | 0.0020658 | 0 | 1.00E+00 | 1.91E-04 | 5.622E+00 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 5.84E+00 | 3.01E-03 | NA | NA |
| Endrin | 0.0063684 | 0 | 1.00E+00 | 5.89E-04 | 5.622E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 5.70E-01 | 5.09E-05 | 5.622E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 1.00E+00 | 2.67E-04 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 1.00E+00 | 1.82E-04 | 5.622E+00 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 1.00E+00 | 2.67E-04 | 1.468E+00 | 0.0 |
| Heptachlor Epoxide | 0.00034 | 0 | 1.00E+00 | 3.14E-05 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 1.00E+00 | 2.59E-04 | 9.035E+00 | 0.0 |
| **Organics** | | | | | | |
| Acenaphthylene | 0.11 | 0 | 1.50E-02 | 3.87E-04 | 1.589E+00 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 8.70E-01 | 1.61E-02 | 1.589E+00 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 9.40E-02 | 1.49E-03 | 6.111E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.3307895 | 0 | 1.20E-01 | 4.30E-03 | 1.589E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 3.50E-02 | 5.86E-04 | 1.589E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 4.60E-02 | 1.39E-03 | 1.589E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1947895 | 0.0205 | 1.00E+00 | 2.62E-02 | 1.118E+02 | 0.0 |
| Butylbenzylphthalate | 0.3925263 | 0 | 1.00E+00 | 3.63E-02 | NA | NA |
| Chrysene | 0.26 | 0 | 2.00E-01 | 5.26E-03 | 1.589E+00 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 1.00E+00 | 3.33E-02 | 1.120E+03 | 0.0 |
| Fluoranthene | 0.27 | 0 | 3.80E-01 | 9.85E-03 | 1.589E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 1.60E-02 | 4.70E-04 | 1.589E+00 | 0.0 |
| Pyrene | 0.26 | 0 | 3.40E-01 | 8.55E-03 | 1.589E+00 | 0.0 |
| Styrene | 0.001 | 0 | 1.00E+00 | 9.25E-05 | NA | NA |
| Toluene | 0.003 | 0 | 1.00E+00 | 2.77E-04 | 1.589E+02 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Cm = (((Cs*Bv*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*Bv*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Soil to plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 1.038E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 2.075E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 3.113E-03 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.533E-02 | |
| FI | Food Ingestion Rate (kg/day) | 5.188E-03 | |
| WI | Water ingestion rate (L/day) | 7.112E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil - Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 6424.1053 | 0.11325 | 4.00E-03 | 2.00E-01 | 1.87E+02 | 2.147E+00 | 86.9 |
| Arsenic | 2.4882 | 0 | 1.10E+00 | 5.23E-01 | 3.95E-01 | 1.401E-01 | 2.8 |
| Barium | 12.6684 | 0.0169 | 1.50E-01 | 3.60E-01 | 8.15E-01 | 1.107E+01 | 0.1 |
| Beryllium | 0.1495 | 0 | 1.00E-02 | 1.00E+00 | 1.91E-02 | 1.357E+00 | 0.0 |
| Cadmium | 3.8774 | 0 | 3.25E+00 | 4.07E+01 | 2.04E+01 | 1.983E+00 | 10.3 |
| Chromium | 8.2763 | 0.002675 | 7.50E-03 | 3.16E+00 | 3.26E+00 | 5.626E+03 | 0.0 |
| Cobalt | 1.0782 | 0 | 2.00E-02 | 1.00E+00 | 1.39E-01 | NA | NA |
| Copper | 10.7045 | 0 | 6.25E-01 | 1.53E+00 | 2.61E+00 | 3.127E+01 | 0.1 |
| Iron | 6779.4737 | 0.2041 | 4.00E-03 | 1.00E-01 | 1.14E+02 | NA | NA |
| Lead | 16.4105 | 0 | 4.68E-01 | 1.52E+00 | 3.77E+00 | 1.645E+01 | 0.2 |
| Manganese | 134.5053 | 0.0491 | 2.50E-01 | 1.24E-01 | 5.49E+00 | 1.809E+02 | 0.0 |
| Mercury | 0.5995 | 0 | 5.00E+00 | 2.06E+01 | 1.77E+00 | 2.673E+00 | 0.7 |
| Nickel | 2.8263 | 0 | 1.41E+00 | 4.73E+00 | 1.98E+00 | 8.223E+01 | 0.0 |
| Selenium | 0.3495 | 0 | 3.01E+00 | 1.34E+00 | 1.45E-01 | 4.111E-01 | 0.4 |
| Silver | 0.28 | 0 | 4.00E-01 | 1.00E+00 | 4.47E-02 | NA | NA |
| Thallium | 0.3718 | 0 | 4.00E-03 | 1.00E+00 | 4.73E-02 | 1.537E-02 | 3.1 |
| Vanadium | 10.5289 | 0.002325 | 5.50E-03 | 8.80E-02 | 1.68E-01 | 4.008E-01 | 0.4 |
| Zinc | 522.9316 | 0 | 1.82E+00 | 1.29E+01 | 9.08E+02 | 3.289E+02 | 2.8 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
LESS CONSERVATIVE ASSUMPTIONS
SITE 21 - BATTERY AND DRUM DISPOSAL AREA
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil - Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDD | 0.0136421 | 0 | 1.15E-02 | 2.00E+00 | 3.42E-03 | 1.645E+00 | 0.0 |
| 4,4'-DDE | 0.0038247 | 0 | 4.80E-03 | 1.06E+01 | 5.00E-03 | 1.645E+00 | 0.0 |
| 4,4'-DDT | 0.0049113 | 0 | 6.50E-03 | 7.00E-01 | 4.45E-04 | 1.645E+00 | 0.0 |
| Aldrin | 0.0026816 | 0 | 6.80E-03 | 1.00E+00 | 3.42E-04 | 4.111E-01 | 0.0 |
| alpha-Chlordane | 0.0020658 | 0 | 8.90E-03 | 3.00E+00 | 7.71E-04 | 5.117E+00 | 0.0 |
| Dieldrin | 0.0056761 | 0 | 3.05E-02 | 8.00E+00 | 5.62E-03 | NA | NA |
| Endrin | 0.0063684 | 0 | 4.61E-02 | 1.00E+00 | 8.33E-04 | 1.023E-01 | 0.0 |
| Endrin Ketone | 0.00095 | 0 | 1.89E-01 | 1.00E+00 | 1.35E-04 | 1.023E-01 | 0.0 |
| Gamma-BHC (Lindane) | 0.0028921 | 0 | 2.70E-01 | 1.00E+00 | 4.31E-04 | NA | NA |
| Gamma-Chlordane | 0.0019711 | 0 | 8.60E-03 | 3.00E+00 | 7.36E-04 | 5.117E+00 | 0.0 |
| Heptachlor | 0.0028921 | 0 | 9.30E-03 | 1.00E+01 | 3.57E-03 | 2.673E-01 | 0.0 |
| Heptachlor Epoxide | 0.00034 | 0 | 4.99E-02 | 1.00E+01 | 4.21E-04 | NA | NA |
| Methoxychlor | 0.0028 | 0 | 4.48E-02 | 1.00E+00 | 3.66E-04 | 8.223E+00 | 0.0 |
| Acenaphthylene | 0.11 | 0 | 1.65E-01 | 2.20E-01 | 4.91E-03 | 1.446E+00 | 0.0 |
| Benzo(a)anthracene | 0.2 | 0 | 1.97E-02 | 2.70E-01 | 7.78E-03 | 1.446E+00 | 0.0 |
| Benzo(a)pyrene | 0.14 | 0 | 1.14E-02 | 3.40E-01 | 6.55E-03 | 1.112E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.3307895 | 0 | 1.01E-02 | 2.10E-01 | 1.02E-02 | 1.446E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.11 | 0 | 5.20E-03 | 1.50E-01 | 2.52E-03 | 1.446E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.22 | 0 | 1.01E-02 | 2.10E-01 | 6.76E-03 | 1.446E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1947895 | 0.0205 | 2.30E-03 | 1.00E+00 | 8.23E-02 | 2.035E+01 | 0.0 |
| Butylbenzylphthalate | 0.3925263 | 0 | 6.17E-02 | 1.00E+00 | 5.18E-02 | NA | NA |
| Chrysene | 0.26 | 0 | 1.97E-02 | 4.40E-01 | 1.55E-02 | 1.446E+00 | 0.0 |
| Di-n-butylphthalate | 0.36 | 0 | 8.38E-02 | 1.00E+00 | 4.82E-02 | 6.118E+02 | 0.0 |
| Fluoranthene | 0.27 | 0 | 4.25E-02 | 3.70E-01 | 1.43E-02 | 1.446E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.13 | 0 | 5.60E-03 | 4.10E-01 | 7.14E-03 | 1.446E+00 | 0.0 |
| Pyrene | 0.26 | 0 | 4.31E-02 | 3.90E-01 | 1.44E-02 | 1.446E+00 | 0.0 |
| Styrene | 0.001 | 0 | 7.74E-01 | 1.00E+00 | 1.90E-04 | NA | NA |
| Toluene | 0.003 | 0 | 9.97E-01 | 1.00E+00 | 6.26E-04 | 2.892E+01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ ≥ 1.0.

# APPENDIX L.4
# AQUATIC RECEPTOR MODELS, FRESHWATER STSTIONS
# SITES 4 , 21, AND 22

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE GREAT BLUE HERON**
**CONSERVATIVE ASSUMPTIONS**
**SITES 4, 21, AND 22 - FRESHWATER STATIONS**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Great Blue Heron | |
|---|---|---|---|
| Cs | Constituent concentration in Sediment | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Sediment to fish bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of Sediment (kg/day) | 9.037E-03 | |
| If | Rate of fish ingestion (kg/day) | 4.518E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.204E+00 | |
| FI | Food ingestion rate (kg/day) | 4.518E-01 | |
| WI | Water ingestion rate (L/day) | 1.112E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Sediment (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Sediment - Fish BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 23900 | 0.147 | 1.00E+00 | 5.00E+03 | 1.097E+02 | 45.6 |
| Antimony | 12.9 | 0 | 1.00E+00 | 2.70E+00 | NA | NA |
| Arsenic | 1.7 | 0 | 1.26E-01 | 5.09E-02 | 5.140E+00 | 0.0 |
| Barium | 22.7 | 0.0308 | 1.00E+00 | 4.75E+00 | 2.080E+01 | 0.2 |
| admium | 0.76 | 0 | 1.64E-01 | 2.87E-02 | 1.450E+00 | 0.0 |
| Chromium | 9.1 | 0.0037 | 3.80E-02 | 1.08E-01 | 1.000E+00 | 0.1 |
| Cobalt | 2.4 | 0 | 1.00E+00 | 5.02E-01 | NA | NA |
| Copper | 23.3 | 0 | 1.00E-01 | 5.73E-01 | 4.700E+01 | 0.0 |
| Iron | 5720 | 0.336 | 1.00E+00 | 1.20E+03 | NA | NA |
| Lead | 9.9 | 0 | 7.00E-02 | 1.83E-01 | 3.850E+00 | 0.0 |
| Manganese | 29.7 | 0.0947 | 1.00E+00 | 6.22E+00 | 9.770E+02 | 0.0 |
| Mercury | 0.24 | 0 | 4.58E+00 | 2.26E-01 | 4.500E-01 | 0.5 |
| Nickel | 4.7 | 0 | 1.00E+00 | 9.83E-01 | 7.740E+01 | 0.0 |
| Vanadium | 11.3 | 0.0034 | 1.00E+00 | 2.36E+00 | 1.140E+01 | 0.2 |
| Zinc | 26.8 | 0 | 1.47E-01 | 9.18E-01 | 1.450E+01 | 0.1 |
| ORGANICS | | | | | | |
| Benzo(a)pyrene | 87 | 0 | 1.00E+00 | 1.82E+01 | NA | NA |
| Benzo(b)fluoranthene | 170 | 0 | 1.00E+00 | 3.55E+01 | NA | NA |
| Benzo(g,h,i)perylene | 55 | 0 | 1.00E+00 | 1.15E+01 | NA | NA |
| Benzo(k)fluoranthene | 52 | 0 | 1.00E+00 | 1.09E+01 | NA | NA |
| Bis-(2-Ethylhexyl)phthalate | 150 | 0 | 1.00E+00 | 3.14E+01 | 1.100E+00 | 28.5 |
| Chrysene | 90 | 0 | 1.00E+00 | 1.88E+01 | NA | NA |
| Indeno(1,2,3-cd)pyrene | 70 | 0 | 1.00E+00 | 1.46E+01 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MINK**
**CONSERVATIVE ASSUMPTIONS**
**SITES 4, 21, AND 22 - FRESHWATER STATIONS**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Mink | |
|---|---|---|---|
| Cs | Constituent concentration in Sediment | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Sediment to fish bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of Sediment (kg/day) | 1.973E-02 | |
| If | Rate of fish ingestion (kg/day) | 1.973E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 5.500E-01 | |
| FI | Food ingestion rate (kg/day) | 1.973E-01 | |
| WI | Water ingestion rate (L/day) | 1.009E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Sediment (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Sediment - Fish BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 23900 | 0.147 | 1.00E+00 | 9.43E+03 | 9.327E-01 | 10110.3 |
| Antimony | 12.9 | 0 | 1.00E+00 | 5.09E+00 | 6.041E-02 | 84.3 |
| Arsenic | 1.7 | 0 | 1.26E-01 | 1.38E-01 | 6.089E-02 | 2.3 |
| Barium | 22.7 | 0.0308 | 1.00E+00 | 8.96E+00 | 4.810E+00 | 1.9 |
| Cadmium | 0.76 | 0 | 1.64E-01 | 7.20E-02 | 8.615E-01 | 0.1 |
| Chromium | 9.1 | 0.0037 | 3.80E-02 | 4.51E-01 | 2.445E+03 | 0.0 |
| Cobalt | 2.4 | 0 | 1.00E+00 | 9.47E-01 | NA | NA |
| Copper | 23.3 | 0 | 1.00E-01 | 1.67E+00 | 1.359E+01 | 0.1 |
| Iron | 5720 | 0.336 | 1.00E+00 | 2.26E+03 | NA | NA |
| Lead | 9.9 | 0 | 7.00E-02 | 6.04E-01 | 7.145E+00 | 0.1 |
| Manganese | 29.7 | 0.0947 | 1.00E+00 | 1.17E+01 | 7.860E+01 | 0.1 |
| Mercury | 0.24 | 0 | 4.58E+00 | 4.03E-01 | 1.161E+00 | 0.3 |
| Nickel | 4.7 | 0 | 1.00E+00 | 1.85E+00 | 3.573E+01 | 0.1 |
| Vanadium | 11.3 | 0.0034 | 1.00E+00 | 4.46E+00 | 1.741E-01 | 25.6 |
| Zinc | 26.8 | 0 | 1.47E-01 | 2.37E+00 | 1.429E+02 | 0.0 |
| ORGANICS | | | | | | |
| Benzo(a)pyrene | 87 | 0 | 1.00E+00 | 3.43E+01 | 4.833E-01 | 71.0 |
| Benzo(b)fluoranthene | 170 | 0 | 1.00E+00 | 6.71E+01 | NA | NA |
| Benzo(g,h,i)perylene | 55 | 0 | 1.00E+00 | 2.17E+01 | NA | NA |
| Benzo(k)fluoranthene | 52 | 0 | 1.00E+00 | 2.05E+01 | NA | NA |
| Bis-(2-Ethylhexyl)phthalate | 150 | 0 | 1.00E+00 | 5.92E+01 | 8.844E+00 | 6.7 |
| Chrysene | 90 | 0 | 1.00E+00 | 3.55E+01 | NA | NA |
| Indeno(1,2,3-cd)pyrene | 70 | 0 | 1.00E+00 | 2.76E+01 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE GREAT BLUE HERON
ESS CONSERVATIVE ASSUMPTIONS
SITES 4, 21, AND 22 - FRESHWATER STATIONS
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Great Blue Heron | |
|---|---|---|---|
| Cs | Constituent concentration in Sediment | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Sediment to fish bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of Sediment (kg/day) | 7.858E-03 | |
| If | Rate of fish ingestion (kg/day) | 3.929E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.229E+00 | |
| FI | Food ingestion rate (kg/day) | 3.929E-01 | |
| WI | Water ingestion rate (L/day) | 1.009E-01 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Sediment (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Water - Fish BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| **INORGANICS** | | | | | | |
| Aluminum | 13057.5 | 0.11325 | 1.00E+00 | 2.35E+03 | 1.097E+03 | 2.1 |
| Antimony | 8.4 | 0 | 1.00E+00 | 1.51E+00 | NA | NA |
| Arsenic | 1.115 | 0 | 1.26E-01 | 2.87E-02 | 1.284E+01 | 0.0 |
| Barium | 12.9 | 0.0169 | 1.00E+00 | 2.32E+00 | 4.170E+01 | 0.1 |
| Cadmium | 0.41 | 0 | 1.64E-01 | 1.33E-02 | 2.000E+01 | 0.0 |
| Chromium | 5.8625 | 0.002675 | 3.80E-02 | 6.01E-02 | 5.000E+00 | 0.0 |
| Cobalt | 1.85 | 0 | 1.00E+00 | 3.33E-01 | NA | NA |
| Copper | 13.725 | 0 | 1.00E-01 | 2.90E-01 | 6.170E+01 | 0.0 |
| Iron | 3642.5 | 0.2041 | 1.00E+00 | 6.55E+02 | NA | NA |
| Lead | 5.55 | 0 | 7.00E-02 | 8.80E-02 | 3.850E+01 | 0.0 |
| Manganese | 18.8 | 0.0491 | 1.00E+00 | 3.38E+00 | 9.770E+03 | 0.0 |
| Mercury | 0.08 | 0 | 4.58E+00 | 6.49E-02 | 9.000E-01 | 0.1 |
| Nickel | 2.9 | 0 | 1.00E+00 | 5.21E-01 | 1.070E+02 | 0.0 |
| Vanadium | 7.275 | 0.002325 | 1.00E+00 | 1.31E+00 | 1.140E+02 | 0.0 |
| Zinc | 19.825 | 0 | 1.47E-01 | 5.84E-01 | 1.310E+02 | 0.0 |
| **ORGANICS** | | | | | | |
| Benzo(a)pyrene | 87 | 0 | 1.00E+00 | 1.56E+01 | NA | NA |
| Benzo(b)fluoranthene | 170 | 0 | 1.00E+00 | 3.06E+01 | NA | NA |
| Benzo(g,h,i)perylene | 55 | 0 | 1.00E+00 | 9.89E+00 | NA | NA |
| Benzo(k)fluoranthene | 52 | 0 | 1.00E+00 | 9.35E+00 | NA | NA |
| Bis-(2-Ethylhexyl)phthalate | 150 | 0 | 1.00E+00 | 2.70E+01 | 1.100E+01 | 2.5 |
| Chrysene | 90 | 0 | 1.00E+00 | 1.62E+01 | NA | NA |
| Indeno(1,2,3-cd)pyrene | 70 | 0 | 1.00E+00 | 1.26E+01 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MINK
CSS CONSERVATIVE ASSUMPTIONS
ATES 4, 21, AND 22 - FRESHWATER STATIONS
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Mink | |
|---|---|---|---|
| Cs | Constituent concentration in Sediment | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Sediment to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of Sediment (kg/day) | 1.051E-02 | |
| If | Rate of fish ingestion (kg/day) | 1.051E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 7.510E-01 | |
| FI | Food ingestion rate (kg/day) | 1.051E-01 | |
| WI | Water ingestion rate (L/day) | 9.648E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Sediment (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Sediment - Fish BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| **INORGANICS** | | | | | | |
| Aluminum | 13057.5 | 0.11325 | 1.00E+00 | 2.01E+03 | 8.628E+00 | 233.1 |
| Antimony | 8.4 | 0 | 1.00E+00 | 1.29E+00 | 5.588E-01 | 2.3 |
| Arsenic | 1.115 | 0 | 1.26E-01 | 3.53E-02 | 5.633E-01 | 0.1 |
| Barium | 12.9 | 0.0169 | 1.00E+00 | 1.99E+00 | 1.636E+01 | 0.1 |
| Cadmium | 0.41 | 0 | 1.64E-01 | 1.52E-02 | 7.970E+00 | 0.0 |
| Chromium | 5.8625 | 0.002675 | 3.80E-02 | 1.14E-01 | 2.261E+04 | 0.0 |
| Cobalt | 1.85 | 0 | 1.00E+00 | 2.85E-01 | NA | NA |
| Copper | 13.725 | 0 | 1.00E-01 | 3.84E-01 | 1.626E+01 | 0.0 |
| Iron | 3642.5 | 0.2041 | 1.00E+00 | 5.61E+02 | NA | NA |
| Lead | 5.55 | 0 | 7.00E-02 | 1.32E-01 | 6.610E+01 | 0.0 |
| Manganese | 18.8 | 0.0491 | 1.00E+00 | 2.90E+00 | 2.347E+02 | 0.0 |
| Mercury | 0.08 | 0 | 4.58E+00 | 5.24E-02 | 1.074E+01 | 0.0 |
| Nickel | 2.9 | 0 | 1.00E+00 | 4.47E-01 | 6.610E+01 | 0.0 |
| Vanadium | 7.275 | 0.002325 | 1.00E+00 | 1.12E+00 | 1.611E+00 | 0.7 |
| Zinc | 19.825 | 0 | 1.47E-01 | 6.86E-01 | 2.644E+02 | 0.0 |
| **ORGANICS** | | | | | | |
| Benzo(a)pyrene | 87 | 0 | 1.00E+00 | 1.34E+01 | 4.471E+00 | 3.0 |
| Benzo(b)fluoranthene | 170 | 0 | 1.00E+00 | 2.62E+01 | NA | NA |
| Benzo(g,h,i)perylene | 55 | 0 | 1.00E+00 | 8.47E+00 | NA | NA |
| Benzo(k)fluoranthene | 52 | 0 | 1.00E+00 | 8.01E+00 | NA | NA |
| Bis-(2-Ethylhexyl)phthalate | 150 | 0 | 1.00E+00 | 2.31E+01 | 8.181E+01 | 0.3 |
| Chrysene | 90 | 0 | 1.00E+00 | 1.39E+01 | NA | NA |
| Indeno(1,2,3-cd)pyrene | 70 | 0 | 1.00E+00 | 1.08E+01 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

# APPENDIX L.5
# AQUATIC RECEPTOR MODELS, TIDAL FRESHWATER STATIONS
# SITES 4, 21, AND 22

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE GREAT BLUE HERON**
**CONSERVATIVE ASSUMPTIONS**
**SITES 4, 21, AND 22 - TIDAL FRESHWATER STATIONS**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Great Blue Heron | |
|---|---|---|---|
| Cs | Constituent concentration in Sediment | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Sediment to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of Sediment (kg/day) | 9.037E-03 | |
| If | Rate of fish ingestion (kg/day) | 4.518E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.204E+00 | |
| FI | Food ingestion rate (kg/day) | 4.518E-01 | |
| WI | Water ingestion rate (L/day) | 1.112E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Sediment (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Sediment - Fish BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 26600 | 1.67 | 1.00E+00 | 5.56E+03 | 1.097E+02 | 50.7 |
| Antimony | 26.7 | 0.0249 | 1.00E+00 | 5.58E+00 | NA | NA |
| Arsenic | 18.6 | 0.003 | 1.26E-01 | 5.57E-01 | 5.140E+00 | 0.1 |
| Barium | 50.5 | 0.0294 | 1.00E+00 | 1.06E+01 | 2.080E+01 | 0.5 |
| Beryllium | 0.54 | 0 | 1.00E+00 | 1.13E-01 | NA | NA |
| Cadmium | 4.4 | 0.0036 | 1.64E-01 | 1.66E-01 | 1.450E+00 | 0.1 |
| Chromium | 51.1 | 0.0054 | 3.80E-02 | 6.08E-01 | 1.000E+00 | 0.6 |
| Cobalt | 11.9 | 0.0038 | 1.00E+00 | 2.49E+00 | NA | NA |
| Copper | 46.5 | 0.0021 | 1.00E-01 | 1.14E+00 | 4.700E+01 | 0.0 |
| Iron | 45300 | 1.99 | 1.00E+00 | 9.47E+03 | NA | NA |
| Lead | 188 | 0.0013 | 7.00E-02 | 3.47E+00 | 3.850E+00 | 0.9 |
| Manganese | 447 | 0.242 | 1.00E+00 | 9.35E+01 | 9.770E+02 | 0.1 |
| Mercury | 0.18 | 0 | 4.58E+00 | 1.70E-01 | 4.500E-01 | 0.4 |
| Nickel | 35.3 | 0 | 1.00E+00 | 7.38E+00 | 7.740E+01 | 0.1 |
| Selenium | 1.3 | 0 | 1.00E+00 | 2.72E-01 | 5.000E-01 | 0.5 |
| Silver | 3.3 | 0 | 1.00E+00 | 6.90E-01 | NA | NA |
| Thallium | 0.78 | 0 | 1.00E+00 | 1.63E-01 | NA | NA |
| Vanadium | 79.9 | 0.0051 | 1.00E+00 | 1.67E+01 | 1.140E+01 | 1.5 |
| Zinc | 185 | 0 | 1.47E-01 | 6.33E+00 | 1.450E+01 | 0.4 |
| ORGANICS | | | | | | |
| 4,4'-DDD | 6.2 | 0 | 2.61E+00 | 3.34E+00 | NA | NA |
| 4,4'-DDE | 3 | 0 | 2.04E+01 | 1.26E+01 | NA | NA |
| alpha-Chlordane | 3.8 | 0 | 1.00E+00 | 7.95E-01 | 2.140E+00 | 0.4 |
| Gamma-Chlordane | 3.2 | 0 | 1.00E+00 | 6.69E-01 | 2.140E+00 | 0.3 |
| Benzo(b)fluoranthene | 140 | 0 | 1.00E+00 | 2.93E+01 | NA | NA |
| Di-n-butylphthalate | 200 | 0 | 1.00E+00 | 4.18E+01 | 1.100E-01 | 380.2 |
| Fluoranthene | 160 | 0 | 1.00E+00 | 3.35E+01 | NA | NA |
| Pyrene | 180 | 0 | 1.00E+00 | 3.76E+01 | NA | NA |
| Tetrachloroethene | 19 | 0 | 1.00E+00 | 3.97E+00 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MINK
CONSERVATIVE ASSUMPTIONS
SITES 4, 21, AND 22 - TIDAL FRESHWATER STATIONS
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Mink | |
|---|---|---|---|
| Cs | Constituent concentration in Sediment | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Sediment to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of Sediment (kg/day) | 1.973E-02 | |
| If | Rate of fish ingestion (kg/day) | 1.973E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 5.500E-01 | |
| FI | Food ingestion rate (kg/day) | 1.973E-01 | |
| WI | Water ingestion rate (L/day) | 1.009E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Sediment (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Sediment - Fish BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 26600 | 1.67 | 1.00E+00 | 1.05E+04 | 9.327E-01 | 11252.8 |
| Antimony | 26.7 | 0.0249 | 1.00E+00 | 1.05E+01 | 6.041E-02 | 174.5 |
| Arsenic | 18.6 | 0.003 | 1.26E-01 | 1.51E+00 | 6.089E-02 | 24.8 |
| Barium | 50.5 | 0.0294 | 1.00E+00 | 1.99E+01 | 4.810E+00 | 4.1 |
| Beryllium | 0.54 | 0 | 1.00E+00 | 2.13E-01 | 5.895E-01 | 0.4 |
| Cadmium | 4.4 | 0.0036 | 1.64E-01 | 4.17E-01 | 8.615E-01 | 0.5 |
| Chromium | 51.1 | 0.0054 | 3.80E-02 | 2.53E+00 | 2.445E+03 | 0.0 |
| Cobalt | 11.9 | 0.0038 | 1.00E+00 | 4.70E+00 | NA | NA |
| Copper | 46.5 | 0.0021 | 1.00E-01 | 3.34E+00 | 1.359E+01 | 0.2 |
| Iron | 45300 | 1.99 | 1.00E+00 | 1.79E+04 | NA | NA |
| Lead | 188 | 0.0013 | 7.00E-02 | 1.15E+01 | 7.145E+00 | 1.6 |
| Manganese | 447 | 0.242 | 1.00E+00 | 1.76E+02 | 7.860E+01 | 2.2 |
| Mercury | 0.18 | 0 | 4.58E+00 | 3.02E-01 | 1.161E+00 | 0.3 |
| Nickel | 35.3 | 0 | 1.00E+00 | 1.39E+01 | 3.573E+01 | 0.4 |
| Selenium | 1.3 | 0 | 1.00E+00 | 5.13E-01 | 1.786E-01 | 2.9 |
| Silver | 3.3 | 0 | 1.00E+00 | 1.30E+00 | NA | NA |
| Thallium | 0.78 | 0 | 1.00E+00 | 3.08E-01 | 6.679E-03 | 46.1 |
| Vanadium | 79.9 | 0.0051 | 1.00E+00 | 3.15E+01 | 1.741E-01 | 181.1 |
| Zinc | 185 | 0 | 1.47E-01 | 1.64E+01 | 1.429E+02 | 0.1 |
| ORGANICS | | | | | | |
| 4,4'-DDD | 6.2 | 0 | 2.61E+00 | 6.03E+00 | NA | NA |
| 4,4'-DDE | 3 | 0 | 2.04E+01 | 2.20E+01 | NA | NA |
| alpha-Chlordane | 3.8 | 0 | 1.00E+00 | 1.50E+00 | 2.223E+00 | 0.7 |
| Gamma-Chlordane | 3.2 | 0 | 1.00E+00 | 1.26E+00 | 2.223E+00 | 0.6 |
| Benzo(b)fluoranthene | 140 | 0 | 1.00E+00 | 5.52E+01 | NA | NA |
| Di-n-butylphthalate | 200 | 0 | 1.00E+00 | 7.89E+01 | 2.658E+02 | 0.3 |
| Fluoranthene | 160 | 0 | 1.00E+00 | 6.31E+01 | NA | NA |
| Pyrene | 180 | 0 | 1.00E+00 | 7.10E+01 | NA | NA |
| Tetrachloroethene | 19 | 0 | 1.00E+00 | 7.50E+00 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

**EQUATIONS USED TO CALCULATE EXPOSURE FOR THE GREAT BLUE HERON**
**CONSERVATIVE ASSUMPTIONS**
**SITES 4, 21, AND 22 - TIDAL FRESHWATER STATIONS**
**NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA**

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Great Blue Heron | |
|---|---|---|---|
| Cs | Constituent concentration in Sediment | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Sediment to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of Sediment (kg/day) | 9.037E-03 | |
| If | Rate of fish ingestion (kg/day) | 4.518E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.204E+00 | |
| FI | Food ingestion rate (kg/day) | 4.518E-01 | |
| WI | Water ingestion rate (L/day) | 1.112E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Sediment (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Sediment - Fish BAF (mg/kg) | Dose (mg/kg/day) | LOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| **INORGANICS** | | | | | | |
| Aluminum | 18710 | 0.8918 | 1.00E+00 | 3.91E+03 | 1.097E+03 | 3.6 |
| Antimony | 11.9133 | 0.01074 | 1.00E+00 | 2.49E+00 | NA | NA |
| Arsenic | 11.4667 | 0.002 | 1.26E-01 | 3.43E-01 | 1.284E+01 | 0.0 |
| Barium | 33 | 0.02678 | 1.00E+00 | 6.90E+00 | 4.170E+01 | 0.2 |
| Beryllium | 0.2528 | 0 | 1.00E+00 | 5.29E-02 | NA | NA |
| Cadmium | 1.1956 | 0.00216 | 1.64E-01 | 4.52E-02 | 2.000E+01 | 0.0 |
| Chromium | 33.4222 | 0.00352 | 3.80E-02 | 3.98E-01 | 5.000E+00 | 0.1 |
| Cobalt | 7.7383 | 0.0022 | 1.00E+00 | 1.62E+00 | NA | NA |
| Copper | 18.8333 | 0.00142 | 1.00E-01 | 4.63E-01 | 6.170E+01 | 0.0 |
| Iron | 31997.7778 | 1.1366 | 1.00E+00 | 6.69E+03 | NA | NA |
| Lead | 53.9778 | 0.00074 | 7.00E-02 | 9.96E-01 | 3.850E+01 | 0.0 |
| Manganese | 237.4333 | 0.1924 | 1.00E+00 | 4.97E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.0819 | 0 | 4.58E+00 | 7.72E-02 | 9.000E-01 | 0.1 |
| Nickel | 17.2278 | 0 | 1.00E+00 | 3.60E+00 | 1.070E+02 | 0.0 |
| Selenium | 0.5383 | 0 | 1.00E+00 | 1.13E-01 | 1.000E+00 | 0.1 |
| Silver | 0.9808 | 0 | 1.00E+00 | 2.05E-01 | NA | NA |
| Thallium | 0.4169 | 0 | 1.00E+00 | 8.72E-02 | NA | NA |
| Vanadium | 50.1056 | 0.00428 | 1.00E+00 | 1.05E+01 | 1.140E+02 | 0.1 |
| Zinc | 110.4056 | 0 | 1.47E-01 | 3.78E+00 | 1.310E+02 | 0.0 |
| **ORGANICS** | | | | | | |
| 4,4'-DDD | 5.3389 | 0 | 2.61E+00 | 2.88E+00 | NA | NA |
| 4,4'-DDE | 5.2583 | 0 | 2.04E+01 | 2.20E+01 | NA | NA |
| alpha-Chlordane | 2.7528 | 0 | 1.00E+00 | 5.76E-01 | 1.070E+01 | 0.1 |
| Gamma-Chlordane | 2.7194 | 0 | 1.00E+00 | 5.69E-01 | 1.070E+01 | 0.1 |
| Benzo(b)fluoranthene | 500.8333 | 0 | 1.00E+00 | 1.05E+02 | NA | NA |
| Di-n-butylphthalate | 519.7222 | 0 | 1.00E+00 | 1.09E+02 | 1.100E+00 | 98.8 |
| Fluoranthene | 489.3889 | 0 | 1.00E+00 | 1.02E+02 | NA | NA |
| Pyrene | 436.3333 | 0 | 1.00E+00 | 9.12E+01 | NA | NA |
| Tetrachloroethene | 13.3611 | 0 | 1.00E+00 | 2.79E+00 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MINK
ESS CONSERVATIVE ASSUMPTIONS
ITES 4, 21, AND 22 - TIDAL FRESHWATER STATIONS
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Mink | |
|---|---|---|---|
| Cs | Constituent concentration in Sediment | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Sediment to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of Sediment (kg/day) | 1.051E-02 | |
| If | Rate of fish ingestion (kg/day) | 1.051E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 7.510E-01 | |
| FI | Food ingestion rate (kg/day) | 1.051E-01 | |
| WI | Water ingestion rate (L/day) | 9.648E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Sediment (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Sediment - Fish BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 18710 | 0.8918 | 1.00E+00 | 2.88E+03 | 8.628E+00 | 334.0 |
| Antimony | 11.9133 | 0.01074 | 1.00E+00 | 1.84E+00 | 5.588E-01 | 3.3 |
| Arsenic | 11.4667 | 0.002 | 1.26E-01 | 3.63E-01 | 5.633E-01 | 0.6 |
| arium | 33 | 0.02678 | 1.00E+00 | 5.09E+00 | 1.636E+01 | 0.3 |
| ryllium | 0.2528 | 0 | 1.00E+00 | 3.89E-02 | 5.453E+00 | 0.0 |
| Cadmium | 1.1956 | 0.00216 | 1.64E-01 | 4.45E-02 | 7.970E+00 | 0.0 |
| Chromium | 33.4222 | 0.00352 | 3.80E-02 | 6.46E-01 | 2.261E+04 | 0.0 |
| Cobalt | 7.7383 | 0.0022 | 1.00E+00 | 1.19E+00 | NA | NA |
| Copper | 18.8333 | 0.00142 | 1.00E-01 | 5.28E-01 | 1.626E+01 | 0.0 |
| Iron | 31997.7778 | 1.1366 | 1.00E+00 | 4.93E+03 | NA | NA |
| Lead | 53.9778 | 0.00074 | 7.00E-02 | 1.28E+00 | 6.610E+01 | 0.0 |
| Manganese | 237.4333 | 0.1924 | 1.00E+00 | 3.66E+01 | 2.347E+02 | 0.2 |
| Mercury | 0.0819 | 0 | 4.58E+00 | 5.37E-02 | 1.074E+01 | 0.0 |
| Nickel | 17.2278 | 0 | 1.00E+00 | 2.65E+00 | 6.610E+01 | 0.0 |
| Selenium | 0.5383 | 0 | 1.00E+00 | 8.29E-02 | 2.727E-01 | 0.3 |
| Silver | 0.9808 | 0 | 1.00E+00 | 1.51E-01 | NA | NA |
| Thallium | 0.4169 | 0 | 1.00E+00 | 6.42E-02 | 6.179E-02 | 1.0 |
| Vanadium | 50.1056 | 0.00428 | 1.00E+00 | 7.72E+00 | 1.611E+00 | 4.8 |
| Zinc | 110.4056 | 0 | 1.47E-01 | 3.82E+00 | 2.644E+02 | 0.0 |
| ORGANICS | | | | | | |
| 4,4'-DDD | 5.3389 | 0 | 2.61E+00 | 2.03E+00 | NA | NA |
| 4,4'-DDE | 5.2583 | 0 | 2.04E+01 | 1.51E+01 | NA | NA |
| alpha-Chlordane | 2.7528 | 0 | 1.00E+00 | 4.24E-01 | 4.113E+00 | 0.1 |
| Gamma-Chlordane | 2.7194 | 0 | 1.00E+00 | 4.19E-01 | 4.113E+00 | 0.1 |
| Benzo(b)fluoranthene | 500.8333 | 0 | 1.00E+00 | 7.71E+01 | NA | NA |
| Di-n-butylphthalate | 519.7222 | 0 | 1.00E+00 | 8.00E+01 | 8.195E+02 | 0.1 |
| Fluoranthene | 489.3889 | 0 | 1.00E+00 | 7.54E+01 | NA | NA |
| Pyrene | 436.3333 | 0 | 1.00E+00 | 6.72E+01 | NA | NA |
| Tetrachloroethene | 13.3611 | 0 | 1.00E+00 | 2.06E+00 | NA | NA |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

# APPENDIX L.6
# TERRESTRIAL RECEPTOR MODELS, SITE 22

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red-Tailed Hawk | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.717E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 1.359E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 9.570E-01 | |
| FI | Food ingestion rate (kg/day) | 1.359E-01 | |
| WI | Water ingestion rate (L/day) | 6.796E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 18700 | 0.147 | 1.00E+00 | 2.71E+03 | 1.097E+02 | 24.7 |
| Antimony | 1.6 | 0 | 1.00E+00 | 2.32E-01 | NA | NA |
| Arsenic | 14.6 | 0 | 1.60E-02 | 7.46E-02 | 2.460E+00 | 0.0 |
| Barium | 41.2 | 0.0308 | 2.53E-01 | 1.60E+00 | 2.080E+01 | 0.1 |
| Beryllium | 0.52 | 0 | 4.10E-01 | 3.17E-02 | NA | NA |
| Cadmium | 4.8 | 0 | 4.48E-01 | 3.19E-01 | 1.450E+00 | 0.2 |
| Chromium | 31.4 | 0.0037 | 3.09E-01 | 1.47E+00 | 1.000E+00 | 1.5 |
| Cobalt | 6.8 | 0 | 1.40E-01 | 1.54E-01 | NA | NA |
| Copper | 1560 | 0 | 1.29E+00 | 2.90E+02 | 4.700E+01 | 6.2 |
| Iron | 31900 | 0.336 | 2.40E-02 | 1.99E+02 | NA | NA |
| Lead | 1910 | 0 | 1.87E-01 | 5.61E+01 | 3.850E+00 | 14.6 |
| Manganese | 229 | 0.0947 | 1.00E+00 | 3.32E+01 | 9.770E+02 | 0.0 |
| Mercury | 0.06 | 0 | 1.92E-01 | 1.81E-03 | 4.500E-01 | 0.0 |
| Nickel | 11.8 | 0 | 8.98E-01 | 1.54E+00 | 7.740E+01 | 0.0 |
| Selenium | 1.4 | 0 | 1.55E-01 | 3.48E-02 | 5.000E-01 | 0.1 |
| Silver | 11.8 | 0 | 1.00E+00 | 1.71E+00 | NA | NA |
| Vanadium | 52.9 | 0.0034 | 1.00E+00 | 7.66E+00 | 1.140E+01 | 0.7 |
| Zinc | 160 | 0 | 2.32E+00 | 5.31E+01 | 1.450E+01 | 3.7 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0025 | 0 | 1.00E+00 | 3.62E-04 | 8.800E-01 | 0.0 |
| 4,4'-DDT | 0.0041 | 0 | 1.00E+00 | 5.94E-04 | 8.800E-01 | 0.0 |
| alpha-Chlordane | 0.0041 | 0 | 1.00E+00 | 5.94E-04 | 2.140E+00 | 0.0 |
| beta-BHC | 0.0044 | 0 | 1.00E+00 | 6.37E-04 | NA | NA |
| Dieldrin | 0.0028 | 0 | 1.00E+00 | 4.05E-04 | NA | NA |
| Gamma-Chlordane | 0.0044 | 0 | 1.00E+00 | 6.37E-04 | 2.140E+00 | 0.0 |
| Heptachlor Epoxide | 0.015 | 0 | 1.00E+00 | 2.17E-03 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 1.00E+00 | 7.24E-03 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.00E+00 | 1.45E-02 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.00E+00 | 1.59E-02 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 0.39 | 0 | 1.00E+00 | 5.65E-02 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 1.00E+00 | 2.03E-02 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.00E+00 | 1.88E-02 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.04 | 1.00E+00 | 1.73E-02 | 1.100E+00 | 0.0 |
| Chrysene | 0.2 | 0 | 1.00E+00 | 2.90E-02 | 1.000E+01 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 1.00E+00 | 6.95E-03 | 1.100E-01 | 0.1 |
| Fluoranthene | 0.2 | 0 | 1.00E+00 | 2.90E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 1.00E+00 | 2.32E-02 | 1.000E+01 | 0.0 |
| Phenanthrene | 0.06 | 0 | 1.00E+00 | 8.69E-03 | 1.000E+01 | 0.0 |
| Pyrene | 0.24 | 0 | 1.00E+00 | 3.48E-02 | 1.000E+01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | American Robin | |
|---|---|---|---|
| BAF | Plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 0.0019 | |
| Iv | Rate of vegetation ingestion (kg/day) | 0.00759 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 0.01309 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 6.350E-02 | |
| FI | Food Ingestion Rate (kg/day) | 0.02068 | |
| WI | Water ingestion rate (L/day) | 1.287E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 18700 | 0.147 | 4.00E-03 | 2.00E-01 | 1.34E+03 | 1.097E+02 | 12.2 |
| Antimony | 1.6 | 0 | 2.00E-01 | 1.00E+00 | 4.16E-01 | NA | NA |
| Arsenic | 14.6 | 0 | 1.10E+00 | 5.23E-01 | 3.94E+00 | 2.460E+00 | 1.6 |
| Barium | 41.2 | 0.0308 | 1.50E-01 | 3.60E-01 | 5.04E+00 | 2.080E+01 | 0.2 |
| Beryllium | 0.52 | 0 | 1.00E-02 | 1.00E+00 | 1.23E-01 | NA | NA |
| Cadmium | 4.8 | 0 | 3.25E+00 | 4.07E+01 | 4.23E+01 | 1.450E+00 | 29.2 |
| Chromium | 31.4 | 0.0037 | 7.50E-03 | 3.16E+00 | 2.14E+01 | 1.000E+00 | 21.4 |
| Cobalt | 6.8 | 0 | 2.00E-02 | 1.00E+00 | 1.62E+00 | NA | NA |
| Copper | 1560 | 0 | 6.25E-01 | 1.53E+00 | 6.56E+02 | 4.700E+01 | 13.9 |
| Iron | 31900 | 0.336 | 4.00E-03 | 1.00E-01 | 1.63E+03 | NA | NA |
| Lead | 1910 | 0 | 4.68E-01 | 1.52E+00 | 7.63E+02 | 3.850E+00 | 198.2 |
| Manganese | 229 | 0.0947 | 2.50E-01 | 1.24E-01 | 1.96E+01 | 9.770E+02 | 0.0 |
| Mercury | 0.06 | 0 | 5.00E+00 | 2.06E+01 | 2.93E-01 | 4.500E-01 | 0.7 |
| Nickel | 11.8 | 0 | 1.41E+00 | 4.73E+00 | 1.38E+01 | 7.740E+01 | 0.2 |
| Selenium | 1.4 | 0 | 3.01E+00 | 1.34E+00 | 9.33E-01 | 5.000E-01 | 1.9 |
| Silver | 11.8 | 0 | 4.00E-01 | 1.00E+00 | 3.35E+00 | NA | NA |
| Vanadium | 52.9 | 0.0034 | 5.50E-03 | 8.80E-02 | 2.58E+00 | 1.140E+01 | 0.2 |
| Zinc | 160 | 0 | 1.82E+00 | 1.29E+01 | 4.65E+02 | 1.450E+01 | 32.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant (BAF) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDE | 0.0025 | 0 | 4.80E-03 | 1.06E+01 | 5.54E-03 | 8.800E-01 | 0.0 |
| 4,4'-DDT | 0.0041 | 0 | 6.50E-03 | 7.00E-01 | 7.17E-04 | 8.800E-01 | 0.0 |
| alpha-Chlordane | 0.0041 | 0 | 8.90E-03 | 3.00E+00 | 2.66E-03 | 2.140E+00 | 0.0 |
| beta-BHC | 0.0044 | 0 | 2.43E-01 | 1.00E+00 | 1.17E-03 | NA | NA |
| Dieldrin | 0.0028 | 0 | 3.05E-02 | 8.00E+00 | 4.71E-03 | NA | NA |
| Gamma-Chlordane | 0.0044 | 0 | 8.60E-03 | 3.00E+00 | 2.86E-03 | 2.140E+00 | 0.0 |
| Heptachlor Epoxide | 0.015 | 0 | 4.99E-02 | 1.00E+01 | 3.15E-02 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.16E-01 | 2.00E-01 | 4.85E-03 | 1.000E+01 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.97E-02 | 2.70E-01 | 8.79E-03 | 1.000E+01 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.14E-02 | 3.40E-01 | 1.12E-02 | 1.000E+01 | 0.0 |
| Benzo(b)fluoranthene | 0.39 | 0 | 1.01E-02 | 2.10E-01 | 2.90E-02 | 1.000E+01 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 5.20E-03 | 1.50E-01 | 8.60E-03 | 1.000E+01 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.01E-02 | 2.10E-01 | 9.67E-03 | 1.000E+01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.04 | 2.30E-03 | 1.00E+00 | 3.17E-02 | 1.100E+00 | 0.0 |
| Chrysene | 0.2 | 0 | 1.97E-02 | 4.40E-01 | 2.46E-02 | 1.000E+01 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 8.38E-02 | 1.00E+00 | 1.18E-02 | 1.100E-01 | 0.1 |
| Fluoranthene | 0.2 | 0 | 4.25E-02 | 3.70E-01 | 2.23E-02 | 1.000E+01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 5.60E-03 | 4.10E-01 | 1.84E-02 | 1.000E+01 | 0.0 |
| Phenanthrene | 0.06 | 0 | 9.08E-02 | 2.80E-01 | 5.91E-03 | 1.000E+01 | 0.0 |
| Pyrene | 0.24 | 0 | 4.31E-02 | 3.90E-01 | 2.77E-02 | 1.000E+01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Short-Tailed Shrew | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 7.289E-05 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 3.037E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.250E-02 | |
| FI | Food ingestion rate (kg/day) | 3.037E-03 | |
| WI | Water ingestion rate (L/day) | 7.036E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 18700 | 0.147 | 2.00E-01 | 1.02E+03 | 2.402E+00 | 424.0 |
| Antimony | 1.6 | 0 | 1.00E+00 | 3.98E-01 | 1.556E-01 | 2.6 |
| Arsenic | 14.6 | 0 | 5.23E-01 | 1.94E+00 | 1.568E-01 | 12.4 |
| Barium | 41.2 | 0.0308 | 3.60E-01 | 4.02E+00 | 1.239E+01 | 0.3 |
| Beryllium | 0.52 | 0 | 1.00E+00 | 1.29E-01 | 1.518E+00 | 0.1 |
| Cadmium | 4.8 | 0 | 4.07E+01 | 4.75E+01 | 2.219E+00 | 21.4 |
| Chromium | 31.4 | 0.0037 | 3.16E+00 | 2.43E+01 | 6.296E+03 | 0.0 |
| Cobalt | 6.8 | 0 | 1.00E+00 | 1.69E+00 | NA | NA |
| Copper | 1560 | 0 | 1.53E+00 | 5.89E+02 | 3.499E+01 | 16.8 |
| Iron | 31900 | 0.336 | 1.00E-01 | 9.63E+02 | NA | NA |
| Lead | 1910 | 0 | 1.52E+00 | 7.17E+02 | 1.840E+01 | 39.0 |
| Manganese | 229 | 0.0947 | 1.24E-01 | 8.77E+00 | 2.024E+02 | 0.0 |
| Mercury | 0.06 | 0 | 2.06E+01 | 3.01E-01 | 2.991E+00 | 0.1 |
| Nickel | 11.8 | 0 | 4.73E+00 | 1.36E+01 | 9.201E+01 | 0.1 |
| Selenium | 1.4 | 0 | 1.34E+00 | 4.64E-01 | 4.601E-01 | 1.0 |
| Silver | 11.8 | 0 | 1.00E+00 | 2.94E+00 | NA | NA |
| Vanadium | 52.9 | 0.0034 | 8.80E-02 | 1.46E+00 | 4.485E-01 | 3.3 |
| Zinc | 160 | 0 | 1.29E+01 | 5.02E+02 | 3.681E+02 | 1.4 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0025 | 0 | 1.06E+01 | 6.45E-03 | 1.840E+00 | 0.0 |
| 4,4'-DDT | 0.0041 | 0 | 7.00E-01 | 7.21E-04 | 1.840E+00 | 0.0 |
| alpha-Chlordane | 0.0041 | 0 | 3.00E+00 | 3.01E-03 | 5.725E+00 | 0.0 |
| beta-BHC | 0.0044 | 0 | 1.00E+00 | 1.09E-03 | NA | NA |
| Dieldrin | 0.0028 | 0 | 8.00E+00 | 5.46E-03 | NA | NA |
| Gamma-Chlordane | 0.0044 | 0 | 3.00E+00 | 3.23E-03 | 5.725E+00 | 0.0 |
| Heptachlor Epoxide | 0.015 | 0 | 1.00E+01 | 3.65E-02 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.00E-01 | 2.72E-03 | 1.618E+00 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 2.70E-01 | 7.14E-03 | 1.618E+00 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 3.40E-01 | 9.73E-03 | 1.245E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.39 | 0 | 2.10E-01 | 2.22E-02 | 1.618E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 1.50E-01 | 5.92E-03 | 1.618E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 2.10E-01 | 7.39E-03 | 1.618E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.04 | 1.00E+00 | 2.50E-01 | 2.278E+01 | 0.0 |
| Chrysene | 0.2 | 0 | 4.40E-01 | 2.25E-02 | 1.618E+00 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 1.00E+00 | 1.19E-02 | 6.846E+02 | 0.0 |
| Fluoranthene | 0.2 | 0 | 3.70E-01 | 1.91E-02 | 1.618E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 4.10E-01 | 1.69E-02 | 1.618E+00 | 0.0 |
| Phenanthrene | 0.06 | 0 | 2.80E-01 | 4.43E-03 | 1.618E+00 | 0.0 |
| Pyrene | 0.24 | 0 | 3.90E-01 | 2.41E-02 | 1.618E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red Fox | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.360E-02 | |
| Im | Rate of small mammal ingestion (kg/day) | 4.858E-01 | |
| HR | Home range size (acres) | 2.370E+02 | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.950E+00 | |
| FI | Food ingestion rate (kg/day) | 4.858E-01 | |
| WI | Water ingestion rate (L/day) | 1.180E-01 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 18700 | 0.147 | 1.00E+00 | 3.17E+03 | 6.129E-01 | 5164.8 |
| Antimony | 1.6 | 0 | 1.00E+00 | 2.71E-01 | 3.969E-02 | 6.8 |
| Arsenic | 14.6 | 0 | 1.60E-02 | 1.06E-01 | 4.001E-02 | 2.6 |
| Barium | 41.2 | 0.0308 | 2.53E-01 | 1.91E+00 | 3.160E+00 | 0.6 |
| Beryllium | 0.52 | 0 | 4.10E-01 | 3.75E-02 | 3.874E-01 | 0.1 |
| Cadmium | 4.8 | 0 | 4.48E-01 | 3.76E-01 | 5.661E-01 | 0.7 |
| Chromium | 31.4 | 0.0037 | 3.09E-01 | 1.74E+00 | 1.606E+03 | 0.0 |
| Cobalt | 6.8 | 0 | 1.40E-01 | 1.88E-01 | NA | NA |
| Copper | 1560 | 0 | 1.29E+00 | 3.39E+02 | 8.928E+00 | 37.9 |
| Iron | 31900 | 0.336 | 2.40E-02 | 2.73E+02 | NA | NA |
| Lead | 1910 | 0 | 1.87E-01 | 6.76E+01 | 4.695E+00 | 14.4 |
| Manganese | 229 | 0.0947 | 1.00E+00 | 3.88E+01 | 5.165E+01 | 0.8 |
| Mercury | 0.06 | 0 | 1.92E-01 | 2.17E-03 | 7.630E-01 | 0.0 |
| Nickel | 11.8 | 0 | 8.98E-01 | 1.80E+00 | 2.348E+01 | 0.1 |
| Selenium | 1.4 | 0 | 1.55E-01 | 4.22E-02 | 1.174E-01 | 0.4 |
| Silver | 11.8 | 0 | 1.00E+00 | 2.00E+00 | NA | NA |
| Vanadium | 52.9 | 0.0034 | 1.00E+00 | 8.95E+00 | 1.144E-01 | 78.3 |
| Zinc | 160 | 0 | 2.32E+00 | 6.18E+01 | 9.390E+01 | 0.7 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0025 | 0 | 1.00E+00 | 4.23E-04 | 4.695E-01 | 0.0 |
| 4,4'-DDT | 0.0041 | 0 | 1.00E+00 | 6.94E-04 | 4.695E-01 | 0.0 |
| alpha-Chlordane | 0.0041 | 0 | 1.00E+00 | 6.94E-04 | 1.461E+00 | 0.0 |
| beta-BHC | 0.0044 | 0 | 1.00E+00 | 7.45E-04 | NA | NA |
| Dieldrin | 0.0028 | 0 | 1.00E+00 | 4.74E-04 | NA | NA |
| Gamma-Chlordane | 0.0044 | 0 | 1.00E+00 | 7.45E-04 | 1.461E+00 | 0.0 |
| Heptachlor Epoxide | 0.015 | 0 | 1.00E+00 | 2.54E-03 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 1.00E+00 | 8.46E-03 | 4.128E-01 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.00E+00 | 1.69E-02 | 4.128E-01 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.00E+00 | 1.86E-02 | 3.176E-01 | 0.1 |
| Benzo(b)fluoranthene | 0.39 | 0 | 1.00E+00 | 6.60E-02 | 4.128E-01 | 0.2 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 1.00E+00 | 2.37E-02 | 4.128E-01 | 0.1 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.00E+00 | 2.20E-02 | 4.128E-01 | 0.1 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.04 | 1.00E+00 | 1.85E-02 | 5.811E+00 | 0.0 |
| Chrysene | 0.2 | 0 | 1.00E+00 | 3.39E-02 | 4.128E-01 | 0.1 |
| Di-n-butylphthalate | 0.048 | 0 | 1.00E+00 | 8.13E-03 | 1.747E+02 | 0.0 |
| Fluoranthene | 0.2 | 0 | 1.00E+00 | 3.39E-02 | 4.128E-01 | 0.1 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 1.00E+00 | 2.71E-02 | 4.128E-01 | 0.1 |
| Phenanthrene | 0.06 | 0 | 1.00E+00 | 1.02E-02 | 4.128E-01 | 0.0 |
| Pyrene | 0.24 | 0 | 1.00E+00 | 4.06E-02 | 4.128E-01 | 0.1 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*BAF*Iv)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Meadow Vole | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 3.773E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.572E-02 | |
| HR | Home range size (acres) | 4.900E-04 | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.700E-02 | |
| FI | Food ingestion rate (kg/day) | 1.572E-02 | |
| WI | Water ingestion rate (L/day) | 1.100E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 18700 | 0.147 | 4.00E-03 | 3.18E+02 | 2.224E+00 | 142.9 |
| Antimony | 1.6 | 0 | 2.00E-01 | 2.74E-02 | 1.441E-01 | 0.2 |
| Arsenic | 14.6 | 0 | 1.10E+00 | 2.57E-01 | 1.452E-01 | 1.8 |
| Barium | 41.2 | 0.0308 | 1.50E-01 | 7.04E-01 | 1.147E+01 | 0.1 |
| Beryllium | 0.52 | 0 | 1.00E-02 | 8.84E-03 | 1.406E+00 | 0.0 |
| Cadmium | 4.8 | 0 | 3.25E+00 | 8.99E-02 | 2.055E+00 | 0.0 |
| Chromium | 31.4 | 0.0037 | 7.50E-03 | 5.34E-01 | 5.830E+03 | 0.0 |
| Cobalt | 6.8 | 0 | 2.00E-02 | 1.16E-01 | NA | NA |
| Copper | 1560 | 0 | 6.25E-01 | 2.70E+01 | 3.240E+01 | 0.8 |
| Iron | 31900 | 0.336 | 4.00E-03 | 5.42E+02 | NA | NA |
| Lead | 1910 | 0 | 4.68E-01 | 3.29E+01 | 1.704E+01 | 1.9 |
| Manganese | 229 | 0.0947 | 2.50E-01 | 3.92E+00 | 1.875E+02 | 0.0 |
| Mercury | 0.06 | 0 | 5.00E+00 | 1.18E-03 | 2.769E+00 | 0.0 |
| Nickel | 11.8 | 0 | 1.41E+00 | 2.09E-01 | 8.520E+01 | 0.0 |
| Selenium | 1.4 | 0 | 3.01E+00 | 2.60E-02 | 4.260E-01 | 0.1 |
| Silver | 11.8 | 0 | 4.00E-01 | 2.03E-01 | NA | NA |
| Vanadium | 52.9 | 0.0034 | 5.50E-03 | 8.99E-01 | 4.153E-01 | 2.2 |
| Zinc | 160 | 0 | 1.82E+00 | 2.87E+00 | 3.408E+02 | 0.0 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0025 | 0 | 4.80E-03 | 4.25E-05 | 1.704E+00 | 0.0 |
| 4,4'-DDT | 0.0041 | 0 | 6.50E-03 | 6.97E-05 | 1.704E+00 | 0.0 |
| alpha-Chlordane | 0.0041 | 0 | 8.90E-03 | 6.97E-05 | 5.302E+00 | 0.0 |
| beta-BHC | 0.0044 | 0 | 2.43E-01 | 7.54E-05 | NA | NA |
| Dieldrin | 0.0028 | 0 | 3.05E-02 | 4.76E-05 | NA | NA |
| Gamma-Chlordane | 0.0044 | 0 | 8.60E-03 | 7.48E-05 | 5.302E+00 | 0.0 |
| Heptachlor Epoxide | 0.015 | 0 | 4.99E-02 | 2.55E-04 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.16E-01 | 8.56E-04 | 1.498E+00 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.97E-02 | 1.70E-03 | 1.498E+00 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.14E-02 | 1.87E-03 | 1.153E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.39 | 0 | 1.01E-02 | 6.63E-03 | 1.498E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 5.20E-03 | 2.38E-03 | 1.498E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.01E-02 | 2.21E-03 | 1.498E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.04 | 2.30E-03 | 1.70E-03 | 2.109E+01 | 0.0 |
| Chrysene | 0.2 | 0 | 1.97E-02 | 3.40E-03 | 1.498E+00 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 8.38E-02 | 8.18E-04 | 6.339E+02 | 0.0 |
| Fluoranthene | 0.2 | 0 | 4.25E-02 | 3.40E-03 | 1.498E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 5.60E-03 | 2.72E-03 | 1.498E+00 | 0.0 |
| Phenanthrene | 0.06 | 0 | 9.08E-02 | 1.02E-03 | 1.498E+00 | 0.0 |
| Pyrene | 0.24 | 0 | 4.31E-02 | 4.09E-03 | 1.498E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Soil to plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidental ingestion of soil (kg/day) | 2.007E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 4.014E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 6.021E-03 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.960E-02 | |
| FI | Food Ingestion Rate (kg/day) | 1.004E-02 | |
| WI | Water ingestion rate (L/day) | 7.022E-02 | |

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil - Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 18700 | 0.147 | 4.00E-03 | 2.00E-01 | 1.36E+03 | 2.147E+00 | 631.8 |
| Antimony | 1.6 | 0 | 2.00E-01 | 1.00E+00 | 5.73E-01 | 1.390E-01 | 4.1 |
| Arsenic | 14.6 | 0 | 1.10E+00 | 5.23E-01 | 5.79E+00 | 1.401E-01 | 41.3 |
| Barium | 41.2 | 0.0308 | 1.50E-01 | 3.60E-01 | 6.35E+00 | 1.107E+01 | 0.6 |
| Beryllium | 0.52 | 0 | 1.00E-02 | 1.00E+00 | 1.66E-01 | 1.357E+00 | 0.1 |
| Cadmium | 4.8 | 0 | 3.25E+00 | 4.07E+01 | 6.32E+01 | 1.983E+00 | 31.9 |
| Chromium | 31.4 | 0.0037 | 7.50E-03 | 3.16E+00 | 3.09E+01 | 5.626E+03 | 0.0 |
| Cobalt | 6.8 | 0 | 2.00E-02 | 1.00E+00 | 2.19E+00 | NA | NA |
| Copper | 1560 | 0 | 6.25E-01 | 1.53E+00 | 9.49E+02 | 3.127E+01 | 30.4 |
| Iron | 31900 | 0.336 | 4.00E-03 | 1.00E-01 | 1.33E+03 | NA | NA |
| Lead | 1910 | 0 | 4.68E-01 | 1.52E+00 | 1.10E+03 | 1.645E+01 | 66.6 |
| Manganese | 229 | 0.0947 | 2.50E-01 | 1.24E-01 | 2.31E+01 | 1.809E+02 | 0.1 |
| Mercury | 0.06 | 0 | 5.00E+00 | 2.06E+01 | 4.42E-01 | 2.673E+00 | 0.2 |
| Nickel | 11.8 | 0 | 1.41E+00 | 4.73E+00 | 2.07E+01 | 8.223E+01 | 0.3 |
| Selenium | 1.4 | 0 | 3.01E+00 | 1.34E+00 | 1.45E+00 | 4.111E-01 | 3.5 |
| Silver | 11.8 | 0 | 4.00E-01 | 1.00E+00 | 4.71E+00 | NA | NA |
| Vanadium | 52.9 | 0.0034 | 5.50E-03 | 8.80E-02 | 2.04E+00 | 4.008E-01 | 5.1 |
| Zinc | 160 | 0 | 1.82E+00 | 1.29E+01 | 6.95E+02 | 3.289E+02 | 2.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Constituent Concentration in Water (mg/L) (Cw) | Soil - Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDE | 0.0025 | 0 | 4.80E-03 | 1.06E+01 | 8.17E-03 | 1.645E+00 | 0.0 |
| 4,4'-DDT | 0.0041 | 0 | 6.50E-03 | 7.00E-01 | 9.29E-04 | 1.645E+00 | 0.0 |
| alpha-Chlordane | 0.0041 | 0 | 8.90E-03 | 3.00E+00 | 3.83E-03 | 5.117E+00 | 0.0 |
| beta-BHC | 0.0044 | 0 | 2.43E-01 | 1.00E+00 | 1.62E-03 | NA | NA |
| Dieldrin | 0.0028 | 0 | 3.05E-02 | 8.00E+00 | 6.93E-03 | NA | NA |
| Gamma-Chlordane | 0.0044 | 0 | 8.60E-03 | 3.00E+00 | 4.11E-03 | 5.117E+00 | 0.0 |
| Heptachlor Epoxide | 0.015 | 0 | 4.99E-02 | 1.00E+01 | 4.64E-02 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.16E-01 | 2.00E-01 | 5.79E-03 | 1.446E+00 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.97E-02 | 2.70E-01 | 9.72E-03 | 1.446E+00 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.14E-02 | 3.40E-01 | 1.29E-02 | 1.112E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.39 | 0 | 1.01E-02 | 2.10E-01 | 3.00E-02 | 1.446E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 5.20E-03 | 1.50E-01 | 8.03E-03 | 1.446E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.01E-02 | 2.10E-01 | 9.99E-03 | 1.446E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.04 | 2.30E-03 | 1.00E+00 | 1.75E-01 | 2.035E+01 | 0.0 |
| Chrysene | 0.2 | 0 | 1.97E-02 | 4.40E-01 | 2.99E-02 | 1.446E+00 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 8.38E-02 | 1.00E+00 | 1.61E-02 | 6.118E+02 | 0.0 |
| Fluoranthene | 0.2 | 0 | 4.25E-02 | 3.70E-01 | 2.65E-02 | 1.446E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 5.60E-03 | 4.10E-01 | 2.20E-02 | 1.446E+00 | 0.0 |
| Phenanthrene | 0.06 | 0 | 9.08E-02 | 2.80E-01 | 6.89E-03 | 1.446E+00 | 0.0 |
| Pyrene | 0.24 | 0 | 4.31E-02 | 3.90E-01 | 3.33E-02 | 1.446E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*BAF*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | American Woodcock | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.317E-02 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.266E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.644E-01 | |
| FI | Food ingestion rate (kg/day) | 1.266E-01 | |
| WI | Water ingestion rate (L/day) | 1.760E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10783.8462 | 0.11325 | 2.00E-01 | 2.52E+03 | 1.097E+03 | 2.3 |
| Antimony | 1.0775 | 0 | 1.00E+00 | 9.16E-01 | NA | NA |
| Arsenic | 6.2477 | 0 | 5.23E-01 | 3.02E+00 | 7.380E+00 | 0.4 |
| Barium | 25.1654 | 0.0169 | 3.60E-01 | 8.99E+00 | 4.170E+01 | 0.2 |
| Beryllium | 0.164 | 0 | 1.00E+00 | 1.39E-01 | NA | NA |
| Cadmium | 1.0488 | 0 | 4.07E+01 | 3.29E+01 | 2.000E+01 | 1.6 |
| Chromium | 17.0192 | 0.002675 | 3.16E+00 | 4.28E+01 | 5.000E+00 | 8.6 |
| Cobalt | 2.4323 | 0 | 1.00E+00 | 2.07E+00 | NA | NA |
| Copper | 78.7992 | 0 | 1.53E+00 | 9.92E+01 | 6.170E+01 | 1.6 |
| Iron | 19656.9231 | 0.2041 | 1.00E-01 | 3.09E+03 | NA | NA |
| Lead | 116.7885 | 0 | 1.52E+00 | 1.46E+02 | 3.850E+01 | 3.8 |
| Manganese | 86.7846 | 0.0491 | 1.24E-01 | 1.52E+01 | 9.770E+03 | 0.0 |
| Mercury | 0.0275 | 0 | 2.06E+01 | 4.39E-01 | 9.000E-01 | 0.5 |
| Nickel | 5.3596 | 0 | 4.73E+00 | 1.99E+01 | 1.070E+02 | 0.2 |
| Selenium | 0.3267 | 0 | 1.34E+00 | 3.63E-01 | 1.000E+00 | 0.4 |
| Silver | 0.7535 | 0 | 1.00E+00 | 6.41E-01 | NA | NA |
| Vanadium | 29.9731 | 0.002325 | 8.80E-02 | 4.43E+00 | 1.140E+02 | 0.0 |
| Zinc | 46.9577 | 0 | 1.29E+01 | 4.70E+02 | 1.310E+02 | 3.6 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN WOODCOCK
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0021442 | 0 | 1.06E+01 | 1.77E-02 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0018744 | 0 | 7.00E-01 | 1.16E-03 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0012731 | 0 | 3.00E+00 | 3.04E-03 | 1.070E+01 | 0.0 |
| beta-BHC | 0.0012615 | 0 | 1.00E+00 | 1.07E-03 | NA | NA |
| Dieldrin | 0.002225 | 0 | 8.00E+00 | 1.39E-02 | NA | NA |
| Gamma-Chlordane | 0.0012904 | 0 | 3.00E+00 | 3.08E-03 | 1.070E+01 | 0.0 |
| Heptachlor Epoxide | 0.0023077 | 0 | 1.00E+01 | 1.80E-02 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.00E-01 | 1.17E-02 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 2.70E-01 | 2.88E-02 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 3.40E-01 | 3.76E-02 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.2004231 | 0 | 2.10E-01 | 4.85E-02 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 1.50E-01 | 2.74E-02 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 2.10E-01 | 3.14E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.0205 | 1.00E+00 | 8.72E-02 | 1.100E+01 | 0.0 |
| Chrysene | 0.2 | 0 | 4.40E-01 | 8.38E-02 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 1.00E+00 | 4.08E-02 | 1.100E+00 | 0.0 |
| Fluoranthene | 0.1887308 | 0 | 3.70E-01 | 6.89E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 4.10E-01 | 6.33E-02 | 1.000E+02 | 0.0 |
| Phenanthrene | 0.06 | 0 | 2.80E-01 | 1.77E-02 | 1.000E+02 | 0.0 |
| Pyrene | 0.1795 | 0 | 3.90E-01 | 6.83E-02 | 1.000E+02 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Bobwhite Quail | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 1.378E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 1.378E-02 | |
| HR | Home range size (acres) | 2.470E+01 | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.767E-01 | |
| FI | Food ingestion rate (kg/day) | 1.378E-02 | |
| WI | Water ingestion rate (L/day) | 2.297E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10783.8462 | 0.11325 | 4.00E-03 | 8.75E+01 | 1.097E+03 | 0.1 |
| Antimony | 1.0775 | 0 | 2.00E-01 | 2.52E-02 | NA | NA |
| Arsenic | 6.2477 | 0 | 1.10E+00 | 5.86E-01 | 7.380E+00 | 0.1 |
| Barium | 25.1654 | 0.0169 | 1.50E-01 | 4.93E-01 | 4.170E+01 | 0.0 |
| Beryllium | 0.164 | 0 | 1.00E-02 | 1.41E-03 | NA | NA |
| Cadmium | 1.0488 | 0 | 3.25E+00 | 2.74E-01 | 2.000E+01 | 0.0 |
| Chromium | 17.0192 | 0.002675 | 7.50E-03 | 1.43E-01 | 5.000E+00 | 0.0 |
| Cobalt | 2.4323 | 0 | 2.00E-02 | 2.28E-02 | NA | NA |
| Copper | 78.7992 | 0 | 6.25E-01 | 4.46E+00 | 6.170E+01 | 0.1 |
| Iron | 19656.9231 | 0.2041 | 4.00E-03 | 1.59E+02 | NA | NA |
| Lead | 116.7885 | 0 | 4.68E-01 | 5.17E+00 | 3.850E+01 | 0.1 |
| Manganese | 86.7846 | 0.0491 | 2.50E-01 | 2.38E+00 | 9.770E+03 | 0.0 |
| Mercury | 0.0275 | 0 | 5.00E+00 | 1.09E-02 | 9.000E-01 | 0.0 |
| Nickel | 5.3596 | 0 | 1.41E+00 | 6.32E-01 | 1.070E+02 | 0.0 |
| Selenium | 0.3267 | 0 | 3.01E+00 | 7.93E-02 | 1.000E+00 | 0.1 |
| Silver | 0.7535 | 0 | 4.00E-01 | 2.94E-02 | NA | NA |
| Vanadium | 29.9731 | 0.002325 | 5.50E-03 | 2.47E-01 | 1.140E+02 | 0.0 |
| Zinc | 46.9577 | 0 | 1.82E+00 | 7.03E+00 | 1.310E+02 | 0.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE BOBWHITE QUAIL
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | cNOAEL (mg/kg/day) | Hazard Quotient (= Dose/NOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0021442 | 0 | 4.80E-03 | 1.75E-05 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0018744 | 0 | 6.50E-03 | 1.56E-05 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0012731 | 0 | 8.90E-03 | 1.08E-05 | 1.070E+01 | 0.0 |
| beta-BHC | 0.0012615 | 0 | 2.43E-01 | 3.38E-05 | NA | NA |
| Dieldrin | 0.002225 | 0 | 3.05E-02 | 2.26E-05 | NA | NA |
| Gamma-Chlordane | 0.0012904 | 0 | 8.60E-03 | 1.09E-05 | 1.070E+01 | 0.0 |
| Heptachlor Epoxide | 0.0023077 | 0 | 4.99E-02 | 2.70E-05 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.16E-01 | 1.23E-03 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.97E-02 | 9.34E-04 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.14E-02 | 9.56E-04 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.2004231 | 0 | 1.01E-02 | 1.72E-03 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 5.20E-03 | 1.15E-03 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.01E-02 | 1.12E-03 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.0205 | 2.30E-03 | 3.46E-03 | 1.100E+01 | 0.0 |
| Chrysene | 0.2 | 0 | 1.97E-02 | 1.87E-03 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 8.38E-02 | 6.88E-04 | 1.100E+00 | 0.0 |
| Fluoranthene | 0.1887308 | 0 | 4.25E-02 | 2.10E-03 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 5.60E-03 | 1.32E-03 | 1.000E+02 | 0.0 |
| Phenanthrene | 0.06 | 0 | 9.08E-02 | 8.93E-04 | 1.000E+02 | 0.0 |
| Pyrene | 0.1795 | 0 | 4.31E-02 | 2.00E-03 | 1.000E+02 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Marsh Wren | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.818E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 2.818E-03 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.000E-02 | |
| FI | Food ingestion rate (kg/day) | 2.818E-03 | |
| WI | Water ingestion rate (L/day) | 2.697E-03 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | LOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10783.8462 | 0.11325 | 2.00E-01 | 9.12E+02 | 1.097E+03 | 0.8 |
| Antimony | 1.0775 | 0 | 1.00E+00 | 3.34E-01 | NA | NA |
| Arsenic | 6.2477 | 0 | 5.23E-01 | 1.10E+00 | 7.380E+00 | 0.1 |
| Barium | 25.1654 | 0.0169 | 3.60E-01 | 3.27E+00 | 4.170E+01 | 0.1 |
| Beryllium | 0.164 | 0 | 1.00E+00 | 5.08E-02 | NA | NA |
| Cadmium | 1.0488 | 0 | 4.07E+01 | 1.21E+01 | 2.000E+01 | 0.6 |
| Chromium | 17.0192 | 0.002675 | 3.16E+00 | 1.56E+01 | 5.000E+00 | 3.1 |
| Cobalt | 2.4323 | 0 | 1.00E+00 | 7.54E-01 | NA | NA |
| Copper | 78.7992 | 0 | 1.53E+00 | 3.62E+01 | 6.170E+01 | 0.6 |
| Iron | 19656.9231 | 0.2041 | 1.00E-01 | 1.11E+03 | NA | NA |
| Lead | 116.7885 | 0 | 1.52E+00 | 5.34E+01 | 3.850E+01 | 1.4 |
| Manganese | 86.7846 | 0.0491 | 1.24E-01 | 5.49E+00 | 9.770E+03 | 0.0 |
| Mercury | 0.0275 | 0 | 2.06E+01 | 1.61E-01 | 9.000E-01 | 0.2 |
| Nickel | 5.3596 | 0 | 4.73E+00 | 7.29E+00 | 1.070E+02 | 0.1 |
| Selenium | 0.3267 | 0 | 1.34E+00 | 1.33E-01 | 1.000E+00 | 0.1 |
| Silver | 0.7535 | 0 | 1.00E+00 | 2.34E-01 | NA | NA |
| Vanadium | 29.9731 | 0.002325 | 8.80E-02 | 1.59E+00 | 1.140E+02 | 0.0 |
| Zinc | 46.9577 | 0 | 1.29E+01 | 1.72E+02 | 1.310E+02 | 1.3 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MARSH WREN
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0021442 | 0 | 1.06E+01 | 6.46E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0018744 | 0 | 7.00E-01 | 4.23E-04 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0012731 | 0 | 3.00E+00 | 1.11E-03 | 1.070E+01 | 0.0 |
| beta-BHC | 0.0012615 | 0 | 1.00E+00 | 3.91E-04 | NA | NA |
| Dieldrin | 0.002225 | 0 | 8.00E+00 | 5.08E-03 | NA | NA |
| Gamma-Chlordane | 0.0012904 | 0 | 3.00E+00 | 1.13E-03 | 1.070E+01 | 0.0 |
| Heptachlor Epoxide | 0.0023077 | 0 | 1.00E+01 | 6.57E-03 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.00E-01 | 4.23E-03 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 2.70E-01 | 1.04E-02 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 3.40E-01 | 1.36E-02 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.2004231 | 0 | 2.10E-01 | 1.75E-02 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 1.50E-01 | 9.86E-03 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 2.10E-01 | 1.14E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.0205 | 1.00E+00 | 3.65E-02 | 1.100E+01 | 0.0 |
| Chrysene | 0.2 | 0 | 4.40E-01 | 3.04E-02 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 1.00E+00 | 1.49E-02 | 1.100E+00 | 0.0 |
| Fluoranthene | 0.1887308 | 0 | 3.70E-01 | 2.50E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 4.10E-01 | 2.30E-02 | 1.000E+02 | 0.0 |
| Phenanthrene | 0.06 | 0 | 2.80E-01 | 6.42E-03 | 1.000E+02 | 0.0 |
| Pyrene | 0.1795 | 0 | 3.90E-01 | 2.48E-02 | 1.000E+02 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red-Tailed Hawk | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.222E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 1.111E-01 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 1.126E+00 | |
| FI | Food ingestion rate (kg/day) | 1.111E-01 | |
| WI | Water ingestion rate (L/day) | 6.388E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10783.8462 | 0.11325 | 1.00E+00 | 1.09E+03 | 1.097E+03 | 1.0 |
| Antimony | 1.0775 | 0 | 1.00E+00 | 1.08E-01 | NA | NA |
| Arsenic | 6.2477 | 0 | 1.60E-02 | 2.22E-02 | 7.380E+00 | 0.0 |
| Barium | 25.1654 | 0.0169 | 2.53E-01 | 6.79E-01 | 4.170E+01 | 0.0 |
| Beryllium | 0.164 | 0 | 4.10E-01 | 6.96E-03 | NA | NA |
| Cadmium | 1.0488 | 0 | 4.48E-01 | 4.84E-02 | 2.000E+01 | 0.0 |
| Chromium | 17.0192 | 0.002675 | 3.09E-01 | 5.53E-01 | 5.000E+00 | 0.1 |
| Cobalt | 2.4323 | 0 | 1.40E-01 | 3.84E-02 | NA | NA |
| Copper | 78.7992 | 0 | 1.29E+00 | 1.02E+01 | 6.170E+01 | 0.2 |
| Iron | 19656.9231 | 0.2041 | 2.40E-02 | 8.54E+01 | NA | NA |
| Lead | 116.7885 | 0 | 1.87E-01 | 2.39E+00 | 3.850E+01 | 0.1 |
| Manganese | 86.7846 | 0.0491 | 1.00E+00 | 8.74E+00 | 9.770E+03 | 0.0 |
| Mercury | 0.0275 | 0 | 1.92E-01 | 5.75E-04 | 9.000E-01 | 0.0 |
| Nickel | 5.3596 | 0 | 8.98E-01 | 4.85E-01 | 1.070E+02 | 0.0 |
| Selenium | 0.3267 | 0 | 1.55E-01 | 5.64E-03 | 1.000E+00 | 0.0 |
| Silver | 0.7535 | 0 | 1.00E+00 | 7.58E-02 | NA | NA |
| Vanadium | 29.9731 | 0.002325 | 1.00E+00 | 3.02E+00 | 1.140E+02 | 0.0 |
| Zinc | 46.9577 | 0 | 2.32E+00 | 1.08E+01 | 1.310E+02 | 0.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED-TAILED HAWK
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0021442 | 0 | 1.00E+00 | 2.16E-04 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0018744 | 0 | 1.00E+00 | 1.89E-04 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0012731 | 0 | 1.00E+00 | 1.28E-04 | 1.070E+01 | 0.0 |
| beta-BHC | 0.0012615 | 0 | 1.00E+00 | 1.27E-04 | NA | NA |
| Dieldrin | 0.002225 | 0 | 1.00E+00 | 2.24E-04 | NA | NA |
| Gamma-Chlordane | 0.0012904 | 0 | 1.00E+00 | 1.30E-04 | 1.070E+01 | 0.0 |
| Heptachlor Epoxide | 0.0023077 | 0 | 1.00E+00 | 2.32E-04 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 1.00E+00 | 5.03E-03 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.00E+00 | 1.01E-02 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.00E+00 | 1.11E-02 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.2004231 | 0 | 1.00E+00 | 2.02E-02 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 1.00E+00 | 1.41E-02 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.00E+00 | 1.31E-02 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.0205 | 1.00E+00 | 1.12E-02 | 1.100E+01 | 0.0 |
| Chrysene | 0.2 | 0 | 1.00E+00 | 2.01E-02 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 1.00E+00 | 4.83E-03 | 1.100E+00 | 0.0 |
| Fluoranthene | 0.1887308 | 0 | 1.00E+00 | 1.90E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 1.00E+00 | 1.61E-02 | 1.000E+02 | 0.0 |
| Phenanthrene | 0.06 | 0 | 1.00E+00 | 6.04E-03 | 1.000E+02 | 0.0 |
| Pyrene | 0.1795 | 0 | 1.00E+00 | 1.81E-02 | 1.000E+02 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | American Robin | |
|---|---|---|---|
| BAF | Soil to plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 1.490E-03 | |
| Iv | Rate of vegetation ingestion (kg/day) | 2.075E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.026E-02 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 7.730E-02 | |
| FI | Food Ingestion Rate (kg/day) | 1.603E-02 | |
| WI | Water ingestion rate (L/day) | 1.062E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil - Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 10783.8462 | 0.11325 | 4.00E-03 | 2.00E-01 | 4.95E+02 | 1.097E+03 | 0.5 |
| Antimony | 1.0775 | 0 | 2.00E-01 | 1.00E+00 | 1.70E-01 | NA | NA |
| Arsenic | 6.2477 | 0 | 1.10E+00 | 5.23E-01 | 7.39E-01 | 7.380E+00 | 0.1 |
| Barium | 25.1654 | 0.0169 | 1.50E-01 | 3.60E-01 | 1.79E+00 | 4.170E+01 | 0.0 |
| Beryllium | 0.164 | 0 | 1.00E-02 | 1.00E+00 | 2.50E-02 | NA | NA |
| Cadmium | 1.0488 | 0 | 3.25E+00 | 4.07E+01 | 5.78E+00 | 2.000E+01 | 0.3 |
| Chromium | 17.0192 | 0.002675 | 7.50E-03 | 3.16E+00 | 7.48E+00 | 5.000E+00 | 1.5 |
| Cobalt | 2.4323 | 0 | 2.00E-02 | 1.00E+00 | 3.71E-01 | NA | NA |
| Copper | 78.7992 | 0 | 6.25E-01 | 1.53E+00 | 1.89E+01 | 6.170E+01 | 0.3 |
| Iron | 19656.9231 | 0.2041 | 4.00E-03 | 1.00E-01 | 6.42E+02 | NA | NA |
| Lead | 116.7885 | 0 | 4.68E-01 | 1.52E+00 | 2.73E+01 | 3.850E+01 | 0.7 |
| Manganese | 86.7846 | 0.0491 | 2.50E-01 | 1.24E-01 | 3.69E+00 | 9.770E+03 | 0.0 |
| Mercury | 0.0275 | 0 | 5.00E+00 | 2.06E+01 | 7.96E-02 | 9.000E-01 | 0.1 |
| Nickel | 5.3596 | 0 | 1.41E+00 | 4.73E+00 | 3.67E+00 | 1.070E+02 | 0.0 |
| Selenium | 0.3267 | 0 | 3.01E+00 | 1.34E+00 | 9.08E-02 | 1.000E+00 | 0.1 |
| Silver | 0.7535 | 0 | 4.00E-01 | 1.00E+00 | 1.23E-01 | NA | NA |
| Vanadium | 29.9731 | 0.002325 | 5.50E-03 | 8.80E-02 | 9.33E-01 | 1.140E+02 | 0.0 |
| Zinc | 46.9577 | 0 | 1.82E+00 | 1.29E+01 | 8.36E+01 | 1.310E+02 | 0.6 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE AMERICAN ROBIN
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil - Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDE | 0.0021442 | 0 | 4.80E-03 | 1.06E+01 | 3.06E-03 | 8.800E+00 | 0.0 |
| 4,4'-DDT | 0.0018744 | 0 | 6.50E-03 | 7.00E-01 | 2.11E-04 | 8.800E+00 | 0.0 |
| alpha-Chlordane | 0.0012731 | 0 | 8.90E-03 | 3.00E+00 | 5.32E-04 | 1.070E+01 | 0.0 |
| beta-BHC | 0.0012615 | 0 | 2.43E-01 | 1.00E+00 | 2.00E-04 | NA | NA |
| Dieldrin | 0.002225 | 0 | 3.05E-02 | 8.00E+00 | 2.41E-03 | NA | NA |
| Gamma-Chlordane | 0.0012904 | 0 | 8.60E-03 | 3.00E+00 | 5.39E-04 | 1.070E+01 | 0.0 |
| Heptachlor Epoxide | 0.0023077 | 0 | 4.99E-02 | 1.00E+01 | 3.11E-03 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.16E-01 | 2.00E-01 | 2.58E-03 | 1.000E+02 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.97E-02 | 2.70E-01 | 5.57E-03 | 1.000E+02 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.14E-02 | 3.40E-01 | 7.12E-03 | 1.000E+02 | 0.0 |
| Benzo(b)fluoranthene | 0.2004231 | 0 | 1.01E-02 | 2.10E-01 | 9.51E-03 | 1.000E+02 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 5.20E-03 | 1.50E-01 | 5.51E-03 | 1.000E+02 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.01E-02 | 2.10E-01 | 6.17E-03 | 1.000E+02 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.0205 | 2.30E-03 | 1.00E+00 | 1.80E-02 | 1.100E+01 | 0.0 |
| Chrysene | 0.2 | 0 | 1.97E-02 | 4.40E-01 | 1.56E-02 | 1.000E+02 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 8.38E-02 | 1.00E+00 | 7.41E-03 | 1.100E+00 | 0.0 |
| Fluoranthene | 0.1887308 | 0 | 4.25E-02 | 3.70E-01 | 1.31E-02 | 1.000E+02 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 5.60E-03 | 4.10E-01 | 1.18E-02 | 1.000E+02 | 0.0 |
| Phenanthrene | 0.06 | 0 | 9.08E-02 | 2.80E-01 | 3.53E-03 | 1.000E+02 | 0.0 |
| Pyrene | 0.1795 | 0 | 4.31E-02 | 3.90E-01 | 1.30E-02 | 1.000E+02 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Red Fox | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to vole bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 8.762E-03 | |
| Im | Rate of small mammal ingestion (kg/day) | 3.129E-01 | |
| HR | Home range size (acres) | 2.564E+03 | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 4.535E+00 | |
| FI | Food ingestion rate (kg/day) | 3.129E-01 | |
| WI | Water ingestion rate (L/day) | 1.134E-01 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10783.8462 | 0.11325 | 1.00E+00 | 7.65E+02 | 5.504E+00 | 139.0 |
| Antimony | 1.0775 | 0 | 1.00E+00 | 7.64E-02 | 3.565E-01 | 0.2 |
| Arsenic | 6.2477 | 0 | 1.60E-02 | 1.90E-02 | 3.593E-01 | 0.1 |
| Barium | 25.1654 | 0.0169 | 2.53E-01 | 4.88E-01 | 1.044E+01 | 0.0 |
| Beryllium | 0.164 | 0 | 4.10E-01 | 4.96E-03 | 3.479E+00 | 0.0 |
| Cadmium | 1.0488 | 0 | 4.48E-01 | 3.44E-02 | 5.084E+00 | 0.0 |
| Chromium | 17.0192 | 0.002675 | 3.09E-01 | 3.96E-01 | 1.443E+04 | 0.0 |
| Cobalt | 2.4323 | 0 | 1.40E-01 | 2.82E-02 | NA | NA |
| Copper | 78.7992 | 0 | 1.29E+00 | 7.17E+00 | 1.037E+01 | 0.7 |
| Iron | 19656.9231 | 0.2041 | 2.40E-02 | 7.05E+01 | NA | NA |
| Lead | 116.7885 | 0 | 1.87E-01 | 1.73E+00 | 4.217E+01 | 0.0 |
| Manganese | 86.7846 | 0.0491 | 1.00E+00 | 6.16E+00 | 1.497E+02 | 0.0 |
| Mercury | 0.0275 | 0 | 1.92E-01 | 4.17E-04 | 6.853E+00 | 0.0 |
| Nickel | 5.3596 | 0 | 8.98E-01 | 3.42E-01 | 4.217E+01 | 0.0 |
| Selenium | 0.3267 | 0 | 1.55E-01 | 4.13E-03 | 1.739E-01 | 0.0 |
| Silver | 0.7535 | 0 | 1.00E+00 | 5.34E-02 | NA | NA |
| Vanadium | 29.9731 | 0.002325 | 1.00E+00 | 2.13E+00 | 1.028E+00 | 2.1 |
| Zinc | 46.9577 | 0 | 2.32E+00 | 7.60E+00 | 1.687E+02 | 0.0 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE RED FOX
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Vole BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0021442 | 0 | 1.00E+00 | 1.52E-04 | 4.217E+00 | 0.0 |
| 4,4'-DDT | 0.0018744 | 0 | 1.00E+00 | 1.33E-04 | 4.217E+00 | 0.0 |
| alpha-Chlordane | 0.0012731 | 0 | 1.00E+00 | 9.03E-05 | 2.624E+00 | 0.0 |
| beta-BHC | 0.0012615 | 0 | 1.00E+00 | 8.95E-05 | NA | NA |
| Dieldrin | 0.002225 | 0 | 1.00E+00 | 1.58E-04 | NA | NA |
| Gamma-Chlordane | 0.0012904 | 0 | 1.00E+00 | 9.15E-05 | 2.624E+00 | 0.0 |
| Heptachlor Epoxide | 0.0023077 | 0 | 1.00E+00 | 1.64E-04 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 1.00E+00 | 3.55E-03 | 7.415E-01 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.00E+00 | 7.09E-03 | 7.415E-01 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.00E+00 | 7.80E-03 | 2.852E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.2004231 | 0 | 1.00E+00 | 1.42E-02 | 7.415E-01 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 1.00E+00 | 9.93E-03 | 7.415E-01 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.00E+00 | 9.22E-03 | 7.415E-01 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.0205 | 1.00E+00 | 7.61E-03 | 5.219E+01 | 0.0 |
| Chrysene | 0.2 | 0 | 1.00E+00 | 1.42E-02 | 7.415E-01 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 1.00E+00 | 3.40E-03 | 5.228E+02 | 0.0 |
| Fluoranthene | 0.1887308 | 0 | 1.00E+00 | 1.34E-02 | 7.415E-01 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 1.00E+00 | 1.13E-02 | 7.415E-01 | 0.0 |
| Phenanthrene | 0.06 | 0 | 1.00E+00 | 4.26E-03 | 7.415E-01 | 0.0 |
| Pyrene | 0.1795 | 0 | 1.00E+00 | 1.27E-02 | 7.415E-01 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0.

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*Br*Ifr)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Short-Tailed Shrew | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to worm bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 4.663E-04 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 1.943E-02 | |
| HR | Home range size (acres) | NA | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.152E-01 | |
| FI | Food ingestion rate (kg/day) | 1.943E-02 | |
| WI | Water ingestion rate (L/day) | 8.621E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10783.8462 | 0.11325 | 2.00E-01 | 2.18E+02 | 1.179E+01 | 18.5 |
| Antimony | 1.0775 | 0 | 1.00E+00 | 9.96E-02 | 7.638E-01 | 0.1 |
| Arsenic | 6.2477 | 0 | 5.23E-01 | 3.09E-01 | 7.700E-01 | 0.4 |
| Barium | 25.1654 | 0.0169 | 3.60E-01 | 8.79E-01 | 2.236E+01 | 0.0 |
| Beryllium | 0.164 | 0 | 1.00E+00 | 1.52E-02 | 7.454E+00 | 0.0 |
| Cadmium | 1.0488 | 0 | 4.07E+01 | 3.86E+00 | 1.089E+01 | 0.4 |
| Chromium | 17.0192 | 0.002675 | 3.16E+00 | 4.90E+00 | 3.091E+04 | 0.0 |
| Cobalt | 2.4323 | 0 | 1.00E+00 | 2.25E-01 | NA | NA |
| Copper | 78.7992 | 0 | 1.53E+00 | 1.11E+01 | 2.223E+01 | 0.5 |
| Iron | 19656.9231 | 0.2041 | 1.00E-01 | 2.20E+02 | NA | NA |
| Lead | 116.7885 | 0 | 1.52E+00 | 1.63E+01 | 9.035E+01 | 0.2 |
| Manganese | 86.7846 | 0.0491 | 1.24E-01 | 1.18E+00 | 3.207E+02 | 0.0 |
| Mercury | 0.0275 | 0 | 2.06E+01 | 5.13E-02 | 1.468E+01 | 0.0 |
| Nickel | 5.3596 | 0 | 4.73E+00 | 2.30E+00 | 9.035E+01 | 0.0 |
| Selenium | 0.3267 | 0 | 1.34E+00 | 4.02E-02 | 3.727E-01 | 0.1 |
| Silver | 0.7535 | 0 | 1.00E+00 | 6.97E-02 | NA | NA |
| Vanadium | 29.9731 | 0.002325 | 8.80E-02 | 3.04E-01 | 2.202E+00 | 0.1 |
| Zinc | 46.9577 | 0 | 1.29E+01 | 5.48E+01 | 3.614E+02 | 0.2 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE SHORT-TAILED SHREW
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0021442 | 0 | 1.06E+01 | 2.06E-03 | 9.035E+00 | 0.0 |
| 4,4'-DDT | 0.0018744 | 0 | 7.00E-01 | 1.23E-04 | 9.035E+00 | 0.0 |
| alpha-Chlordane | 0.0012731 | 0 | 3.00E+00 | 3.48E-04 | 5.622E+00 | 0.0 |
| beta-BHC | 0.0012615 | 0 | 1.00E+00 | 1.17E-04 | NA | NA |
| Dieldrin | 0.002225 | 0 | 8.00E+00 | 1.61E-03 | NA | NA |
| Gamma-Chlordane | 0.0012904 | 0 | 3.00E+00 | 3.52E-04 | 5.622E+00 | 0.0 |
| Heptachlor Epoxide | 0.0023077 | 0 | 1.00E+01 | 2.09E-03 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.00E-01 | 1.01E-03 | 1.589E+00 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 2.70E-01 | 2.66E-03 | 1.589E+00 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 3.40E-01 | 3.62E-03 | 6.111E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.2004231 | 0 | 2.10E-01 | 4.24E-03 | 1.589E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 1.50E-01 | 2.20E-03 | 1.589E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 2.10E-01 | 2.75E-03 | 1.589E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.0205 | 1.00E+00 | 1.75E-02 | 1.118E+02 | 0.0 |
| Chrysene | 0.2 | 0 | 4.40E-01 | 8.38E-03 | 1.589E+00 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 1.00E+00 | 4.44E-03 | 1.120E+03 | 0.0 |
| Fluoranthene | 0.1887308 | 0 | 3.70E-01 | 6.72E-03 | 1.589E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 4.10E-01 | 6.27E-03 | 1.589E+00 | 0.0 |
| Phenanthrene | 0.06 | 0 | 2.80E-01 | 1.65E-03 | 1.589E+00 | 0.0 |
| Pyrene | 0.1795 | 0 | 3.90E-01 | 6.71E-03 | 1.589E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Dose = (((Cs*BAF*Iv)+(Cs*Is)+(Cw*Iw))*H) / BW

| Parameter | Description | Meadow Vole | |
|---|---|---|---|
| Cs | Constituent concentration in soil | CS | (Chemical Specific) |
| Cw | Constituent concentration in drinking water | CS | |
| BAF | Soil to plant bioaccumulation factor | CS | |
| Is | Rate of incidential ingestion of soil (kg/day) | 2.366E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 9.858E-03 | |
| HR | Home range size (acres) | 6.600E-02 | |
| SA | Site area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 3.286E-02 | |
| FI | Food ingestion rate (kg/day) | 9.858E-03 | |
| WI | Water ingestion rate (L/day) | 6.901E-03 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in WAter (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| INORGANICS | | | | | | |
| Aluminum | 10783.8462 | 0 | 4.00E-03 | 3.64E+02 | 1.887E+01 | 19.3 |
| Antimony | 1.0775 | 0 | 2.00E-01 | 8.28E-02 | 1.222E+00 | 0.1 |
| Arsenic | 6.2477 | 0 | 1.10E+00 | 1.72E+00 | 1.232E+00 | 1.4 |
| Barium | 25.1654 | 0 | 1.50E-01 | 1.66E+00 | 3.577E+01 | 0.0 |
| Beryllium | 0.164 | 0 | 1.00E-02 | 5.75E-03 | 1.192E+01 | 0.0 |
| Cadmium | 1.0488 | 0 | 3.25E+00 | 7.84E-01 | 1.743E+01 | 0.0 |
| Chromium | 17.0192 | 0 | 7.50E-03 | 5.87E-01 | 4.945E+04 | 0.0 |
| Cobalt | 2.4323 | 0 | 2.00E-02 | 9.06E-02 | NA | NA |
| Copper | 78.7992 | 0 | 6.25E-01 | 1.34E+01 | 3.556E+01 | 0.4 |
| Iron | 19656.9231 | 0 | 4.00E-03 | 6.63E+02 | NA | NA |
| Lead | 116.7885 | 0 | 4.68E-01 | 1.59E+01 | 1.445E+02 | 0.1 |
| Manganese | 86.7846 | 0 | 2.50E-01 | 7.62E+00 | 5.131E+02 | 0.0 |
| Mercury | 0.0275 | 0 | 5.00E+00 | 3.12E-02 | 2.349E+01 | 0.0 |
| Nickel | 5.3596 | 0 | 1.41E+00 | 1.84E+00 | 1.445E+02 | 0.0 |
| Selenium | 0.3267 | 0 | 3.01E+00 | 2.27E-01 | 5.962E-01 | 0.4 |
| Silver | 0.7535 | 0 | 4.00E-01 | 9.11E-02 | NA | NA |
| Vanadium | 29.9731 | 0 | 5.50E-03 | 1.02E+00 | 3.522E+00 | 0.3 |
| Zinc | 46.9577 | 0 | 1.82E+00 | 2.03E+01 | 5.781E+02 | 0.0 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE MEADOW VOLE
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Maximum Constituent Concentration in Soil (mg/kg) (Cs) | Maximum Constituent Concentration in Water (mg/L) (Cw) | Soil-Plant BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|
| ORGANICS | | | | | | |
| 4,4'-DDE | 0.0021442 | 0 | 4.80E-03 | 7.27E-05 | 1.445E+01 | 0.0 |
| 4,4'-DDT | 0.0018744 | 0 | 6.50E-03 | 6.43E-05 | 1.445E+01 | 0.0 |
| alpha-Chlordane | 0.0012731 | 0 | 8.90E-03 | 4.43E-05 | 8.993E+00 | 0.0 |
| beta-BHC | 0.0012615 | 0 | 2.43E-01 | 1.09E-04 | NA | NA |
| Dieldrin | 0.002225 | 0 | 3.05E-02 | 8.80E-05 | NA | NA |
| Gamma-Chlordane | 0.0012904 | 0 | 8.60E-03 | 4.48E-05 | 8.993E+00 | 0.0 |
| Heptachlor Epoxide | 0.0023077 | 0 | 4.99E-02 | 1.01E-04 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.16E-01 | 4.02E-03 | 2.541E+00 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.97E-02 | 3.72E-03 | 2.541E+00 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.14E-02 | 3.89E-03 | 9.775E+00 | 0.0 |
| Benzo(b)fluoranthene | 0.2004231 | 0 | 1.01E-02 | 7.03E-03 | 2.541E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 5.20E-03 | 4.76E-03 | 2.541E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.01E-02 | 4.56E-03 | 2.541E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.0205 | 2.30E-03 | 3.34E-03 | 1.789E+02 | 0.0 |
| Chrysene | 0.2 | 0 | 1.97E-02 | 7.44E-03 | 2.541E+00 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 8.38E-02 | 2.46E-03 | 1.792E+03 | 0.0 |
| Fluoranthene | 0.1887308 | 0 | 4.25E-02 | 7.97E-03 | 2.541E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 5.60E-03 | 5.45E-03 | 2.541E+00 | 0.0 |
| Phenanthrene | 0.06 | 0 | 9.08E-02 | 3.17E-03 | 2.541E+00 | 0.0 |
| Pyrene | 0.1795 | 0 | 4.31E-02 | 7.60E-03 | 2.541E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Cm = (((Cs*BAF*Iv)+(Cs*Is))*H) / BW
Dose = (((Cm*Im*Bb)+(Cs*BAF*Iv)+(Cs*Is))*H) / BW

| Parameter | Description | Deer Mouse | |
|---|---|---|---|
| BAF | Soil to plant bioaccumulation factor | CS | (Chemical Specific) |
| Cs | Constituent concentration in soil | CS | |
| Cw | Constituent concentration in water | CS | |
| Is | Rate of Incidential ingestion of soil (kg/day) | 1.038E-04 | |
| Iv | Rate of vegetation ingestion (kg/day) | 2.075E-03 | |
| Ii | Rate of invertebrate ingestion (kg/day) | 3.113E-03 | |
| HR | Home Range Size (acres) | NA | |
| SA | Site Area (acres) | 1.000E+00 | |
| H | Ratio of home range area to site area (=1 for screening) | 1.000E+00 | |
| BW | Body weight (kg) | 2.533E-02 | |
| FI | Food Ingestion Rate (kg/day) | 5.188E-03 | |
| WI | Water ingestion rate (L/day) | 7.112E-02 | |

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil - Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | ILOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| INORGANICS | | | | | | | |
| Aluminum | 10783.8462 | 0.11325 | 4.00E-03 | 2.00E-01 | 3.13E+02 | 2.013E+01 | 15.5 |
| Antimony | 1.0775 | 0 | 2.00E-01 | 1.00E+00 | 1.54E-01 | 1.304E+00 | 0.1 |
| Arsenic | 6.2477 | 0 | 1.10E+00 | 5.23E-01 | 9.92E-01 | 1.314E+00 | 0.8 |
| Barium | 25.1654 | 0.0169 | 1.50E-01 | 3.60E-01 | 1.57E+00 | 3.817E+01 | 0.0 |
| Beryllium | 0.164 | 0 | 1.00E-02 | 1.00E+00 | 2.10E-02 | 1.272E+01 | 0.0 |
| Cadmium | 1.0488 | 0 | 3.25E+00 | 4.07E+01 | 5.53E+00 | 1.860E+01 | 0.3 |
| Chromium | 17.0192 | 0.002675 | 7.50E-03 | 3.16E+00 | 6.70E+00 | 5.277E+04 | 0.0 |
| Cobalt | 2.4323 | 0 | 2.00E-02 | 1.00E+00 | 3.13E-01 | NA | NA |
| Copper | 78.7992 | 0 | 6.25E-01 | 1.53E+00 | 1.92E+01 | 3.795E+01 | 0.5 |
| Iron | 19656.9231 | 0.2041 | 4.00E-03 | 1.00E-01 | 3.29E+02 | NA | NA |
| Lead | 116.7885 | 0 | 4.68E-01 | 1.52E+00 | 2.68E+01 | 1.542E+02 | 0.2 |
| Manganese | 86.7846 | 0.0491 | 2.50E-01 | 1.24E-01 | 3.59E+00 | 5.475E+02 | 0.0 |
| Mercury | 0.0275 | 0 | 5.00E+00 | 2.06E+01 | 8.11E-02 | 2.507E+01 | 0.0 |
| Nickel | 5.3596 | 0 | 1.41E+00 | 4.73E+00 | 3.76E+00 | 1.542E+02 | 0.0 |
| Selenium | 0.3267 | 0 | 3.01E+00 | 1.34E+00 | 1.36E-01 | 6.362E-01 | 0.2 |
| Silver | 0.7535 | 0 | 4.00E-01 | 1.00E+00 | 1.20E-01 | NA | NA |
| Vanadium | 29.9731 | 0.002325 | 5.50E-03 | 8.80E-02 | 4.67E-01 | 3.759E+00 | 0.1 |
| Zinc | 46.9577 | 0 | 1.82E+00 | 1.29E+01 | 8.16E+01 | 6.169E+02 | 0.1 |

EQUATIONS USED TO CALCULATE EXPOSURE FOR THE DEER MOUSE
LESS CONSERVATIVE ASSUMPTIONS
SITE 22 - BURNING PAD
NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

| Detected Constituent | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Soil (mg/kg) (Cs) | Arithmatic Mean (Half Non-Detects) Constituent Concentration in Water (mg/L) (Cw) | Soil - Plant BAF | Soil-Worm BAF (mg/kg) | Dose (mg/kg/day) | lLOAEL (mg/kg/day) | Hazard Quotient (= Dose/LOAEL) |
|---|---|---|---|---|---|---|---|
| ORGANICS | | | | | | | |
| 4,4'-DDE | 0.0021442 | 0 | 4.80E-03 | 1.06E+01 | 2.80E-03 | 1.542E+01 | 0.0 |
| 4,4'-DDT | 0.0018744 | 0 | 6.50E-03 | 7.00E-01 | 1.70E-04 | 1.542E+01 | 0.0 |
| alpha-Chlordane | 0.0012731 | 0 | 8.90E-03 | 3.00E+00 | 4.75E-04 | 9.597E+00 | 0.0 |
| beta-BHC | 0.0012615 | 0 | 2.43E-01 | 1.00E+00 | 1.85E-04 | NA | NA |
| Dieldrin | 0.002225 | 0 | 3.05E-02 | 8.00E+00 | 2.20E-03 | NA | NA |
| Gamma-Chlordane | 0.0012904 | 0 | 8.60E-03 | 3.00E+00 | 4.82E-04 | 9.597E+00 | 0.0 |
| Heptachlor Epoxide | 0.0023077 | 0 | 4.99E-02 | 1.00E+01 | 2.85E-03 | NA | NA |
| 2-Methylnaphthalene | 0.05 | 0 | 2.16E-01 | 2.00E-01 | 2.32E-03 | 2.712E+00 | 0.0 |
| Benzo(a)anthracene | 0.1 | 0 | 1.97E-02 | 2.70E-01 | 3.89E-03 | 2.712E+00 | 0.0 |
| Benzo(a)pyrene | 0.11 | 0 | 1.14E-02 | 3.40E-01 | 5.15E-03 | 1.043E+01 | 0.0 |
| Benzo(b)fluoranthene | 0.2004231 | 0 | 1.01E-02 | 2.10E-01 | 6.16E-03 | 2.712E+00 | 0.0 |
| Benzo(g,h,i)perylene | 0.14 | 0 | 5.20E-03 | 1.50E-01 | 3.21E-03 | 2.712E+00 | 0.0 |
| Benzo(k)fluoranthene | 0.13 | 0 | 1.01E-02 | 2.10E-01 | 3.99E-03 | 2.712E+00 | 0.0 |
| Bis-(2-Ethylhexyl)phthalate | 0.1 | 0.0205 | 2.30E-03 | 1.00E+00 | 7.03E-02 | 1.909E+02 | 0.0 |
| Chrysene | 0.2 | 0 | 1.97E-02 | 4.40E-01 | 1.20E-02 | 2.712E+00 | 0.0 |
| Di-n-butylphthalate | 0.048 | 0 | 8.38E-02 | 1.00E+00 | 6.42E-03 | 1.912E+03 | 0.0 |
| Fluoranthene | 0.1887308 | 0 | 4.25E-02 | 3.70E-01 | 1.00E-02 | 2.712E+00 | 0.0 |
| Indeno(1,2,3-cd)pyrene | 0.16 | 0 | 5.60E-03 | 4.10E-01 | 8.79E-03 | 2.712E+00 | 0.0 |
| Phenanthrene | 0.06 | 0 | 9.08E-02 | 2.80E-01 | 2.76E-03 | 2.712E+00 | 0.0 |
| Pyrene | 0.1795 | 0 | 4.31E-02 | 3.90E-01 | 9.97E-03 | 2.712E+00 | 0.0 |

Notes:
NA = Not Applicable
Shading indicates HQ > 1.0