FINAL

WHITE PAPER – ECOLOGICAL RISK ASSESSMENT
AEROJET SUPERFUND SITE

AEROJET
A GenCorp Company

SACRAMENTO COUNTY, CALIFORNIA

AEROJET DOCUMENT CONTROL NUMBER: SR10120515-R1

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1.0 *ECOLOGICAL RISK ASSESSMENT AGREEMENTS FOR THE AEROJET SUPERFUND SITE*

This white paper summarizes agreements reached with the United States Environmental Protection Agency (USEPA) Region IX, California Department of Toxic Substances Control (DTSC), and California Regional Water Quality Control Board (RWQCB), collectively referred to as the agencies, regarding the scope and specific methods to be used in conducting ecological risk assessments (ERAs) for the Operable Units (OUs) at the Aerojet Superfund Site in Rancho Cordova, California (the Site).

This white paper is intended to be a "living document" and will be updated periodically as new agreements are reached with the agencies regarding the scope and methods to be used in conducting the ERAs.

The following documents, meeting notes, and letters (presented in reverse chronological order) were used as the basis for the agreements outlined in this document:

1. *Final Remedial Investigation/Feasibility Study Work Plan – Source Area Operable Units* (Source Area RI/FS Work Plan, 17 June 2005).
2. Responses to Agency Comments on the Draft Source Area RI/FS Work Plan (Appendix D of the RI/FS Work Plan, 17 June 2005).
3. Scoping meeting minutes, Background Soil Data Set – Use in Risk Analysis, RI/FS Work Plan – Source Area OUs (2 December 2004).
4. Scoping meeting minutes, RI/FS Work Plan – Source Area OUs (1 November 2004).

The agreements presented below are organized by category (i.e., data evaluation, screening-level ERA (SLERA) methodology, and baseline ERA methodology) and its corresponding reference source(s) number in parenthesis follows each agreement. The ecological screening levels that will be used during the data evaluation are presented in Appendix A.

1.1 *DATA EVALUATION*

The data evaluation agreements described for the Human Health Risk Assessment (HHRA) submitted under separate cover, including collection and use of background data for inorganics, are largely expected to apply

for the ERA as well. Obvious exceptions include the use of ecotoxicological benchmarks rather than health-based preliminary remediation goals (PRGs) for constituents of potential concern (COPCs) screening, and other agreements that pertain only to the assessment of exposure and risk of humans rather than non-human organisms in the environment. Other differences or agreements specific to the ERA are noted as follows:

- Ecological COPCs will be selected based on RAGS Part D guidance, and DTSC and Human and Ecological Risk Division (HERD) guidance. Organic chemicals that are infrequently detected (less than 5 percent frequency of detection) will be retained as COPCs if they are potentially bioaccumulative (e.g., log K_{ow} greater than 3.0). (1, 2)
- Site chemicals that are at concentrations similar to background do not need to be evaluated in the ecological risk assessment. Moreover, a quantitative background risk assessment is not needed for chemicals that occur at or below background levels. (1, 3)
- Treated and untreated groundwater will not be evaluated as an exposure medium for aquatic life in the ERA. Untreated groundwater is not known to discharge to surface water bodies within the OUs, but this will be verified during the OU-specific remedial investigation. If treated or untreated groundwater is found to discharge to surface water bodies, it will be evaluated in the SLERA as a potential source. Otherwise, groundwater data will not be evaluated in the SLERA. (1, 2)
- Contamination at depths greater than 6 feet below ground surface (bgs) will not be considered to pose a threat to ecological receptors. Aerojet may consider the use of shallower maximum depths (e.g., 3 to 4 feet bgs) based on the burrowing depths of OU-specific receptors. (1, 2)

1.2 *SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENTS METHODOLOGY*

The following agreements pertain to the SLERAs to be performed for each OU.

- The USEPA 8-step ERA process will be followed. SLERAs (Steps 1 and 2) will be conducted for all exposure areas within each OU. (4)
- For some chemicals with limited information for ecological exposure and toxicity, such as perchlorate and N-nitrosodimethylamine

(NDMA), Aerojet and the agencies will collaborate to identify ecological toxicity screening values. (4)

- For each OU, one or more exposure area(s) will be identified based on appropriate habitat. Source areas that do not contain habitat under current conditions and that will not provide habitat in the future, or that do not serve as a potential source of migration into adjacent habitats, will not be evaluated. (1, 2)
- The Problem Formulation for each OU will be presented in the OU-specific field-sampling plan. Information to be presented includes COPCs, exposure factors, receptors, endpoints, and toxicity reference values (TRVs). Plant and animal lists and habitat maps, including potential Threatened and Endangered (T/E) species and wetlands, will be prepared based on historical as well as more recent biological surveys conducted at the site, such as the sitewide biological surveys conducted in 2002-2004, and included in the OU-specific Field-Sampling Plans. (2)
- Seasonally inundated depressions and linear drainages (e.g., potential vernal pools and other wetland areas) that do not receive discharge from groundwater extraction and treatment (GET) systems will be identified during the OU-specific field-sampling program and will be evaluated for inclusion in the SLERA. (1, 2)
- Potential inhalation exposure to volatile organic compounds (VOCs) in animal burrows will be evaluated on a qualitative basis, as appropriate for each OU. (1)
- The Site-Wide Conceptual Site Model (CSM) will be used as a guide to identify surrogate ecological receptors for principal trophic levels and functional group/feeding guilds with potentially complete exposure pathways. Specific receptors to be evaluated will be identified in the OU-specific problem formulation phase. (2)
- Aquatic and soil invertebrates will be separately evaluated, where relevant pathways exist. (2)
- Exposure estimates will be derived from maximum detected chemical concentrations within each exposure area. (1)
- For screening purposes, wildlife home ranges will be assumed to be confined within the boundaries of each individual OU. The use of realistic area use factors may be evaluated as part of an uncertainty analysis in the risk characterization. (1, 2)

1.3 *BASELINE ECOLOGICAL RISK ASSESSMENTS METHODOLOGY*

For each OU, separate Baseline ERAs (BERAs) will be performed if needed, in accordance with the conclusions of the SLERA. Appropriate methods and endpoints will be developed based on OU-specific considerations, consistent with the USEPA 8-Step ERA Process. In addition, the following agreements relate to the performance of BERAs:

- Bioaccumulation modeling will be used when determining if a BERA is warranted. (4)
- If food chain analysis is performed for the BERA, the assumption that the home range of each receptor is confined to the OU may be modified to provide a more realistic spatial analysis of risk. (1)
- If chemicals are present at concentrations that could impact wetland related species, then a formal wetland delineation of the impacted area will be conducted to support the development of a BERA. Additionally, if a remedial alternative is selected that results in potential disturbance of a wetland, a formal wetland delineation will be conducted on the area that will be disturbed. No other wetland delineations will be completed as part of the RI/FS. (2)
- Additional information on T/E species will be collected should the SLERA identify a potential threat to surrogate receptors. (2)

APPENDIX A

SCREENING LEVELS FOR ECOLOGICAL RECEPTORS

TABLE 1

ECOLOGICAL SCREENING LEVELS FOR INHALATION OF SOIL VAPOR PATHWAY

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA
(Page 1 of 2)

CAS No.	Chemical	Soil Vapor ESL (ug/m^3)[1]
71-55-6	1,1,1-Trichloroethane	3.820E+04
79-00-5	1,1,2-Trichloroethane	5.680E+01
75-34-3	1,1-Dichloroethane	3.620E+04
75-35-4	1,1-Dichloroethene	6.000E+02
120-82-1	1,2,4-Trichlorobenzene	7.510E+03
95-63-6	1,2,4-Trimethylbenzene	1.550E+04
95-50-1	1,2-Dichlorobenzene	7.510E+03
107-06-2	1,2-Dichloroethane	4.220E+04
540-59-0	1,2-Dichloroethene	1.890E+03
78-87-5	1,2-Dichloropropane	1.230E+02
108-67-8	1,3,5-Trimethylbenzene	1.550E+04
541-73-1	1,3-Dichlorobenzene	7.510E+03
106-46-7	1,4-Dichlorobenzene	7.510E+03
78-93-3	2-Butanone (Methyl ethyl ketone)	8.690E+05
591-78-6	2-Hexanone	2.440E+03
67-64-1	Acetone	1.311E+06
71-43-2	Benzene	5.710E+02
75-15-0	Carbon disulfide	2.380E+02
56-23-5	Carbon tetrachloride	6.300E+02
108-90-7	Chlorobenzene	5.760E+04
75-00-3	Chloroethane	9.920E+05
67-66-3	Chloroform	2.430E+02
74-87-3	Chloromethane	7.390E+02
156-59-2	Cis-1,2-Dichloroethene	1.890E+03
100-41-4	Ethylbenzene	2.320E+04
106-93-4	Ethylene dibromide	5.780E+02
76-13-1	Freon 113	9.090E+04
AER-001-415	m,p-Xylenes	1.550E+04
1634-04-4	Methyl tert-butyl ether	2.580E+05
75-09-2	Methylene chloride	8.700E+02
103-65-1	n-Propylbenzene	2.320E+04
95-47-6	o-Xylene	1.550E+04
100-42-5	Styrene	3.840E+04
127-18-4	Tetrachloroethene	2.430E+04
108-88-3	Toluene	8.390E+01
156-60-5	Trans-1,2-Dichloroethene	1.890E+03
79-01-6	Trichloroethene	6.430E+03
75-69-4	Trichlorofluoromethane (Freon 11)	9.090E+04
75-01-4	Vinyl chloride	5.570E+00
1330-20-7	Xylenes (total)	1.550E+04
87-61-6	1,2,3-Trichlorobenzene	7.510E+03

TABLE 1

ECOLOGICAL SCREENING LEVELS FOR INHALATION OF SOIL VAPOR PATHWAY

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA
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CAS No.	Chemical	Soil Vapor ESL (ug/m^3)[1]
91-57-6	2-Methylnaphthalene	3.750E+02
86-73-7	Fluorene	1.690E+02
91-20-3	Naphthalene	3.750E+02
104-51-8	n-Butylbenzene	2.320E+04
85-01-8	Phenanthrene	1.690E+02
135-98-8	sec-Butylbenzene	2.320E+04
98-06-6	t-Butylbenzene	2.320E+04

Notes

1 The screening values are NOAEL-equivalent TRVs listed in the Edwards Air Force Base ecological risk assessment (Tetra Tech 2003) that were used to evaluate inhalation risks for the Panamint kangaroo rat, the Merriam's kangaroo rat, and the kit fox. The TRVs were originally developed for an ecological risk assessment at Vandenberg Air Force Base (Tetra Tech 2004).

Tetra Tech, Inc. 2003. "Final Predictive Ecological Risk Assessment (PERA) for Sites 205, 208, and 209 at Operable Unit 6. Edwards Air Force Base, California." December.

Tetra Tech, Inc. 2004. "Final Toxicity Profiles for the Ecological Risk Assessments at Vandenberg Air Force Base, California." August.

TABLE 2a

SOIL ECOLOGICAL SCREENING LEVELS

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA
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Chemical	Mammalian (Deer Mouse) ESL (mg/kg)	Mammalian (California Vole) ESL (mg/kg)	Avian (Robin) ESL (mg/kg)	Avian (Mourning Dove) ESL (mg/kg)	Invertabrate ESL (mg/kg)	Lowest Soil ESL (mg/kg)	Background Soil 95UCL (mg/kg)	Selected ESL (mg/kg)
1,2,3,4,6,7,8-HpCDD	1.19E-03	3.07E-03	3.80E-01	2.61E+00	NA	1.19E-03		1.19E-03
1,2,3,4,6,7,8-HpCDF	1.19E-03	2.99E-03	2.55E-02	2.52E-01	NA	1.19E-03		1.19E-03
1,2,3,4,7,8,9-HpCDF	1.18E-03	2.95E-03	2.55E-02	2.48E-01	NA	1.18E-03		1.18E-03
1,2,3,4,7,8-HxCDD	1.19E-04	2.99E-04	5.11E-03	5.04E-02	NA	1.19E-04		1.19E-04
1,2,3,4,7,8-HxCDF	1.18E-04	2.95E-04	2.55E-03	2.48E-02	NA	1.18E-04		1.18E-04
1,2,3,6,7,8-HxCDD	1.19E-04	2.99E-04	2.55E-02	2.52E-01	NA	1.19E-04		1.19E-04
1,2,3,6,7,8-HxCDF	1.18E-04	2.95E-04	2.55E-03	2.48E-02	NA	1.18E-04		1.18E-04
1,2,3,7,8,9-HxCDD	1.19E-04	2.99E-04	2.55E-03	2.52E-02	NA	1.19E-04		1.19E-04
1,2,3,7,8,9-HxCDF	1.18E-04	2.95E-04	2.55E-03	2.48E-02	NA	1.18E-04		1.18E-04
1,2,3,7,8-PeCDD	1.19E-05	2.99E-05	2.55E-04	2.52E-03	NA	1.19E-05		1.19E-05
1,2,3,7,8-PeCDF	2.37E-04	5.89E-04	2.55E-03	2.48E-02	NA	2.37E-04		2.37E-04
2,3,4,6,7,8-HxCDF	1.18E-04	2.95E-04	2.55E-03	2.48E-02	NA	1.18E-04		1.18E-04
2,3,4,7,8-PeCDF	2.37E-05	5.89E-05	2.55E-04	2.48E-03	NA	2.37E-05		2.37E-05
2,3,7,8-TCDD	1.19E-05	2.99E-05	2.55E-04	2.52E-03	5.00E+02	1.19E-05		1.19E-05
2,3,7,8-TCDF	1.18E-04	2.95E-04	1.79E-05	1.73E-04	NA	1.79E-05		1.79E-05
OCDD	1.14E-02	3.40E-02	2.53E-01	1.33E+01	NA	1.14E-02		1.14E-02
OCDF	1.14E-02	3.40E-02	2.53E-01	1.33E+01	NA	1.14E-02		1.14E-02
Aluminum	2.28E+02	2.39E+02	1.51E+04	2.16E+04	NA	2.28E+02	P	2.28E+02
Antimony	1.42E+00	3.04E+00	NA	NA	NA	1.42E+00	P	1.42E+00
Arsenic	1.19E+01	1.53E+01	3.11E+02	7.36E+02	2.50E-01	2.50E-01	P	2.50E-01
Barium	1.68E+02	1.12E+02	2.12E+03	1.59E+03	NA	1.12E+02	P	1.12E+02
Beryllium	6.97E+01	6.73E+01	NA	NA	NA	6.73E+01	P	6.73E+01
Boron	6.43E+01	4.62E+01	5.10E+02	5.00E+02	NA	4.62E+01	P	4.62E+01
Cadmium	8.79E-02	1.74E-01	4.02E-02	4.04E-01	1.00E+01	4.02E-02	P	4.02E-02
Chromium	4.35E+04	6.14E+04	NA	NA	1.00E+01	1.00E+01	P	1.00E+01
Cobalt	7.86E+01	1.07E+02	NA	NA	NA	7.86E+01	P	7.86E+01
Copper	4.44E+01	5.45E+01	7.33E+01	1.97E+02	3.20E+01	3.20E+01	P	3.20E+01

TABLE 2a

SOIL ECOLOGICAL SCREENING LEVELS

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA
(Page 2 of 10)

Chemical	Mammalian (Deer Mouse) ESL (mg/kg)	Mammalian (California Vole) ESL (mg/kg)	Avian (Robin) ESL (mg/kg)	Avian (Mourning Dove) ESL (mg/kg)	Invertabrate ESL (mg/kg)	Lowest Soil ESL (mg/kg)	Background Soil 95UCL (mg/kg)	Selected ESL (mg/kg)
Hexavalent Chromium	1.62E+01	1.23E+01	NA	NA	2.00E-01	2.00E-01	P	2.00E-01
Lead	3.30E+01	4.47E+01	1.50E-01	3.96E-01	1.00E+02	1.50E-01	P	1.50E-01
Manganese	7.46E+02	5.22E+02	9.85E+03	8.57E+03	NA	5.22E+02	P	5.22E+02
Mercury	4.66E+00	4.89E+00	4.91E+00	1.11E+01	1.00E-01	1.00E-01	P	1.00E-01
Methyl mercury	1.24E+00	9.34E-01	4.26E-01	9.65E-01	2.50E+00	4.26E-01	P	4.26E-01
Molybdenum	1.29E+00	9.71E-01	6.19E+01	6.07E+01	NA	9.71E-01	P	9.71E-01
Nickel	1.47E+00	3.49E+00	2.34E+01	2.16E+02	1.00E+02	1.47E+00	P	1.47E+00
Selenium	3.08E-01	2.63E-01	4.14E+00	5.68E+00	7.70E+00	2.63E-01	P	2.63E-01
Silver	2.23E+00	5.95E+00	NA	NA	NA	2.23E+00	P	2.23E+00
Thallium	1.19E+00	8.97E-01	NA	NA	NA	8.97E-01	P	8.97E-01
Vanadium	2.49E+00	6.26E+00	2.04E+02	2.00E+03	NA	2.49E+00	P	2.49E+00
Zinc	3.19E+01	5.45E+01	8.62E+01	5.64E+02	1.99E+02	3.19E+01	P	3.19E+01
Aroclor 1016	1.62E+01	3.97E+01	NA	NA	2.51E+03	1.62E+01		1.62E+01
Aroclor 1221	1.62E+01	3.97E+01	NA	NA	NA	1.62E+01		1.62E+01
Aroclor 1232	8.02E-01	1.97E+00	NA	NA	NA	8.02E-01		8.02E-01
Aroclor 1242	8.14E-01	2.00E+00	7.32E+00	6.95E+01	NA	8.14E-01		8.14E-01
Aroclor 1248	1.65E-01	3.85E-01	NA	NA	NA	1.65E-01		1.65E-01
Aroclor 1254	8.02E-01	1.97E+00	1.61E+00	1.53E+01	2.51E+03	8.02E-01		8.02E-01
Aroclor 1260	8.02E-01	1.97E+00	NA	NA	NA	8.02E-01		8.02E-01
Aroclor 1262	8.02E-01	1.97E+00	NA	NA	NA	8.02E-01		8.02E-01
PCB-105	1.88E-02	5.48E-02	4.15E-01	1.61E+01	NA	1.88E-02		1.88E-02
PCB-114	3.76E-03	1.10E-02	4.15E-01	1.61E+01	NA	3.76E-03		3.76E-03
PCB-118	1.88E-02	5.48E-02	4.15E+00	1.61E+02	NA	1.88E-02		1.88E-02
PCB-123	1.88E-02	5.48E-02	4.15E+00	1.61E+02	NA	1.88E-02		1.88E-02
PCB-126	1.88E-05	5.48E-05	4.15E-04	1.61E-02	NA	1.88E-05		1.88E-05
PCB-156	3.76E-03	1.10E-02	4.15E-01	1.61E+01	NA	3.76E-03		3.76E-03
PCB-157	3.76E-03	1.10E-02	4.15E-01	1.61E+01	NA	3.76E-03		3.76E-03

TABLE 2a

SOIL ECOLOGICAL SCREENING LEVELS

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA

Chemical	Mammalian (Deer Mouse) ESL (mg/kg)	Mammalian (California Vole) ESL (mg/kg)	Avian (Robin) ESL (mg/kg)	Avian (Mourning Dove) ESL (mg/kg)	Invertabrate ESL (mg/kg)	Lowest Soil ESL (mg/kg)	Background Soil 95UCL (mg/kg)	Selected ESL (mg/kg)
PCB-167	1.88E-01	5.48E-01	4.15E+00	1.61E+02	NA	1.88E-01		1.88E-01
PCB-169	1.88E-04	5.48E-04	4.15E-02	1.61E+00	NA	1.88E-04		1.88E-04
PCB-189	1.88E-02	5.48E-02	4.15E+00	1.61E+02	NA	1.88E-02		1.88E-02
PCB-77	1.88E-02	5.48E-02	8.30E-04	3.22E-02	NA	8.30E-04		8.30E-04
PCB-81	1.88E-02	5.48E-02	4.15E-04	1.61E-02	NA	4.15E-04		4.15E-04
Perchlorate	8.41E-03	6.35E-03	NA	NA	NA	6.35E-03		6.35E-03
1,2,4-Trichlorobenzene	1.40E+02	1.96E+02	NA	NA	2.00E+01	2.00E+01		2.00E+01
1,2-Dichlorobenzene	6.52E+02	6.74E+02	NA	NA	NA	6.52E+02		6.52E+02
1,2-Diphenylhydrazine	9.89E+00	7.47E+00	NA	NA	NA	7.47E+00		7.47E+00
1,3-Dichlorobenzene	3.71E+02	2.80E+02	NA	NA	NA	2.80E+02		2.80E+02
1,4-Dichlorobenzene	1.86E+02	1.40E+02	NA	NA	2.00E+01	2.00E+01		2.00E+01
2,4,5-Trichlorophenol	2.47E+02	1.87E+02	NA	NA	9.00E+00	9.00E+00		9.00E+00
2,4,6-Trichlorophenol	4.95E+02	3.74E+02	NA	NA	1.00E+01	1.00E+01		1.00E+01
2,4-Dichlorophenol	1.48E+00	1.12E+00	NA	NA	NA	1.12E+00		1.12E+00
2,4-Dimethylphenol	8.39E+01	5.46E+01	NA	NA	NA	5.46E+01		5.46E+01
2,4-Dinitrophenol	1.34E+01	1.01E+01	2.35E+00	2.31E+00	NA	2.31E+00		2.31E+00
2,4-Dinitrotoluene	1.47E+00	1.06E+00	NA	NA	NA	1.06E+00		1.06E+00
2,6-Dinitrotoluene	2.94E+00	2.11E+00	NA	NA	NA	2.11E+00		2.11E+00
2-Chloronaphthalene	6.18E+02	4.67E+02	NA	NA	NA	4.67E+02		4.67E+02
2-Chlorophenol	2.47E+01	1.87E+01	NA	NA	NA	1.87E+01		1.87E+01
2-Methylnaphthalene	4.52E+02	5.83E+02	NA	NA	NA	4.52E+02		4.52E+02
2-Methylphenol	5.87E+01	3.51E+01	NA	NA	NA	3.51E+01		3.51E+01
2-Nitroaniline	2.67E+01	2.02E+01	1.33E+02	1.30E+02	NA	2.02E+01		2.02E+01
2-Nitrophenol	2.67E+01	2.02E+01	NA	NA	NA	2.02E+01		2.02E+01
3,3'-Dichlorobenzidine	1.48E+00	1.12E+00	NA	NA	NA	1.12E+00		1.12E+00
3,5-Dimethylphenol	2.47E+02	1.87E+02	NA	NA	NA	1.87E+02		1.87E+02
3-Methylphenol	2.47E+02	1.87E+02	NA	NA	NA	1.87E+02		1.87E+02

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AEROJET SUPERFUND SITE
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(Page 4 of 10)

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3-Nitroaniline	2.67E+01	2.02E+01	2.35E+01	2.31E+01	NA	2.02E+01		2.02E+01
4,4'-DDD	8.68E-02	2.61E-01	NA	NA	NA	8.68E-02		8.68E-02
4,4'-DDE	1.49E-01	4.44E-01	8.13E-04	5.88E-02	NA	8.13E-04		8.13E-04
4,4'-DDT	1.39E-01	4.16E-01	7.52E-04	6.24E-02	NA	7.52E-04		7.52E-04
4,6-Dinitro-2-methylphenol	2.67E+01	2.02E+01	NA	NA	NA	2.02E+01		2.02E+01
4-Bromophenyl phenyl ether	4.95E+00	3.74E+00	NA	NA	NA	3.74E+00		3.74E+00
4-Chloro-3-methylphenol	2.47E+01	1.87E+01	NA	NA	NA	1.87E+01		1.87E+01
4-Chloroaniline	5.15E+00	3.01E+00	1.73E+01	5.48E+00	NA	3.01E+00		3.01E+00
4-Chlorophenyl phenyl ether	1.48E+00	1.12E+00	NA	NA	NA	1.12E+00		1.12E+00
4-Methylphenol	1.16E+02	6.93E+01	1.67E+01	6.06E+00	NA	6.06E+00		6.06E+00
4-Nitroaniline	2.67E+01	2.02E+01	1.33E+01	1.30E+01	NA	1.30E+01		1.30E+01
4-Nitrophenol	2.67E+01	2.02E+01	NA	NA	7.00E+00	7.00E+00		7.00E+00
Acenaphthene	2.83E+01	8.19E+01	5.11E-01	2.78E+01	NA	5.11E-01		5.11E-01
Acenaphthylene	1.62E+03	2.18E+03	NA	NA	NA	1.62E+03		1.62E+03
Aldrin	1.18E+00	2.94E+00	NA	NA	NA	1.18E+00		1.18E+00
alpha-BHC	4.89E-01	7.21E-01	1.00E+01	4.13E+01	NA	4.89E-01		4.89E-01
Aniline	6.18E+01	4.67E+01	NA	NA	NA	4.67E+01		4.67E+01
Anthracene	2.47E+03	1.87E+03	1.96E+01	1.93E+01	NA	1.93E+01		1.93E+01
Azobenzene	4.95E+00	3.74E+00	NA	NA	NA	3.74E+00		3.74E+00
Benzene	2.84E+00	1.77E+00	NA	NA	NA	1.77E+00		1.77E+00
Benzidine	2.67E+00	2.02E+00	NA	NA	NA	2.02E+00		2.02E+00
Benz(a)anthracene	4.70E-01	1.27E+00	NA	NA	NA	4.70E-01		4.70E-01
Benzo(a)pyrene	5.26E-01	1.57E+00	NA	NA	2.50E+04	5.26E-01		5.26E-01
Benzo(b)fluoranthene	2.27E-01	6.72E-01	NA	NA	NA	2.27E-01		2.27E-01
Benzo(g,h,i)perylene	2.04E-01	6.16E-01	NA	NA	NA	2.04E-01		2.04E-01
Benzo(k)fluoranthene	2.31E-01	6.79E-01	NA	NA	NA	2.31E-01		2.31E-01
Benzoic Acid	1.55E+01	8.70E+00	1.73E+01	5.78E+00	NA	5.78E+00		5.78E+00

TABLE 2a

SOIL ECOLOGICAL SCREENING LEVELS

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA
(Page 5 of 10)

Chemical	Mammalian (Deer Mouse) ESL (mg/kg)	Mammalian (California Vole) ESL (mg/kg)	Avian (Robin) ESL (mg/kg)	Avian (Mourning Dove) ESL (mg/kg)	Invertabrate ESL (mg/kg)	Lowest Soil ESL (mg/kg)	Background Soil 95UCL (mg/kg)	Selected ESL (mg/kg)
Benzyl Alcohol	3.56E+01	2.56E+01	1.77E+01	1.73E+01	NA	1.73E+01		1.73E+01
beta-BHC	2.47E-01	1.87E-01	9.96E+00	9.77E+00	NA	1.87E-01		1.87E-01
bis(2-Chloroethoxy)methane	1.77E+02	1.34E+02	NA	NA	NA	1.34E+02		1.34E+02
bis(2-Chloroethyl)ether	1.77E+02	1.34E+02	NA	NA	NA	1.34E+02		1.34E+02
bis(2-Chloroisopropyl) ether	1.77E+02	1.34E+02	NA	NA	NA	1.34E+02		1.34E+02
Bis(2-ethylhexyl)phthalate	2.19E+02	5.59E+02	1.98E+01	2.01E+02	NA	1.98E+01		1.98E+01
Butyl benzyl phthalate	3.93E+02	2.97E+02	NA	NA	NA	2.97E+02		2.97E+02
Carbazole	4.95E+03	3.74E+03	NA	NA	3.40E+01	3.40E+01		3.40E+01
Chrysene	2.63E-01	7.26E-01	NA	NA	NA	2.63E-01		2.63E-01
delta-BHC	2.47E-01	1.87E-01	9.96E+00	9.77E+00	NA	1.87E-01		1.87E-01
Dibenz(a,h)anthracene	2.10E-01	6.26E-01	NA	NA	NA	2.10E-01		2.10E-01
Dibenzofuran	9.73E+03	1.42E+04	NA	NA	6.20E+01	6.20E+01		6.20E+01
Dieldrin	9.48E-04	2.86E-03	5.66E-03	5.24E-01	NA	9.48E-04		9.48E-04
Diethylphthalate	6.08E+03	4.09E+03	NA	NA	NA	4.09E+03		4.09E+03
Dimethylphenol isomer	1.68E+02	1.09E+02	NA	NA	NA	1.09E+02		1.09E+02
Dimethyl phthalate	6.08E+03	4.09E+03	NA	NA	2.00E+02	2.00E+02		2.00E+02
Di-n-butylphthalate	1.26E+03	2.17E+03	1.96E+00	1.05E+01	NA	1.96E+00		1.96E+00
Di-n-octyl phthalate	3.68E+03	6.33E+03	NA	NA	NA	3.68E+03		3.68E+03
Endosulfan Sulfate	1.34E+00	1.70E+00	1.78E+02	5.62E+02	NA	1.34E+00		1.34E+00
Endrin	3.52E-01	7.30E-01	1.78E-01	1.35E+00	NA	1.78E-01		1.78E-01
Ethylbenzene	3.17E+02	2.86E+02	NA	NA	NA	2.86E+02		2.86E+02
Fluoranthene	1.66E+02	1.02E+02	NA	NA	3.80E+01	3.80E+01		3.80E+01
Fluorene	7.06E+02	1.49E+03	1.80E+01	1.33E+02	2.70E+01	1.80E+01		1.80E+01
Heptachlor	1.53E+00	3.70E+00	2.38E+01	2.21E+02	NA	1.53E+00		1.53E+00
Heptachlor Epoxide	4.13E-02	7.95E-02	NA	NA	NA	4.13E-02		4.13E-02
Hexachlorobenzene	3.96E-01	2.99E-01	4.82E+02	4.73E+02	NA	2.99E-01		2.99E-01
Hexachlorocyclopentadiene	1.48E+01	1.12E+01	NA	NA	NA	1.12E+01		1.12E+01

TABLE 2a

SOIL ECOLOGICAL SCREENING LEVELS

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA

Chemical	Mammalian (Deer Mouse) ESL (mg/kg)	Mammalian (California Vole) ESL (mg/kg)	Avian (Robin) ESL (mg/kg)	Avian (Mourning Dove) ESL (mg/kg)	Invertabrate ESL (mg/kg)	Lowest Soil ESL (mg/kg)	Background Soil 95UCL (mg/kg)	Selected ESL (mg/kg)
Hexachloroethane	2.47E+00	1.87E+00	NA	NA	NA	1.87E+00		1.87E+00
Indeno(1,2,3-cd)pyrene	1.35E+01	2.25E+01	NA	NA	NA	1.35E+01		1.35E+01
Isophorone	5.51E+02	3.96E+02	NA	NA	NA	3.96E+02		3.96E+02
Lindane	2.47E-01	1.87E-01	3.54E+01	3.47E+01	NA	1.87E-01		1.87E-01
Methylphenol	2.47E+02	1.87E+02	NA	NA	NA	1.87E+02		1.87E+02
Naphthalene	1.21E+01	3.17E+01	NA	NA	NA	1.21E+01		1.21E+01
Nitrobenzene	2.28E+00	1.72E+00	NA	NA	4.00E+01	1.72E+00		1.72E+00
N-Nitrosodimethylamine	1.32E+00	6.67E-01	NA	NA	NA	6.67E-01		6.67E-01
N-Nitrosodi-n-propylamine	1.32E+00	6.67E-01	NA	NA	NA	6.67E-01		6.67E-01
N-Nitrosodiphenylamine	1.32E+00	6.67E-01	NA	NA	2.00E+01	6.67E-01		6.67E-01
Pentachlorophenol	4.26E-01	7.11E-01	2.28E+00	1.59E+01	6.00E+00	4.26E-01		4.26E-01
Phenanthrene	1.85E+01	3.58E+01	4.86E-01	4.93E+00	3.40E+01	4.86E-01		4.86E-01
Phenol	8.10E+01	4.48E+01	1.92E+01	3.83E+00	3.00E+01	3.83E+00		3.83E+00
Pyrene	1.24E+02	8.01E+01	NA	NA	1.80E+01	1.80E+01		1.80E+01
Pyridine	1.65E+00	1.07E+00	NA	NA	NA	1.07E+00		1.07E+00
Trimethyl benzene	9.63E+02	8.54E+02	NA	NA	NA	8.54E+02		8.54E+02
1,2,3-Trichloropropane	1.41E+01	1.07E+01	NA	NA	NA	1.07E+01		1.07E+01
1,1,1,2-Tetrachloroethane	8.84E+01	6.67E+01	NA	NA	NA	6.67E+01		6.67E+01
1,1,1-Trichloroethane	3.99E+03	2.75E+03	NA	NA	NA	2.75E+03		2.75E+03
1,1,2,2-Tetrachloroethane	6.93E+00	5.23E+00	NA	NA	NA	5.23E+00		5.23E+00
1,1,2-Trichloro-1,2,2-trifluoroethane	2.43E+02	1.74E+02	NA	NA	NA	1.74E+02		1.74E+02
1,1,2-Trichloroethane	4.29E+00	2.54E+00	NA	NA	NA	2.54E+00		2.54E+00
1,1-Dichloroethane	9.85E+01	5.72E+01	NA	NA	NA	5.72E+01		5.72E+01
1,1-Dichloroethene	2.04E-01	1.98E-01	NA	NA	NA	1.98E-01		1.98E-01
1,1-Dichloropropene	2.52E+01	1.91E+01	NA	NA	NA	1.91E+01		1.91E+01
1,2,3-Trichlorobenzene	1.45E+02	2.13E+02	NA	NA	2.00E+01	2.00E+01		2.00E+01
1,2,4-Trimethylbenzene	1.25E+03	1.43E+03	NA	NA	NA	1.25E+03		1.25E+03

TABLE 2a

SOIL ECOLOGICAL SCREENING LEVELS

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA

Chemical	Mammalian (Deer Mouse) ESL (mg/kg)	Mammalian (California Vole) ESL (mg/kg)	Avian (Robin) ESL (mg/kg)	Avian (Mourning Dove) ESL (mg/kg)	Invertabrate ESL (mg/kg)	Lowest Soil ESL (mg/kg)	Background Soil 95UCL (mg/kg)	Selected ESL (mg/kg)
1,2-Dibromo-3-chloropropane	2.95E+01	2.43E+01	NA	NA	NA	2.43E+01		2.43E+01
1,2-Dibromoethane	6.14E+00	3.33E+00	NA	NA	NA	3.33E+00		3.33E+00
1,2-Dichloro-1,1,2-Trifluoroethane	2.21E+03	1.59E+03	NA	NA	NA	1.59E+03		1.59E+03
1,2-Dichloroethane	6.91E+01	3.84E+01	2.93E+02	5.98E+01	NA	3.84E+01		3.84E+01
1,2-Dichloropropane	1.42E+01	8.52E+00	NA	NA	7.00E+02	8.52E+00		8.52E+00
1,3,5-Trimethylbenzene	1.14E+03	1.17E+03	NA	NA	NA	1.14E+03		1.14E+03
1,3-Dichlorobenzene	3.71E+02	2.80E+02	NA	NA	NA	2.80E+02		2.80E+02
1,3-Dichloropropane	2.52E+01	1.91E+01	NA	NA	NA	1.91E+01		1.91E+01
1,3-Dichloropropene	5.05E+00	3.81E+00	NA	NA	NA	3.81E+00		3.81E+00
2,2-Dichloropropane	2.52E+01	1.91E+01	NA	NA	NA	1.91E+01		1.91E+01
2-Butanone	8.76E+03	6.62E+03	NA	NA	NA	6.62E+03		6.62E+03
2-Chloroethylvinylether	8.41E-01	6.35E-01	NA	NA	NA	6.35E-01		6.35E-01
2-Chlorotoluene	5.68E+02	5.83E+02	NA	NA	NA	5.68E+02		5.68E+02
2-Hexanone	7.00E+02	3.84E+02	NA	NA	NA	3.84E+02		3.84E+02
4-bromofluorobenzene	7.32E+01	5.53E+01	NA	NA	NA	5.53E+01		5.53E+01
4-Chlorotoluene	3.71E+02	2.80E+02	NA	NA	NA	2.80E+02		2.80E+02
4-Methyl-2-Pentanone	2.82E+03	2.13E+03	NA	NA	NA	2.13E+03		2.13E+03
Acetone	1.56E+00	7.96E-01	6.55E+04	1.96E+03	NA	7.96E-01		7.96E-01
Acrolein	2.62E+02	1.98E+02	NA	NA	NA	1.98E+02		1.98E+02
Acrylonitrile	4.95E-01	3.74E-01	NA	NA	NA	3.74E-01		3.74E-01
Bromobenzene	2.84E+00	1.77E+00	NA	NA	NA	1.77E+00		1.77E+00
Bromochloromethane	6.14E+00	3.33E+00	NA	NA	NA	3.33E+00		3.33E+00
Bromodichloromethane	8.87E+00	5.36E+00	NA	NA	NA	5.36E+00		5.36E+00
Bromoform	3.29E+01	2.20E+01	NA	NA	NA	2.20E+01		2.20E+01
Bromomethane	6.14E+00	3.33E+00	NA	NA	NA	3.33E+00		3.33E+00
Carbon disulfide	2.55E+01	1.52E+01	NA	NA	NA	1.52E+01		1.52E+01
Carbon tetrachloride	1.87E+00	1.46E+00	NA	NA	NA	1.46E+00		1.46E+00

TABLE 2a

SOIL ECOLOGICAL SCREENING LEVELS

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA

Chemical	Mammalian (Deer Mouse) ESL (mg/kg)	Mammalian (California Vole) ESL (mg/kg)	Avian (Robin) ESL (mg/kg)	Avian (Mourning Dove) ESL (mg/kg)	Invertabrate ESL (mg/kg)	Lowest Soil ESL (mg/kg)	Background Soil 95UCL (mg/kg)	Selected ESL (mg/kg)
Chlorobenzene	1.07E+02	8.01E+01	NA	NA	4.00E+01	4.00E+01		4.00E+01
Chlorodibromomethane	4.44E+01	2.68E+01	NA	NA	NA	2.68E+01		2.68E+01
Chloroethane	4.62E+01	2.85E+01	NA	NA	NA	2.85E+01		2.85E+01
Chloroform	1.36E-01	9.54E-02	NA	NA	NA	9.54E-02		9.54E-02
Chloromethane	4.05E+00	2.14E+00	NA	NA	NA	2.14E+00		2.14E+00
Chlorotrifluoroethene	1.05E+01	6.24E+00	NA	NA	NA	6.24E+00		6.24E+00
Chlorotrifluoromethane	4.37E+01	2.74E+01	NA	NA	NA	2.74E+01		2.74E+01
cis-1,2-Dichloroethene	4.35E+01	2.68E+01	NA	NA	NA	2.68E+01		2.68E+01
cis-1,3-Dichloropropene	1.39E+01	8.54E+00	NA	NA	NA	8.54E+00		8.54E+00
Decahydronaphthalene	2.47E+02	1.87E+02	NA	NA	NA	1.87E+02		1.87E+02
Dibromochloromethane	3.12E+01	1.95E+01	NA	NA	NA	1.95E+01		1.95E+01
Dibromomethane	6.14E+00	3.33E+00	NA	NA	NA	3.33E+00		3.33E+00
Dichlorobenzenes	5.73E+02	5.95E+02	NA	NA	NA	5.73E+02		5.73E+02
Dichlorodifluoromethane	4.37E+01	2.74E+01	NA	NA	NA	2.74E+01		2.74E+01
Formaldehyde	6.84E+01	4.92E+01	NA	NA	NA	4.92E+01		4.92E+01
Freon 113	2.21E+03	1.59E+03	NA	NA	NA	1.59E+03		1.59E+03
Hexachlorobutadiene	2.18E+00	4.15E+00	5.68E+01	3.57E+02	NA	2.18E+00		2.18E+00
Hexanal	2.82E+03	2.13E+03	NA	NA	NA	2.13E+03		2.13E+03
Isopropylbenzene	8.17E+02	9.49E+02	NA	NA	NA	8.17E+02		8.17E+02
m,p-Xylene	1.01E+03	9.30E+02	NA	NA	NA	9.30E+02		9.30E+02
Methyl Isobutyl Ketone	5.54E+02	2.85E+02	NA	NA	NA	2.85E+02		2.85E+02
Methyl tert-butyl ether	1.02E+01	5.40E+00	NA	NA	NA	5.40E+00		5.40E+00
Methylene chloride	6.14E+00	3.33E+00	NA	NA	NA	3.33E+00		3.33E+00
Monochlorobenzene	3.71E+02	2.80E+02	NA	NA	NA	2.80E+02		2.80E+02
n-Butylbenzene	9.99E+02	1.64E+03	NA	NA	NA	9.99E+02		9.99E+02
Nonane	2.82E+03	2.13E+03	NA	NA	NA	2.13E+03		2.13E+03
n-Propylbenzene	6.35E+02	5.71E+02	NA	NA	NA	5.71E+02		5.71E+02

TABLE 2a

SOIL ECOLOGICAL SCREENING LEVELS

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA

Chemical	Mammalian (Deer Mouse) ESL (mg/kg)	Mammalian (California Vole) ESL (mg/kg)	Avian (Robin) ESL (mg/kg)	Avian (Mourning Dove) ESL (mg/kg)	Invertabrate ESL (mg/kg)	Lowest Soil ESL (mg/kg)	Background Soil 95UCL (mg/kg)	Selected ESL (mg/kg)
o-Xylene	9.63E+02	8.54E+02	NA	NA	NA	8.54E+02		8.54E+02
Pentanal	2.82E+03	2.13E+03	NA	NA	NA	2.13E+03		2.13E+03
p-Isopropyltoluene	9.63E+02	8.54E+02	NA	NA	NA	8.54E+02		8.54E+02
sec-Butylbenzene	6.35E+02	5.71E+02	NA	NA	NA	5.71E+02		5.71E+02
Styrene	8.52E+02	6.66E+02	NA	NA	NA	6.66E+02		6.66E+02
tert-Butylbenzene	9.33E+02	1.33E+03	NA	NA	NA	9.33E+02		9.33E+02
tetrachloroethene	3.75E+00	3.81E+00	NA	NA	NA	3.75E+00		3.75E+00
Tetramethylcyclohexane Isomer	9.63E+02	8.54E+02	NA	NA	NA	8.54E+02		8.54E+02
Thiobismethane	5.44E+01	4.11E+01	NA	NA	NA	4.11E+01		4.11E+01
Toluene	2.82E+00	2.11E+00	NA	NA	NA	2.11E+00		2.11E+00
Total xylenes	9.63E+01	8.54E+01	NA	NA	NA	8.54E+01		8.54E+01
trans-1,2-Dichloroethene	6.14E+02	3.79E+02	NA	NA	NA	3.79E+02		3.79E+02
trans-1,3-Dichloropropene	5.05E+00	3.81E+00	NA	NA	NA	3.81E+00		3.81E+00
Trichloroethene	2.62E+00	1.76E+00	NA	NA	NA	1.76E+00		1.76E+00
Trichlorofluoromethane	2.88E+02	2.01E+02	NA	NA	NA	2.01E+02		2.01E+02
Vinyl acetate	5.79E+02	4.37E+02	NA	NA	NA	4.37E+02		4.37E+02
Vinyl chloride	8.41E-01	6.35E-01	NA	NA	NA	6.35E-01		6.35E-01
1,3,5-Trinitrobenzene	1.33E+01	1.00E+01	NA	NA	NA	1.00E+01		1.00E+01
1,3-Dinitrobenzene	8.66E-01	6.54E-01	7.47E+00	7.32E+00	NA	6.54E-01		6.54E-01
2,4,6-Trinitrotoluene	3.67E-01	2.64E-01	NA	NA	NA	2.64E-01		2.64E-01
2-AMINO-4,6-DNT	1.47E+00	1.06E+00	NA	NA	NA	1.06E+00		1.06E+00
2-Nitrotoluene	1.47E+00	1.06E+00	NA	NA	NA	1.06E+00		1.06E+00
3-Nitrotoluene	1.47E+00	1.06E+00	NA	NA	NA	1.06E+00		1.06E+00
4-AMINO-2,6-DNT	1.47E+00	1.06E+00	NA	NA	NA	1.06E+00		1.06E+00
4-Nitrotoluene	1.47E+00	1.06E+00	NA	NA	NA	1.06E+00		1.06E+00
HMX	7.42E+01	5.60E+01	NA	NA	NA	5.60E+01		5.60E+01
RDX	4.48E+00	NA	NA	NA	NA	4.48E+00		4.48E+00

TABLE 2a

SOIL ECOLOGICAL SCREENING LEVELS

AEROJET SUPERFUND SITE
SACRAMENTO COUNTY, CALIFORNIA

Chemical	Mammalian (Deer Mouse) ESL (mg/kg)	Mammalian (California Vole) ESL (mg/kg)	Avian (Robin) ESL (mg/kg)	Avian (Mourning Dove) ESL (mg/kg)	Invertabrate ESL (mg/kg)	Lowest Soil ESL (mg/kg)	Background Soil 95UCL (mg/kg)	Selected ESL (mg/kg)
Tetryl	3.22E+01	NA	NA	NA	NA	3.22E+01		3.22E+01
Hydrazine	1.63E-04	NA	NA	NA	NA	1.63E-04		1.63E-04
Monomethylhydrazine	5.84E-02	NA	NA	NA	NA	5.84E-02		5.84E-02
Unsymetricaldimethylhydrazine	5.84E-02	NA	NA	NA	NA	5.84E-02		5.84E-02

[P] Pending identification of soil background data set for metals

Table 2b

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (DEER MOUSE)
AEROJET SUPERFUND SITE

Chemical	TEF	Test Species Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Mammalian ESL[b] (mg/kg soil)	Plant AF[c] (unitless)	Invertebrate AF[c] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	TRV Initial Compilation Source
1,1,1,2-Tetrachloroethane	1	rat	0 35	LOAEL	chronic	kidney/liver toxicity	89 3		5	1 79E+01		8 84E+01	1 0000	1 00	Yes	Yes	IRIS
1,1,1-Trichloroethane	1	mouse	0 035	NOAEL	chronic	reproductive	1000			1 00E+03		3 99E+03	1 4100	1 00		Yes	Sample et al 1996
1,1,2,2-Tetrachloroethane	1	mouse	0 03				1 4	Y		1 40E+00	1,1,2,2-Tetrachloroethylene	6 93E+00	1 0000	1 00	Yes	Yes	Sample et al 1996
1,1,2-Trichloro-1,2,2-trifl	1	human	70	NOAEL	subchronic	no adverse medical symptoms observe	30	Y		4 91E+01		2 43E+02	1 0000	1 00	Yes	Yes	IRIS
1,1,2-Trichloroethane	1	mouse	0 03	NOAEL	subchronic	hematology	3 9	2		1 95E+00		4 29E+00	3 1300	1 00		Yes	IRIS
1,1-Dichloroethane	1	mouse	0 035				50			5 00E+01	1,2 Dichloroethane	9 85E+01	2 5800	1 00		Yes	Sample et al 1996
1,1-Dichloroethene	1	dog	14	NOAEL	subchronic	organ toxicity, mortality	2 5	Y		7 18E-02		2 04E-01	2 2700	1 00		Yes	Sample et al 1996
1,1-Dichloropropene	1	rat	0 35				5 1			5 10E+00	1,3-Dichloropropene	2 52E+01	1 0000	1 00	Yes	Yes	IRIS
1,2,3,4,6,7,8-HpCDD	0 01	rat	0 35				0 000001			1 00E-04	2,3,7,8-TCDD	1 19E-03	0 0007	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,6,7,8-HpCDF	0 01	rat	0 35				0 000001			1 00E-04	2,3,7,8-TCDD	1 19E-03	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8,9-HpCDF	0 01	rat	0 35				0 000001			1 00E-04	2,3,7,8-TCDD	1 18E-03	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8-HxCDD	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	1 19E-04	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8-HxCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	1 18E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,6,7,8-HxCDD	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	1 19E-04	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,6,7,8-HxCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	1 18E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8,9-HxCDD	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	1 19E-04	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8,9-HxCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	1 18E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8-PeCDD	1	rat	0 35				0 000001			1 00E-06	2,3,7,8-TCDD	1 19E-05	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8-PeCDF	0 05	rat	0 35				0 000001			2 00E-05	2,3,7,8-TCDD	2 37E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3-Trichlorobenzene	1	rat	0 35				14 8			1 48E+01	1,2,4-Trichlorobenzene	1 45E+02	0 1570	1 00		Yes	IRIS
1,2,3-Trichloropropane	1	rat	0 35	NOAEL	subchronic	clinical chemistry, hematology	5 71	2		2 86E+00		1 41E+01	1 0000	1 00	Yes	Yes	IRIS
1,2,4-Trichlorobenzene	1	rat	0 35	NOAEL	chronic	reproduction	14 8			1 48E+01		1 40E+02	0 1840	1 00		Yes	IRIS
1,2,4-Trimethylbenzene	1	rat	0 35				150			1 50E+02	Xylenes	1 25E+03	0 3090	1 00		Yes	Condie et al 1988
1,2-Dibromo-3-chloropro	1	rat	0 35				5 1			5 10E+00	1,3-Dichloropropene	2 95E+01	0 7540	1 00		Yes	IRIS
1,2-Dibromoethane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	6 14E+00	7 3400	1 00		Yes	Sample et al 1996
1,2-Dichloro-1,1,2-Triflu	1	human	70				273			4 46E+02	1,1 2-Trichloro-1,2,2-trifluoroethane	2 21E+03	1 0000	1 00	Yes	Yes	IRIS
1,2-Dichlorobenzene	1	rat	0 35	NOAEL	chronic	organ toxicity	85 7			8 57E+01		6 52E+02	0 4030	1 00		Yes	IRIS
1,2-Dichloroethane	1	mouse	0 035	NOAEL	chronic	reproduction	50			5 00E+01		6 91E+01	5 4000	1 00		Yes	Sample et al 1996
1,2-Dichloropropane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	1 42E+01	2 7800	1 00		Yes	Sample et al 1996
1,2-Diphenylhydrazine	1	rat	0 35	NOAEL	chronic	survival	2			2 00E+00		9 89E+00	1 0000	1 00	Yes	Yes	ATSDR
1,3,5-Trimethylbenzene	1	rat	0 35				150			1 50E+02	Xylenes	1 14E+03	0 4090	1 00		Yes	Condie et al 1988
1,3,5-Trinitrobenzene	1	rat	0 35	NOAEL	chronic	growth, organ toxicity	2 68			2 68E+00		1 33E+01	1 0000	1 00	Yes	Yes	IRIS
1,3-Dichlorobenzene	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	3 71E+02	1 0000	1 00	Yes	Yes	ATSDR
1,3-Dichlorobenzene	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	5 98E+02	0 3530	1 00		Yes	ATSDR
1,3-Dichloropropane	1	rat	0 35				5 1			5 10E+00	1,3-Dichloropropene	2 52E+01	1 0000	1 00	Yes	Yes	IRIS
1,3-Dichloropropene	1	rat	0 35	LOAEL	chronic	growth, histology	5 1		5	1 02E+00		5 05E+00	1 0000	1 00	Yes	Yes	IRIS
1,3-Dinitrobenzene	1	rat	0 35	NOAEL	subchronic	testicular degeneration	0 35	2		1 75E-01		8 66E-01	1 0000	1 00	Yes	Yes	Talmage et al 1999
1,4-Dichlorobenzene	1	rat	0 35	NOAEL	subchronic	body weight gain	75	2		3 75E+01		1 86E+02	1 0000	1 00	Yes	Yes	ATSDR
2,2-Dichloropropane	1	rat	0 35				5 1			5 10E+00	1,3-Dichloropropene	2 52E+01	1 0000	1 00	Yes	Yes	IRIS
2,3,4,6,7,8-HxCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	1 18E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,3,4,7,8-PeCDF	0 5	rat	0 35				0 000001			2 00E-06	2,3,7,8-TCDD	2 37E-05	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,3,7,8-TCDD	1	rat	0 35	NOAEL	chronic	growth, organ toxicity, blood chemist	0 000001			1 00E-06		1 19E-05	0 0046	1 00		Yes	Sample et al 1996
2,3,7,8-TCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	1 18E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,4,5-Trichlorophenol	1	rat	0 35	NOAEL	subchronic	liver and kidney toxicity	100	2		5 00E+01		2 47E+02	1 0000	1 00	Yes	Yes	IRIS
2,4,6-Trichlorophenol	1	rat	0 35				100			1 00E+02	2,4,5-Trichlorophenol	4 95E+02	1 0000	1 00	Yes	Yes	IRIS
2,4,6-Trinitrotoluene	1	dog	14	LOAEL	subchronic	liver toxicity	0 5	2	5	7 42E-02		3 67E-01	1 0000	1 00	Yes	Yes	IRIS
2,4-Dichlorophenol	1	rat	0 35	NOAEL	chronic	reproduction	0 3			3 00E-01		1 48E+00	1 0000	1 00	Yes	Yes	IRIS
2,4-Dimethylphenol	1	rat	0 35	NOAEL	subchronic	growth, hematology	50	2		2 50E+01		8 39E+01	1 8100	1 00		Yes	IRIS
2,4-Dinitrophenol	1	rat	0 35	NOAEL	subchronic	growth	5 4	2		2 70E+00		1 34E+01	1 0000	1 00	Yes	Yes	IRIS[d]
2,4-Dinitrotoluene	1	dog	14	NOAEL	chronic	behavioral, neurotoxicity	0 2			2 97E-01		1 47E+00	1 0000	1 00	Yes	Yes	ATSDR
2,6-Dinitrotoluene	1	dog	14	LOAEL	acute	*	0 4	Y	Y	5 94E-01		2 94E+00	1 0000	1 00	Yes	Yes	EPA Region 6
2-AMINO-4,6-DNT	1	dog	14				0 2			2 97E-01	2,4-Dinitrotoluene	1 47E+00	1 0000	1 00	Yes	Yes	ATSDR
2-Butanone	1	rat	0 35	NOAEL	chronic	reproduction	1771			1 77E+03		8 76E+03	1 0000	1 00	Yes	Yes	IRIS
2-Chloroethylvinylether	1	rat	0 35				0 17			1 70E-01	Vinyl chloride	8 41E-01	1 0000	1 00	Yes	Yes	Sample et al 1996
2-Chloronaphthalene	1	mouse	0 03	NOAEL	subchronic	growth, mortality, organ toxicity	250	2		1 25E+02		6 18E+02	1 0000	1 00	Yes	Yes	IRIS
2-Chlorophenol	1	rat	0 35	NOAEL	chronic	reproduction	5			5 00E+00		2 47E+01	1 0000	1 00	Yes	Yes	IRIS
2-Chlorotoluene	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	5 68E+02	0 4090	1 00		Yes	ATSDR
2-Hexanone	1	rat	0 35				570			5 70E+02	Hexane	7 00E+02	6 1700	1 00		Yes	HEAST FY 1997
2-Methylnaphthalene	1	mouse	0 03				50			5 00E+01	Naphthalene	4 52E+02	0 2270	1 00		Yes	EFA West 1998
2-Methylphenol	1	rat	0 35	NOAEL	subchronic	growth, neurotoxicity	50	2		2 50E+01		5 87E+01	2 8900	1 00		Yes	IRIS

Table 2b

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (DEER MOUSE)
AEROJET SUPERFUND SITE

Chemical	TEF	Test Species Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Mammalian ESL[b] (mg/kg soil)	Plant AF[c] (unitless)	Invertebrate AF[c] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	TRV Initial Compilation Source
2-Nitroaniline	1	rat	0 35				5 4			5 40E+00	2,4-Dinitrophenol	2 67E+01	1 0000	1 00	Yes	Yes	IRIS
2-Nitrophenol	1	rat	0 35				5 4			5 40E+00	2,4-Dinitrophenol	2 67E+01	1 0000	1 00	Yes	Yes	IRIS
2-Nitrotoluene	1	dog	14				0 2			2 97E-01	2,4-Dinitrotoluene	1 47E+00	1 0000	1 00	Yes	Yes	ATSDR
3,3'-Dichlorobenzidine	1	rat	0 35				0 3			3 00E-01	2,4-Dichlorophenol	1 48E+00	1 0000	1 00	Yes	Yes	IRIS
3,5-Dimethylphenol	1	rat	0 35				50			5 00E+01	2,4-Dimethylphenol	2 47E+02	1 0000	1 00	Yes	Yes	IRIS
3-Methylphenol	1	rat	0 35				50			5 00E+01	2-Methylphenol	2 47E+02	1 0000	1 00	Yes	Yes	IRIS
3-Nitroaniline	1	rat	0 35				5 4			5 40E+00	2,4 Dinitrophenol	2 67E+01	1 0000	1 00	Yes	Yes	IRIS
3-Nitrotoluene	1	dog	14				0 2			2 97E-01	2,4-Dinitrotoluene	1 47E+00	1 0000	1 00	Yes	Yes	ATSDR
4,4'-DDD	1	rat	0 32				0 8			8 00E-01	4,4'-DDT	8 68E-02	0 0280	116 6100			EFA West 1998
4,4'-DDE	1	rat	0 32				0 8			8 00E-01	4,4'-DDT	1 49E-01	0 1360	67 5500			EFA West 1998
4,4'-DDT	1	rat	0 32	NOAEL	chronic	reproductive	0 8			8 00E-01		1 39E-01	0 0280	73 0400			EFA West 1998
4,6-Dinitro-2-methylphen	1	rat	0 35				5 4			5 40E+00	2,4 Dinitrophenol	2 67E+01	1 0000	1 00	Yes	Yes	IRIS
4-AMINO-2,6-DNT	1	dog	14				0 2			2 97E-01	2,4-Dinitrotoluene	1 47E+00	1 0000	1 00	Yes	Yes	ATSDR
4-bromofluorobenzene	1	rat	0 35				14 8			1 48E+01	1,2,4-Trichlorobenzene	7 32E+01	1 0000	1 00	Yes	Yes	IRIS
4-Bromophenyl phenyl et	1	rat	0 35				1			1 00E+00	Decabromodiphenyl ether	4 95E+00	1 0000	1 00	Yes	Yes	IRIS
4-Chloro-3-methylphenol	1	rat	0 35				5			5 00E+00	2-Chlorophenol	2 47E+01	1 0000	1 00	Yes	Yes	IRIS
4-Chloroaniline	1	rat	0 35	LOAEL	chronic	growth, histology	12 5		5	2 50E+00		5 15E+00	3 3900	1 00		Yes	IRIS
4-Chlorophenyl phenyl et	1	rat	0 35				0 3			3 00E-01	2,4-Dichlorophenol	1 48E+00	1 0000	1 00	Yes	Yes	IRIS
4-Chlorotoluene	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	3 71E+02	1 0000	1 00	Yes	Yes	ATSDR
4-Methyl-2-Pentanone	1	rat	0 35				570			5 70E+02	Hexane	2 82E+03	1 0000	1 00	Yes	Yes	HEAST FY 1997
4-Methylphenol	1	rat	0 35				50			5 00E+01	2-Methylphenol	1 16E+02	2 9300	1 00		Yes	IRIS
4-Nitroaniline	1	rat	0 35				5 4			5 40E+00	2,4-Dinitrophenol	2 67E+01	1 0000	1 00	Yes	Yes	IRIS
4-Nitrophenol	1	rat	0 35				5 4			5 40E+00	2,4-Dinitrophenol	2 67E+01	1 0000	1 00	Yes	Yes	IRIS
4-Nitrotoluene	1	dog	14				0 2			2 97E-01	2,4-Dinitrotoluene	1 47E+00	1 0000	1 00	Yes	Yes	ATSDR
Acenaphthene	1	mouse	0 03	NOAEL	subchronic	growth, organ toxicity	175	2		8 75E+01		2 83E+01	0 2100	38 7500			IRIS
Acenaphthylene	1	mouse	0 03				175			1 75E+02	Acenaphthene	1 62E+03	0 2040	1 00		Yes	IRIS
Acetone	1	rat	0 35	NOAEL	subchronic	kidney and liver toxicity	10	Y		1 00E+01		1 56E+00	53 3000	1 00		Yes	Sample et al 1996
Acrolein	1	rat	0 35				53			5 30E+01	Acrylic acid	2 62E+02	1 0000	1 00	Yes	Yes	IRIS
Acrylonitrile	1	rat	0 35	NOAEL	chronic	early mortality	0 1			1 00E-01		4 95E-01	1 0000	1 00	Yes	Yes	ATSDR
Aldrin	1	rat	0 065	LOAEL	subchronic	Decrease in conditioned avoidance res	1	2	5	1 00E-01		1 18E+00	0 0068	1 00		Yes	EFA West 1998
alpha-BHC	1	rat	0 176				0 05			5 00E-02	Lindane	4 89E-01	0 1570	1 00		Yes	EFA West 1998
Aluminum	1	mouse	0 03	NOAEL	chronic	reproduction	1 93			1 93E+00		2 28E+02	0 0029	0 04			Sample et al 1996
Aniline	1	rat	0 35				12 5			1 25E+01	4-Chloroaniline	6 18E+01	1 0000	1 00	Yes	Yes	IRIS
Anthracene	1	mouse	0 03	NOAEL	subchronic	growth, histology	1000	2		5 00E+02		2 47E+03	1 0000	1 00	Yes	Yes	IRIS
Antimony	1	mouse	0 03	NOAEL	chronic	longevity	0 125		Y	1 25E-01		1 42E+00	0 0370	1 00		Yes	Sample et al 1996
Aroclor 1016	1	mink	1	NOAEL	chronic	reproduction	1 37			1 37E+00		1 62E+01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1221	1	mink	1				1 37			1 37E+00	Aroclor 1016	1 62E+01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1232	1	mouse	0 014				0 068			6 80E-02	Aroclor 1254	8 02E-01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1242	1	mink	1	LOAEL	chronic	reproduction	0 069		Y	6 90E-02		8 14E-01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1248	1	Rhesus monkey	5	LOAEL	chronic	reproduction	0 01		Y	1 40E-02		1 65E-01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1254	1	mouse	0 014	NOAEL	chronic	reproduction	0 068			6 80E-02		8 02E-01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1260	1	mouse	0 014				0 068			6 80E-02	Aroclor 1254	8 02E-01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1262	1	mouse	0 014				0 068			6 80E-02	Aroclor 1254	8 02E-01	0 0090	1 00		Yes	Sample et al 1996
Arsenic	1	mouse	0 03	NOAEL	chronic	reproduction	0 32			3 20E-01		1 19E+01	0 0375	0 22			EFA West 1998
Azobenzene	1	rat	0 35				1 0			1 00E+00	Benzene	4 95E+00	1 0000	1 00	Yes	Yes	Sample et al 1996
Barium	1	rat	0 435	NOAEL	chronic	growth, development	5 1			5 10E+00		1 68E+02	0 1560	0 09			Sample et al 1996
Benz(a)anthracene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	4 70E-01	0 5370	34 4500			EFA West 1998
Benzene	1	rat	0 35	NOAEL	chronic	hematopoetic	1 0			1 00E+00		2 84E+00	2 2700	1 00		Yes	ATSDR
Benzidine	1	mouse	0 03	LOAEL	chronic	growth, organ toxicity	2 7		5	5 40E-01		2 67E+00	1 0000	1 00	Yes	Yes	IRIS
Benzo(a)pyrene	1	mouse	0.03	NOAEL	chronic	longevity, pulmonary edema	1 31			1 31E+00		5 26E-01	0 0181	31 4700			EFA West 1998
Benzo(b)fluoranthene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	2 27E-01	0 1730	72 7800			EFA West 1998
Benzo(g,h,i)perylene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	2 04E-01	0 0057	81 0800			EFA West 1998
Benzo(k)fluoranthene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	2 31E-01	0 2550	71 3000			EFA West 1998
Benzoic Acid	1	human	70	NOAEL	chronic	no adverse medical symptoms observi	4 4			7 19E+00		1 55E+01	3 2100	1 00		Yes	IRIS
Benzyl Alcohol	1	human	70				4 4			7 19E+00	Benzoic Acid	3 56E+01	1 0000	1 00	Yes	Yes	IRIS
Beryllium	1	rat	0 35	NOAEL	chronic	longevity	0 66			6 60E-01		6 97E+01	0 0100	0 05			Sample et al 1996
beta-BHC	1	rat	0 176				0 05			5 00E-02	Lindane	2 47E-01	1 0000	1 00	Yes	Yes	EFA West 1998
bis(2-Chloroethoxy)meth	1	mouse	0 03				35 8			3 58E+01	bis(2-Chloroisopropyl) ether	1 77E+02	1 0000	1 00	Yes	Yes	IRIS
bis(2-Chloroethyl)ether	1	mouse	0 03				35 8			3 58E+01	bis(2-Chloroisopropyl) ether	1 77E+02	1 0000	1 00	Yes	Yes	IRIS
bis(2-Chloroisopropyl) et	1	mouse	0 03	NOAEL	chronic	hematopoetic	35 8			3 58E+01		1 77E+02	1 0000	1 00	Yes	Yes	IRIS

Table 2b

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (DEER MOUSE)
AEROJET SUPERFUND SITE

Chemical	TEF	Test Species Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Mammalian ESL[b] (mg/kg soil)	Plant AF[c] (unitless)	Invertebrate AF[c] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	TRV Initial Compilation Source
Bis(2-ethylhexyl)phthalat	1	mouse	0 03	NOAEL	chronic	reproduction	18 33			1 83E+01		2 19E+02	0 0016	1 00		Yes	Sample et al 1996
Boron	1	dog	12 7	NOAEL	chronic	reproduction	8 8			1 30E+01		6 43E+01	1 0000	1 00	Yes	Yes	IRIS
Bromobenzene	1	mouse	0 03				1			1 00E+00	Benzene	2 84E+00	2 2700	1 00		Yes	Sample et al 1996
Bromochloromethane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	6 14E+00	7 3400	1 00		Yes	Sample et al 1996
Bromodichloromethane	1	mouse	0 03	LOAEL	chronic	kidney toxicity	17 9		5	3 58E+00		8 87E+00	2 7000	1 00		Yes	IRIS
Bromoform	1	rat	0 35	NOAEL	subchronic	organ toxicity	17 9	2		8 95E+00		3 29E+01	1 5900	1 00		Yes	IRIS
Bromomethane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	6 14E+00	7 3400	1 00		Yes	Sample et al 1996
Butyl benzyl phthalate	1	rat	0 35	NOAEL	subchronic	growth, organ toxicity	159	2		7 95E+01		3 93E+02	1 0000	1 00	Yes	Yes	IRIS
Cadmium	1	mouse	0 0322	NOAEL	chronic	reproduction	0 06			6 00E-02		8 79E-02	0 5857	7 71			EFA West 1998
Carbazole	1	mouse	0 03				1000			1 00E+03	Anthracene	4 95E+03	1 0000	1 00	Yes	Yes	IRIS
Carbon disulfide	1	rabbit	1 13	NOAEL	chronic	fetal toxicity/malformations	11			1 10E+01		2 55E+01	2 9300	1 00		Yes	IRIS
Carbon tetrachloride	1	rat	0 35	NOAEL	subchronic	liver toxicity	0 71	2		3 55E-01		1 87E+00	0 8960	1 00		Yes	IRIS
Chlordane	1	rat	0 35	NOAEL	chronic	liver toxicity	0 08			8 00E-02		9 43E-01	0 0098	1 00		Yes	Khasawinah and Grutsch 1989
Chlorobenzene	1	dog	14	NOAEL	subchronic	organ toxicity	27 25	2		2 02E+01		1 07E+02	0 8840	1 00		Yes	IRIS
Chlorodibromomethane	1	mouse	0 03				17 9			1 79E+01	Bromodichloromethane	4 44E+01	2 7000	1 00		Yes	IRIS
Chloroethane	1	mouse	0 03				17			1 70E+01	trans-1,2-dichloroethene	4 62E+01	2 4000	1 00		Yes	Sample et al 1996
Chloroform	1	dog	14	LOAEL	chronic	liver toxicity	1		5	5 65E-02		1 36E-01	2 8100	1 00		Yes	IRIS[d]
Chloromethane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	4 05E+00	11 5000	1 00		Yes	Sample et al 1996
Chlorotrifluoroethene	1	dog	14				2 5	Y		3 71E+00	1,1-Dichloroethene	1 05E+01	2 2700	1 00		Yes	Sample et al 1996
Chlorotrifluoromethane	1	rat	0 35				15			1 50E+01	Dichlorodifluoromethane	4 37E+01	2 1900	1 00		Yes	IRIS
Chromium	1	rat	0 35	NOAEL	chronic	growth, organ weight, blood chemistr	1468			1 47E+03		4 35E+04	0 0410	0 31			IRIS
Chrysene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	2 63E-01	0 7840	61 7800			EFA West 1998
cis-1,2-Dichloroethene	1	rat	0 35	NOAEL	subchronic	body weight gain	32	2		1 60E+01		4 35E+01	2 4000	1 00		Yes	ATSDR
cis-1,3-Dichloropropene	1	rat	0 35				5 1			5 10E+00	1,3-Dichloropropene	1 39E+01	2 4000	1 00		Yes	IRIS
Cobalt	1	rat	0 35	LOAEL	chronic	reproduction (decreased pup growth)	1 2		Y	1 20E+00		7 86E+01	0 0075	0 12			EFA West 1998
Copper	1	mouse	0 03	NOAEL	subchronic	growth, thymic cell count, mortality	2 667	Y		2 67E+00		4 44E+01	0 1243	0 52			EFA West 1998
Decahydronaphthalene	1	rat	0 28				50			5 00E+01	Naphthalene	2 47E+02	1 0000	1 00	Yes	Yes	EFA West 1998
delta-BHC	1	mouse	0 03				0 05			5 00E-02	Lindane	2 47E-01	1 0000	1 00	Yes	Yes	EFA West 1998
Dibenz(a,h)anthracene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	2 10E-01	0 1280	78 7100			EFA West 1998
Dibenzofuran	1	mouse	0 03				1000			1 00E+03	Anthracene	9 73E+03	0 1610	1 00		Yes	IRIS
Dibromochloromethane	1	rat	0 35	NOAEL	subchronic	hepatic lesions	21 4	2		1 07E+01		3 12E+01	2 1900	1 00		Yes	IRIS
Dibromomethane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	6 14E+00	7 3400	1 00		Yes	Sample et al 1996
Dichlorobenzenes	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	5 73E+02	0 3980	1 00		Yes	ATSDR
Dichlorodifluoromethane	1	rat	0 35	NOAEL	chronic	growth	15			1 50E+01		4 37E+01	2 1900	1 00		Yes	IRIS
Dieldrin	1	rat	0 35	NOAEL	chronic	reproduction	0 02			2 00E-02		9 48E-04	0 0240	267 0800			Sample et al. 1996
Diethylphthalate	1	mouse	0 03	NOAEL	*	body weight gain	1625			1 63E+03		6 08E+03	1 5500	1 00		Yes	ATSDR
Dimethyl phthalate	1	mouse	0 03				1625			1 63E+03	Diethylphthalate	6 08E+03	1 5500	1 00		Yes	ATSDR
Dimethylphenol isomer	1	rat	0 35				50			5 00E+01	2 4-Dimethylphenol	1 68E+02	1 8100	1 00		Yes	IRIS
Di-n-butylphthalate	1	rat	0 35	NOAEL	chronic	reproduction (decreased pup weight)	120			1 20E+02		1 26E+03	0 0971	1 00		Yes	ATSDR
Di-n-octyl phthalate	1	rat	0 35	NOAEL	chronic	reproduction	350			3 50E+02		3 68E+03	0 0971	1 00		Yes	ATSDR
Endosulfan Sulfate	1	rat	0 35	NOAEL	subchronic	reproduction	0 15	Y		1 50E-01		1 34E+00	0 2370	1 00		Yes	Sample et al 1996
Endrin	1	dog	14	NOAEL	chronic	neurologic/systemic	0 025			3 11E-02		3 52E-01	0 0382	1 00		Yes	ATSDR
Ethylbenzene	1	rat	0 35	NOAEL	subchronic	liver and kidney toxicity	97 1	2		4 86E+01		3 17E+02	0 5850	1 00		Yes	IRIS
Fluoranthene	1	mouse	0 03	NOAEL	subchronic	liver and kidney toxicity, hematology	125	2		6 25E+01		1 66E+02	2 4660	1 00		Yes	IRIS
Fluorene	1	mouse	0 03	NOAEL	subchronic	hematology	125	2		6 25E+01		7 06E+02	0 0410	1 00		Yes	IRIS
Formaldehyde	1	dog	12	NOAEL	chronic	reproduction	9 4			1 38E+01		6 84E+01	1 0000	1 00	Yes	Yes	Sample et al. 1996
Freon 113	1	human	70				273			4 46E+02	1,1,2-Trichloro-1,2,2-trifluoroethane	2 21E+03	1 0000	1 00	Yes	Yes	IRIS
Heptachlor	1	rat	0 1	LOAEL	chronic	weight gain, prostate androgenic rece	0 13		Y	1 30E-01		1 53E+00	0 0115	1 00		Yes	EFA WEST 1998
Heptachlor Epoxide	1	dog	14	LOAEL	chronic	liver toxicity	0 0125		5	3 71E-03		4 13E-02	0 0512	1 00		Yes	IRIS
Hexachlorobenzene	1	rat	0 35	NOAEL	chronic	liver toxicity	0 08			8 00E-02		3 96E-01	1 0000	1 00	Yes	Yes	IRIS
Hexachlorobutadiene	1	rat	0 35	NOAEL	chronic	kidney toxicity	0 2			2 00E-01		2 18E+00	0 0669	1 00		Yes	ATSDR
Hexachlorocyclopentadiene	1	rat	0 35	NOAEL	subchronic	stomach lesions	6	2		3 00E+00		1 48E+01	1 0000	1 00	Yes	Yes	IRIS[e]
Hexachloroethane	1	rat	0 35	NOAEL	subchronic	kidney toxicity	1	2		5 00E-01		2 47E+00	1 0000	1 00	Yes	Yes	IRIS
Hexanal	1	rat	0 35				570			5 70E+02	Hexane	2 82E+03	1 0000	1 00	Yes	Yes	HEAST FY 1997
Hexavalent Chromium	1	rat	0 35	NOAEL	chronic	growth	3 28			3 28E+00		1 62E+01	1 0000	1 00	Yes	Yes	Sample et al 1996
HMX	1	mouse	0 03	NOAEL	subchronic	mortality	30	2		1 50E+01		7 42E+01	1 0000	1 00	Yes	Yes	Talmage et al 1999
Hydrazine	1	mouse	0 03	LOAEL	chronic	survival and histopathology	0 059		5	1 18E-02	1,2 dimethylhydrazine	1 63E-04	609 0000	1 00		Yes	ATSDR
Indeno(1,2,3-cd)pyrene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	1 35E+01	0 1100	1 00		Yes	EFA West 1998
Isophorone	1	dog	14	NOAEL	subchronic	kidney toxicity	150	2		1 11E+02		5 51E+02	1 0000	1 00	Yes	Yes	IRIS
Isopropylbenzene	1	rat	0 35				97 1			9 71E+01	Ethylbenzene	8 17E+02	0 2970	1 00		Yes	IRIS

Table 2b

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (DEER MOUSE)
AEROJET SUPERFUND SITE

(Page 4 of 5)

Chemical	TEF	Test Species Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Mammalian ESL[b] (mg/kg soil)	Plant AF[c] (unitless)	Invertebrate AF[c] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	TRV Initial Compilation Source
Lead	1	rat	0 35	NOAEL	chronic	kidney function	1			1 00E+00		3 30E+01	0 0388	0 27			Region 9 BTAG 2002
Lindane	1	rat	0 176	NOAEL	chronic	reproduction, development	0 05			5 00E-02		2 47E-01	1 0000	1 00	Yes	Yes	EFA West 1998
m,p-Xylene	1	rat	0 35				150			1 50E+02	Xylenes	1 01E+03	0 5480	1 00		Yes	Condie et al 1988
Manganese	1	mouse	0 0346	LOAEL	subchronic	reproductive organ toxicity	13 7		Y	1 37E+01		7 46E+02	0 0790	0 05			EFA West 1998
Mercury	1	mink	1	NOAEL	chronic	reproduction	1 01			1 01E+00		4 66E+00	0 6630	1 69			Sample et al 1996
Methyl Isobutyl Ketone	1	rat	0 35				1771			1 77E+03	2-Butanone	5 54E+02	26 3000	1 00		Yes	IRIS
Methyl mercury	1	rat	0 1875	NOAEL	chronic	reproductive, developmental	0 25			2 50E-01		1 24E+00	1 0000	1 00	Yes	Yes	EFA West 1998
Methyl tert-butyl ether	1	rat	0 35	LOAEL	subchronic	mortality	143	2	5	1 43E+01		1 02E+01	11 1000	1 00		Yes	ATSDR
Methylene chloride	1	rat	0 35	NOAEL	chronic	organ toxicity	5 85			5 85E+00		6 14E+00	7 3400	1 00		Yes	Sample et al 1996
Methylphenol	1	rat	0 35				50			5 00E+01	2-Methylphenol	2 47E+02	1 0000	1 00	Yes	Yes	IRIS
Molybdenum	*1*	*mouse*	*0 03*	NOAEL	chronic	reproduction	*0 26*		Y	*2 60E-01*		*1 29E+00*	*1 0000*	*1 00*	*Yes*	*Yes*	*Sample et al 1996*
Monochlorobenzene	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	3 71E+02	1 0000	1 00	Yes	Yes	ATSDR
Monomethylhydrazine	1	mouse	0 03	LOAEL	chronic	survival and histopathology	0 059		5	1 18E-02	1,2 dimethylhydrazine	5 84E-02	1 0000	1 00	Yes	Yes	ATSDR
Naphthalene	1	rat	0 28	NOAEL	chronic	reproductive, systemic effects	50			5 00E+01		1 21E+01	1 0590	50 6100			EFA West 1998
n-Butylbenzene	1	rat	0 35				97 1			9 71E+01	Ethylbenzene	9 99E+02	*0 1140*	*1 00*		Yes	*IRIS*
Nickel	1	rat	0 35	LOAEL	chronic	reproduction (decreased pup viability)	0 133		Y	1 33E-01		1 47E+00	0 0179	1 06			EFA West 1998
Nitrobenzene	1	mouse	0 03	LOAEL	subchronic	organ toxicity	4 6	2	5	4 60E-01		2 28E+00	1 0000	1 00	Yes	Yes	IRIS
N-Nitrosodimethylamine	1	rat	0 35				13			1 30E+01	Tetryl	1 32E+00	82 7000	1 00		Yes	Talmage et al 1999
N-Nitrosodi-n-propylamin	1	rat	0 35				13			1 30E+01	Tetryl	1 32E+00	82 7000	1 00		Yes	Talmage et al 1999
N-Nitrosodiphenylamine	1	rat	0 35				13			1 30E+01	Tetryl	1 32E+00	82 7000	1 00		Yes	Talmage et al 1999
Nonane	1	rat	0 35				570			5 70E+02	Hexane	2 82E+03	1 0000	1 00	Yes	Yes	HEAST FY 1997
n-Propylbenzene	1	rat	0 35				97 1			9 71E+01	Ethylbenzene	6 35E+02	0 5850	1 00		Yes	IRIS
OCDD	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	1 14E-02	0 0001	11 0110			TEF from Van den Berg et al 1998
OCDF	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	1 14E-02	0 0004	11 0110			TEF from Van den Berg et al 1998
o-Xylene	1	rat	0 35				150			1 50E+02	Xylenes	9 63E+02	0 6090	1 00		Yes	Condie et al 1988
PCB-105	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	1 88E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-114	0 0005	rat	0 35				0 000001			2 00E-03	2,3,7,8-TCDD	3 76E-03	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-118	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	1 88E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-123	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	1 88E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-126	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	1 88E-05	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-156	0 0005	rat	0 35				0 000001			2 00E-03	2,3,7,8-TCDD	3 76E-03	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-157	0 0005	rat	0 35				0 000001			2 00E-03	2,3,7,8-TCDD	3 76E-03	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-167	0 00001	rat	0 35				0 000001			1 00E-01	2,3,7,8-TCDD	1 88E-01	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-169	0 01	rat	0 35				0 000001			1 00E-04	2,3,7,8-TCDD	1 88E-04	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-189	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	1 88E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-77	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	1 88E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-81	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	1 88E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
Pentachlorophenol	1	rat	0 35	NOAEL	chronic	liver and kidney toxicity	3			3 00E+00		4 26E-01	9 6151	74 6800			Schwetz et al 1978 (IRIS)
Pentanal	1	rat	0 35				570			5 70E+02	Hexane	2 82E+03	1 0000	1 00	Yes	Yes	HEAST FY 1997
Perchlorate	1	rat	0 35	LOAEL	chronic	changes in fetal TSH, T_3, and T_4 level	0 0085		5	1 70E-03		8 41E-03	1 0000	1 00	Yes	Yes	USEPA 2002, Argus 2001
Phenanthrene	1	mouse	0 03				75			7 50E+01	Pyrene	1 85E+01	3 8370	45 4900			IRIS
Phenol	1	rat	0 35	NOAEL	chronic	reproduction	60			6 00E+01		8 10E+01	5 5500	*1 00*		Yes	*IRIS*
p-Isopropyltoluene	1	rat	0 35				150			1 50E+02	Xylenes	9 63E+02	0 6090	1 00		Yes	Condie et al 1988
Pyrene	1	mouse	0 03	NOAEL	subchronic	kidney toxicity	75	2		3 75E+01		1 24E+02	1 8520	1 00		Yes	IRIS
Pyridine	1	rat	0 35	NOAEL	subchronic	liver toxicity	1	2		5 00E-01		1 65E+00	1 8520	1 00		Yes	IRIS
RDX	1	rat	0 35	NOAEL	chronic	organ toxicity	10			1 00E+01		4 48E+00	12 2000	9 9100			Talmage et al 1999
sec-Butylbenzene	1	rat	0 35				97 1			9 71E+01	Ethylbenzene	6 35E+02	0 5850	1 00		Yes	IRIS
Selenium	1	rats	0 35	NOAEL	chronic	hepatic lesions	0 05			5 00E-02		3 08E-01	0 6719	0 99			EFA West 1998
Silver	1	mouse	0 03	LOAEL	chronic	*	0 375		Y	3 75E-01		2 23E+00	0 0140	2 05			EPA Region 6
Styrene	1	dog	14	NOAEL	subchronic	growth, hematology	200	2		1 48E+02		8 52E+02	*0 7640*	*1 00*		Yes	*IRIS*
tert-Butylbenzene	1	rat	0 35				97 1			9 71E+01	Ethylbenzene	9 33E+02	0 1720	1 00		Yes	IRIS
Tetrachloroethene	1	mouse	0 011	LOAEL	subchronic	behavior	5	2	5	5 00E-01		3 75E+00	0 4200	1 00		Yes	Frednksson et al 1993
Tetramethylcyclohexane 1	1	rat	0 35				150			1 50E+02	Xylenes	9 63E+02	0 6090	1 00		Yes	Condie et al 1988
Tetryl	1	rat	0 35	NOAEL	subchronic	organ weight, kidney, blood cell count	13	2		6 50E+00		3 22E+01	1 0000	1 00	Yes	Yes	Talmage et al 1999
Thallium	1	rat	0 35	NOAEL	subchronic	hair loss	0 48	2		2 40E-01		1 19E+00	1 0000	1 00	Yes	Yes	EFA West 1998
Thiobismethane	1	rabbit	1 13				11			1 10E+01	Carbon disulfide	5 44E+01	1 0000	1 00	Yes	Yes	IRIS
Toluene	1	mouse	0 03	LOAEL	chronic	behavior	2 88		5	5 76E-01		2 82E+00	1 0200	1 00		Yes	Kostas and Hotchin 1981
Total xylenes	1	rat	0 35	LOAEL	subchronic	liver and kidney toxicity	150	2	5	1 50E+01		9 63E+01	0 6090	1 00		Yes	Condie et al 1988
trans-1,2-Dichloroethene	1	mouse	0 03	NOAEL	subchronic	organ toxicity	452	2		2 26E+02		6 14E+02	2 4000	1 00		Yes	ATSDR
trans-1,3-Dichloropropen	1	rat	0 35	LOAEL	chronic	organ toxicity	5 1		5	1 02E+00		5 05E+00	1 0000	1 00	Yes	Yes	IRIS

Table 2b

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (DEER MOUSE)
AEROJET SUPERFUND SITE

Chemical	TEF	Test Species Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Mammalian ESL[b] (mg/kg soil)	Plant AF[c] (unitless)	Invertebrate AF[c] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	TRV Initial Compilation Source
Trichloroethene	1	mouse	0 03	LOAEL	subchronic	liver toxicity	0 7	Y	Y	7.00E-01		2 62E+00	1 5500	1 00		Yes	Sample et al 1996
Trichlorofluoromethane	1	rat/mice	0 35	LOAEL	chronic	survival and histopathology	349		5	6 98E+01		2 88E+02	1 3400	1 00		Yes	IRIS
Trimethyl benzene	1	rat	0 35				150			1.50E+02	Xylenes	9 63E+02	0 6090	1 00		Yes	Condie et al 1988
Unsymetricaldimethylhyd	1	mouse	0 03	LOAEL	chronic	survival and histopathology	0 059		5	1.18E-02	1,2 dimethylhydrazine	5 84E-02	1 0000	1 00	Yes	Yes	ATSDR
Vanadium	1	rat	0 26	NOAEL	chronic	reproduction	0 21			2.10E-01		2 49E+00	0 0049	1 00		Yes	Sample et al 1996
Vinyl acetate	1	rat	0 35	NOAEL	chronic	pup body weight gain	117			1.17E+02		5 79E+02	1 0000	1 00	Yes	Yes	ATSDR
Vinyl chloride	1	rat	0 35	NOAEL	chronic	longevity	0 17			1.70E-01		8 41E-01	1 0000	1 00	Yes	Yes	Sample et al 1996
Zinc	1	mouse	0 0255	LOAEL	chronic	pancreatic,adrenal	9 6		Y	9 60E+00		3 19E+01	0 3662	3 20			EFA West 1998

Notes

(a) # Indicates no appropriate structurally related surrogate available Surrogate chosen is the lowest within the chemical group

(b) Food and incidental soil intake values calculated as described in Table X

Deer Mouse Exposure Factors		
Default deer mouse bodyweight (kg)	0 0193	Based on mean adult weight (EPA 1993)
Ingestion rate(kg/day-kg body weight) =	0 197	= 0 0038 1/0 0193 - Ingestion rate of deer mouse listed in Nagy (2001)
Fraction plant consumed (dry weight) (unitless) =	0 6	Food will consist of 40 percent plant tissue and 60 percent invertebrate tissue because the deer mouse was selected as representative species for omnivorous mammals
Fraction invertebrate consumed (dry weight) (unitless) =	0 4	
Soil consumed (dry weight) at 2 4% of intake (kg/day-kg be	0 0047 0 0038	= d260 * 024 - 2 4 percent of food ingestion rate based on meadow vole (Beyer and others 1994)

ESL = (TRV/((((%Plant * Plant BAF)+(%Invert * Invert BAF)) * Total Ingestion Rate (kg/day-kb bw) + Soil Consumed(kg/day-kg bw))))

ESL = (Kxx/((((SD$261*Nxx)+(SD$262*Oxx))*SD$260)+(SD$263))) xx = Column number

(c) BAFs are based on literature or a default of 1 (see BAF spreadsheets for source)

(d) Secondary study selected because primary study was an anecdotal account of human cataract formation, not necessarily relevant to ecological endpoints

(e) *BMDL10*

* Indicates that experimental detail not available in cited source document

BAF - bioaccumulation factor

ESL - ecological screening level

kg - kilogram

LOAEL - lowest-observable-adverse-effect-level

mg - milligram

NOAEL - no-observable-adverse-effect-level

PCB - polychlorinated biphenyl

SVOC - semivolatile organic compound

TEF - toxicity equivalence factor

TRV - toxicity reference value

UF - uncertainty factor

VOC - volatile organic compound

Y - uncertainty factor used to derive TRV was included by original source

Table 2c

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (CA VOLE)
AEROJET SUPERFUND SITE

(Page 1 of 5)

Chemical	TEF	Test Species Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Mammalian FSL[b] (mg/kg soil)	Plant AF[c] (unitless)	Invertebrate AF[c] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	TRV Initial Compilation Source
1,1,1,2-Tetrachloroethane	1	rat	0 35	LOAEL	chronic	kidney/liver toxicity	89 3		5	1 79E+01		6 67E+01	1 0000	1 00	Yes	Yes	IRIS
1,1,1-Trichloroethane	1	mouse	0 035	NOAEL	chronic	reproductive	1000			1 00E+03		2 75E+03	1 4100	1 00		Yes	Sample et al 1996
1,1,2,2-Tetrachloroethane	1	mouse	0 03				1 4	Y		1 40E+00	1,1,2,2-Tetrachloroethylene	5 23E+00	1 0000	1 00	Yes	Yes	Sample et al 1996
1,1,2-Trichloro-1,2,2-trifluoroethane	1	human	70	NOAEL	subchronic	no adverse medical symptoms observed	30	Y		4 67E+01		1 74E+02	1 0000	1 00	Yes	Yes	IRIS
1,1,2-Trichloroethane	1	mouse	0 03	NOAEL	subchronic	hematology	3 9	2		1 95E+00		2 54E+00	3 1300	1 00		Yes	IRIS
1,1-Dichloroethane	1	mouse	0 035				50			5 00E+01	1,2 Dichloroethane	5 72E+01	3 5800	1 00		Yes	Sample et al 1996
1,1-Dichloroethene	1	dog	14	NOAEL	subchronic	organ toxicity, mortality	2 5	Y		1 12E-01		1 98E-01	2 2700	1 00		Yes	Sample et al 1996
1,1-Dichloropropene	1	rat	0 35				5 1			5 10E+00	1,3-Dichloropropene	1 91E+01	1 0000	1 00	Yes	Yes	IRIS
1,2,3,4,6,7,8-HpCDD	0 01	rat	0 35				0 000001			1 00E-04	2,3,7,8-TCDD	3 07E-03	0 0007	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,6,7,8-HpCDF	0 01	rat	0 35				0 000001			1 00E-04	2,3,7,8-TCDD	2 99E-03	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8,9-HpCDF	0 01	rat	0 35				0 000001			1 00E-04	2,3,7,8-TCDD	2 95E-03	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8-HxCDD	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	2 99E-04	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8-HxCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	2 95E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,6,7,8-HxCDD	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	2 99E-04	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,6,7,8-HxCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	2 95E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8,9-HxCDD	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	2 99E-04	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8,9-HxCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	2 95E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8-PeCDD	1	rat	0 35				0 000001			1 00E-06	2,3,7,8-TCDD	2 99E-05	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8-PeCDF	0 05	rat	0 35				0 000001			2 00E-05	2,3,7,8-TCDD	5 89E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3-Trichlorobenzene	1	rat	0 35				14 8			1 48E+01	1,2,4-Trichlorobenzene	2 13E+02	0 1570	1 00		Yes	IRIS
1,2,3-Trichloropropane	1	rat	0 35	NOAEL	subchronic	clinical chemistry, hematology	5 71	2		2 86E+00		1 07E+01	1 0000	1 00	Yes	Yes	IRIS
1,2,4-Trichlorobenzene	1	rat	0 35	NOAEL	chronic	reproduction	14 8			1 48E+01		1 96E+02	0 1840	1 00		Yes	IRIS
1,2,4-Trimethylbenzene	1	rat	0 35				150			1 50E+02	Xylenes	1 43E+03	0 3090	1 00		Yes	Condie et al 1988
1,2-Dibromo-3-chloropropane	1	rat	0 35				5 1			5 10E+00	1,3-Dichloropropene	2 43E+01	0 7540	1 00		Yes	IRIS
1,2-Dibromoethane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	3 33E+00	7 3400	1 00		Yes	Sample et al 1996
1,2-Dichloro-1,1,2-Trifluoroethane	1	human	70				273			2 73E+02	1,1,2-Trichloro-1,2,2-trifluoroethane	1 59E+03	1 0000	1 00	Yes	Yes	IRIS
1,2-Dichlorobenzene	1	rat	0 35	NOAEL	chronic	organ toxicity	85 7			8 57E+01		6 74E+02	0 4030	1 00		Yes	IRIS
1,2-Dichloroethane	1	mouse	0 035	NOAEL	chronic	reproduction	50			5 00E+01		3 84E+01	5 4000	1 00		Yes	Sample et al 1996
1,2-Dichloropropane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	8 52E+00	2 7800	1 00		Yes	Sample et al 1996
1,2-Diphenylhydrazine	1	rat	0 35	NOAEL	chronic	survival	2			2 00E+00		7 47E+00	1 0000	1 00	Yes	Yes	ATSDR
1,3,5-Trimethylbenzene	1	rat	0 35				150			1 50E+02	Xylenes	1 17E+03	0 4090	1 00		Yes	Condie et al 1988
1,3,5-Trinitrobenzene	1	rat	0 35	NOAEL	chronic	growth, organ toxicity	2 68			2 68E+00		1 00E+01	1 0000	1 00	Yes	Yes	IRIS
1,3-Dichlorobenzene	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	2 80E+02	1 0000	1 00	Yes	Yes	ATSDR
1,3-Dichlorobenzene	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	6 50E+02	0 3530	1 00		Yes	ATSDR
1,3-Dichloropropane	1	rat	0 35				5 1			5 10E+00	1,3-Dichloropropene	1 91E+01	1 0000	1 00	Yes	Yes	IRIS
1,3-Dichloropropene	1	rat	0 35	LOAEL	chronic	growth, histology	5 1		5	1 02E+00		3 81E+00	1 0000	1 00	Yes	Yes	IRIS
1,3-Dinitrobenzene	1	rat	0 35	NOAEL	subchronic	testicular degeneration	0 35	2		1 75E-01		6 54E-01	1 0000	1 00	Yes	Yes	Talmage et al 1999
1,4-Dichlorobenzene	1	rat	0 35	NOAEL	subchronic	body weight gain	75	2		3 75E+01		1 40E+02	1 0000	1 00	Yes	Yes	ATSDR
2,2-Dichloropropane	1	rat	0 35				5 1			5 10E+00	1,3-Dichloropropene	1 91E+01	1 0000	1 00	Yes	Yes	IRIS
2,3,4,6,7,8-HxCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	2 95E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,3,4,7,8-PeCDF	0 5	rat	0 35				0 000001			2 00E-06	2,3,7,8-TCDD	5 89E-05	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,3,7,8-TCDD	1	rat	0 35	NOAEL	chronic	growth, organ toxicity, blood chemistry	0 000001			1 00E-06		2 99E-05	0 0046	1 00		Yes	Sample et al 1996
2,3,7,8-TCDF	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	2 95E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,4,5-Trichlorophenol	1	rat	0 35	NOAEL	subchronic	liver and kidney toxicity	100	2		5 00E+01		1 87E+02	1 0000	1 00	Yes	Yes	IRIS
2,4,6-Trichlorophenol	1	rat	0 35				100			1 00E+02	2,4,5-Trichlorophenol	3 74E+02	1 0000	1 00	Yes	Yes	IRIS
2,4,6-Trinitrotoluene	1	dog	14	LOAEL	subchronic	liver toxicity	0 5	2	5	7 07E-02		2 64E-01	1 0000	1 00	Yes	Yes	IRIS
2,4-Dichlorophenol	1	rat	0 35	NOAEL	chronic	reproduction	0 3			3 00E-01		1 12E+00	1 0000	1 00	Yes	Yes	IRIS
2,4-Dimethylphenol	1	rat	0 35	NOAEL	subchronic	growth, hematology	50	2		2 50E+01		5 46E+01	1 8100	1 00		Yes	IRIS
2,4-Dinitrophenol	1	rat	0 35	NOAEL	subchronic	growth	5 4	2		2 70E+00		1 01E+01	1 0000	1 00	Yes	Yes	IRIS[d]
2,4-Dinitrotoluene	1	dog	14	NOAEL	chronic	behavioral, neurotoxicity	0 2			2 83E-01		1 06E+00	1 0000	1 00	Yes	Yes	ATSDR
2,6-Dinitrotoluene	1	dog	14	LOAEL	acute	*	0 4	Y	Y	5 65E-01		2 11E+00	1 0000	1 00	Yes	Yes	EPA Region 6
2-AMINO-4,6-DNT	1	dog	14				0 2			2 83E-01	2,4-Dinitrotoluene	1 06E+00	1 0000	1 00	Yes	Yes	ATSDR
2-Butanone	1	rat	0 35	NOAEL	chronic	reproduction	1771			1 77E+03		6 62E+03	1 0000	1 00	Yes	Yes	IRIS
2-Chloroethylvinylether	1	rat	0 35				0 17			1 70E-01	Vinyl chloride	6 35E-01	1 0000	1 00	Yes	Yes	Sample et al 1996
2-Chloronaphthalene	1	mouse	0 03	NOAEL	subchronic	growth, mortality, organ toxicity	250	2		1 25E+02		4 67E+02	1 0000	1 00	Yes	Yes	IRIS
2-Chlorophenol	1	rat	0 35	NOAEL	chronic	reproduction	5			5 00E+00		1 87E+01	1 0000	1 00	Yes	Yes	IRIS
2-Chlorotoluene	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	5 83E+02	0 4090	1 00		Yes	ATSDR
2-Hexanone	1	rat	0 35				570			5 70E+02	Hexane	3 84E+02	6 1700	1 00		Yes	HEAST FY 1997
2-Methylnaphthalene	1	mouse	0 03				50			5 00E+01	Naphthalene	5 83E+02	0 2270	1 00		Yes	EPA West 1998
2-Methylphenol	1	rat	0 35	NOAEL	subchronic	growth, neurotoxicity	50	2		2 50E+01		3 51E+01	2 8900	1 00		Yes	IRIS
2-Nitroaniline	1	rat	0 35				5 4			5 40E+00	2,4-Dinitrophenol	2 02E+01	1 0000	1 00	Yes	Yes	IRIS
2-Nitrophenol	1	rat	0 35				5 4			5 40E+00	2,4-Dinitrophenol	2 02E+01	1 0000	1 00	Yes	Yes	IRIS
2-Nitrotoluene	1	dog	14				0 2			2 83E-01	2,4-Dinitrotoluene	1 06E+00	1 0000	1 00	Yes	Yes	ATSDR
3,3'-Dichlorobenzidine	1	rat	0 35				0 3			3 00E-01	2,4-Dichlorophenol	1 12E+00	1 0000	1 00	Yes	Yes	IRIS
3,5-Dimethylphenol	1	rat	0 35				50			5 00E+01	2,4-Dimethylphenol	1 87E+02	1 0000	1 00	Yes	Yes	IRIS
3-Methylphenol	1	rat	0 35				50			5 00E+01	2-Methylphenol	1 87E+02	1 0000	1 00	Yes	Yes	IRIS
3-Nitroaniline	1	rat	0 35				5 4			5 40E+00	2,4 Dinitrophenol	2 02E+01	1 0000	1 00	Yes	Yes	IRIS
3-Nitrotoluene	1	dog	14				0 2			2 83E-01	2,4-Dinitrotoluene	1 06E+00	1 0000	1 00	Yes	Yes	ATSDR
4,4'-DDD	1	rat	0 32				0 8			8 00E-01	4,4'-DDT	2 61E-01	0 0280	116 6100			EPA West 1998

Table 2c

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (CA VOLE)
AEROJET SUPERFUND SITE

Chemical	TEF	Test Species Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Mammalian FSI[b] (mg/kg soil)	Plant AF[c] (unitless)	Invertebrate AF[c] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	TRV Initial Compilation Source
4,4'-DDE	1	rat	0 32				0 8			8 00E-01	4,4'-DDT	4 44E-01	0 1360	67 5500			EFA West 1998
4,4'-DDT	1	rat	0 32	NOAEL	chronic	reproductive	0 8			8 00E-01		4 16E-01	0 0280	73 0400			EFA West 1998
4,6-Dinitro-2 methylphenol	1	rat	0 35				5 4			5 40E+00	2,4 Dinitrophenol	2 02E+01	1 0000	1 00	Yes	Yes	IRIS
4-AMINO-2,6-DNT	1	*dog*	14				0 2			2 83E-01	*2,4-Dinitrotoluene*	*1 06E+00*	*1 0000*	*1 00*	Yes	Yes	*ATSDR*
4-bromofluorobenzene	1	rat	0 35				14 8			1 48E+01	1,2,4-Trichlorobenzene	5 53E+01	1 0000	1 00	Yes	Yes	IRIS
4-Bromophenyl phenyl ether	1	rat	0 35				1			1 00E+00	Decabromodiphenyl ether	3 74E+00	1 0000	1 00	Yes	Yes	IRIS
4-Chloro-3-methylphenol	1	rat	0 35				5			5 00E+00	2-Chlorophenol	1 87E+01	1 0000	1 00	Yes	Yes	IRIS
4-Chloroaniline	1	rat	0 35	LOAEL	chronic	growth, histology	12 5		5	2 50E+00		3 01E+00	3 1900	1 00		Yes	IRIS
4-Chlorophenyl phenyl ether	1	*rat*	0 35				0 3			*3 00E-01*	2,4-Dichlorophenol	*1 12E+00*	*1 0000*	*1 00*	Yes	Yes	*IRIS*
4-Chlorotoluene	1	rat	0 35				75			7 50E+01	1,4-Dichlorobenzene	2 80E+02	1 0000	1 00	Yes	Yes	ATSDR
4-Methyl-2-Pentanone	1	*rat*	*0 35*				*570*			5 70E+02	*Hexane*	*2 13E+03*	*1 0000*	*1 00*	Yes	Yes	*HEAST FY 1997*
4-Methylphenol	1	rat	0 35				50			5 00E+01	2-Methylphenol	6 93E+01	2 9300	1 00		Yes	IRIS
4-Nitroaniline	1	rat	0 35				5 4			5 40E+00	2,4-Dinitrophenol	2 02E+01	1 0000	1 00	Yes	Yes	IRIS
4-Nitrophenol	1	rat	0 35				5 4			5 40E+00	2,4-Dinitrophenol	2 02E+01	1 0000	1 00	Yes	Yes	IRIS
4-Nitrotoluene	1	dog	14				0 2			2 83E-01	2,4-Dinitrotoluene	1 06E+00	1 0000	1 00	Yes	Yes	ATSDR
Acenaphthene	1	mouse	0 03	NOAEL	subchronic	growth, organ toxicity	175	2		8 75E+01		8 19E+01	0 2100	38 7500			IRIS
Acenaphthylene	1	mouse	0 03				175			1 75E+02	Acenaphthene	2 18E+03	0 2040	1 00		Yes	IRIS
Acetone	1	*rat*	*0 35*	NOAEL	*subchronic*	*kidney and liver toxicity*	*10*	Y		*1 00E+01*		*7 96E-01*	*53 3090*	*1 00*		Yes	*Sample et al 1996*
Acrolein	1	rat	0 35				53			5 30E+01	Acrylic acid	1 98E+02	1 0000	1 00	Yes	Yes	IRIS
Acrylonitrile	1	rat	0 35	NOAEL	chronic	early mortality	0 1			1 00E-01		3 74E-01	1 0000	1 00	Yes	Yes	ATSDR
Aldrin	1	rat	0 065	LOAEL	subchronic	Decrease in conditioned avoidance response	1	2	5	1 00E-01		2 94E+00	0 0068	1 00		Yes	EFA West 1998
alpha-BHC	1	rat	0 176				0 05			5 00E-02	Lindane	7 21E-01	0 1570	1 00		Yes	EFA West 1998
Aluminum	1	mouse	0 03	NOAEL	chronic	reproduction	1 93			1 93E+00		2 39E+02	0 0029	0 04			Sample et al 1996
Aniline	1	rat	0 35				12 5			1 25E+01	4-Chloroaniline	4 67E+01	1 0000	1 00	Yes	Yes	IRIS
Anthracene	1	*mouse*	*0 03*	NOAEL	*subchronic*	*growth, histology*	*1000*	2		*5 00E+02*		*1 87E+03*	*1 0000*	*1 00*	Yes	Yes	*IRIS*
Antimony	1	mouse	0 03	NOAEL	chronic	longevity	0 125		Y	1 25E-01		3 04E+00	0 0370	1 00		Yes	Sample et al 1996
Aroclor 1016	1	mink	1	NOAEL	chronic	reproduction	1 37			1 37E+00		3 97E+01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1221	1	mink	1				1 37			1 37E+00	Aroclor 1016	3 97E+01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1232	1	mouse	0 014				0 068			6 80E-02	Aroclor 1254	1 97E+00	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1242	1	mink	1	LOAEL	chronic	reproduction	0 069		Y	6 90E-02		2 00E+00	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1248	1	Rhesus monkey	5	LOAEL	chronic	reproduction	0 01		Y	1 33E-02		3 85E-01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1254	1	*mouse*	*0 014*	NOAEL	*chronic*	*reproduction*	*0 068*			6 80E-02		*1 97E+00*	*0 0090*	*1 00*		Yes	*Sample et al 1996*
Aroclor 1260	1	mouse	0 014				0 068			6 80E-02	Aroclor 1254	1 97E+00	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1262	1	mouse	0 014				0 068			6 80E-02	Aroclor 1254	1 97E+00	0 0090	1 00		Yes	Sample et al 1996
Arsenic	1	mouse	0 03	NOAEL	chronic	reproduction	0 32			3 20E-01		1 53E+01	0 0375	0 22			EFA West 1998
Azobenzene	1	rat	0 35				1 0			1 00E+00	Benzene	3 74E+00	1 0000	1 00	Yes	Yes	Sample et al 1996
Barium	1	rat	0 435	NOAEL	chronic	growth, development	5 1			5 10E+00		1 12E+02	0 1560	0 09			Sample et al 1996
Benz(a)anthracene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	1 27E+00	0 5370	34 4500			EFA West 1998
Benzene	1	*rat*	*0 35*	NOAEL	*chronic*	*hematopoetic*	*1 0*			*1 00E+00*		*1 77E+00*	*2 2700*	*1 00*		Yes	*ATSDR*
Benzidine	1	mouse	0 03	LOAEL	chronic	growth, organ toxicity	2 7		5	5 40E-01		2 02E+00	1 0000	1 00	Yes	Yes	IRIS
Benzo(a)pyrene	1	mouse	0 03	NOAEL	chronic	longevity, pulmonary edema	1 31			1 31E+00		1 57E+00	0 0181	31 4700			EFA West 1998
Benzo(b)fluoranthene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	6 72E-01	0 1730	72 7800			EFA West 1998
Benzo(g,h,i)perylene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	6 16E-01	0 0057	81 0800			EFA West 1998
Benzo(k)fluoranthene	1	mouse	0 03				1 31			1 31E+00	Benzo(a)pyrene	6 79E-01	0 2550	71 3000			EFA West 1998
Benzoic Acid	1	human	70	NOAEL	chronic	no adverse medical symptoms observed	4 4			6 85E+00		8 70E+00	3 2100	1 00		Yes	IRIS
Benzyl Alcohol	1	*human*	*70*				*4 4*			*6 85E+00*	*Benzoic Acid*	*2 56E+01*	*1 0000*	*1 00*	Yes	Yes	*IRIS*
Beryllium	1	rat	0 35	NOAEL	chronic	longevity	0 66			6 60E-01		6 73E+01	0 0100	0 05			Sample et al 1996
beta-BHC	1	rat	0 176				0 05			5 00E-02	Lindane	1 87E-01	1 0000	1 00	Yes	Yes	EFA West 1998
bis(2-Chloroethoxy)methane	1	mouse	0 03				35 8			3 58E+01	bis(2-Chloroisopropyl) ether	1 34E+02	1 0000	1 00	Yes	Yes	IRIS
bis(2-Chloroethyl)ether	1	mouse	0 03				35 8			3 58E+01	bis(2-Chloroisopropyl) ether	1 14E+02	1 0000	1 00	Yes	Yes	IRIS
bis(2-Chloroisopropyl) ether	1	mouse	0 03	NOAEL	chronic	hematopoetic	35 8			3 58E+01		1 34E+02	1 0000	1 00	Yes	Yes	IRIS
Bis(2-ethylhexyl)phthalate	1	mouse	0 03	NOAEL	chronic	reproduction	18 33			1 83E+01		5 59E+02	0 0016	1 00		Yes	Sample et al 1996
Boron	1	*dog*	*12 7*	*NOAEL*	*chronic*	*reproduction*	*8 8*			*1 24E+01*		*4 62E+01*	*1 0000*	*1 00*	Yes	Yes	*IRIS*
Bromobenzene	1	mouse	0 03				1			1 00E+00	Benzene	1 77E+00	2 2700	1 00		Yes	Sample et al 1996
Bromochloromethane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	3 33E+00	7 3400	1 00		Yes	Sample et al 1996
Bromodichloromethane	1	mouse	0 03	LOAEL	chronic	kidney toxicity	17 9		5	3 58E+00		5 36E+00	2 7000	1 00		Yes	IRIS
Bromoform	1	rat	0 35	NOAEL	subchronic	organ toxicity	17 9	2		8 95E+00		2 20E+01	1 5900	1 00		Yes	IRIS
Bromomethane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	3 33E+00	7 3400	1 00		Yes	Sample et al 1996
Butyl benzyl phthalate	1	rat	0 35	NOAEL	subchronic	growth, organ toxicity	159	2		7 95E+01		2 97E+02	1 0000	1 00	Yes	Yes	IRIS
Cadmium	1	*mouse*	*0 0322*	*NOAEL*	*chronic*	*reproduction*	*0 06*			6 00E-02		*1 74E-01*	*0 5857*	*7 71*			*EFA West 1998*
Carbazole	1	mouse	0 03				1000			1 00E+03	Anthracene	3 74E+03	1 0000	1 00	Yes	Yes	IRIS
Carbon disulfide	1	rabbit	1 13	NOAEL	chronic	fetal toxicity/malformations	11			1 10E+01		1 52E+01	2 9300	1 00		Yes	IRIS
Carbon tetrachloride	1	rat	0 35	NOAEL	subchronic	liver toxicity	0 71	2		3 55E-01		1 46E+00	0 8960	1 00		Yes	IRIS
Chlordane	1	rat	0 35	NOAEL	chronic	liver toxicity	0 08			8 00E-02		2 30E+00	0 0098	1 00		Yes	Khasawinah and Grutsch 1989
Chlorobenzene	1	dog	14	NOAEL	subchronic	organ toxicity	27 25	2		1 93E+01		8 01E+01	0 8840	1 00		Yes	*IRIS*
Chlorodibromomethane	1	mouse	0 03				17 9			1 79E+01	Bromodichloromethane	2 68E+01	2 7000	1 00		Yes	IRIS
Chloroethane	1	*mouse*	*0 03*				17			*1 70E+01*	*trans-1,2-dichloroethene*	*2 85E+01*	*2 4000*	*1 00*		Yes	Sample et al 1996
Chloroform	1	dog	14	LOAEL	chronic	liver toxicity	1		5	6 61E-02		9 54E-02	2 8100	1 00		Yes	IRIS[d]
Chloromethane	1	rat	0 35				5 85			5 85E+00	Methylene chloride	2 14E+00	11 5000	1 00		Yes	Sample et al 1996

Table 2c

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (CA VOLE)
AEROJET SUPERFUND SITE

Chemical	TEF	Test Species Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Mammalian FSL[b] (mg/kg soil)	Plant AF[c] (unitless)	Invertebrate AF[c] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	TRV Initial Compilation Source
Chlorotrifluoroethene	1	dog	14				2 5	Y		3.53E+00	1,1-Dichloroethene	6 24E+00	2 2700	1 00		Yes	Sample et al 1996
Chlorotrifluoromethane	1	rat	0 35				15			1.50E+01	Dichlorodifluoromethane	2 74E+01	2 1900	1 00		Yes	IRIS
Chromium	1	rat	0 35	NOAEL	chronic	growth, organ weight, blood chemistry	1468			1 47E+03		6 14E+04	0 0410	0 31			IRIS
Chrysene	1	mouse	0 03				1 31			1.31E+00	Benzo(a)pyrene	7 26E-01	0 7840	61 7800			EFA West 1998
cis-1,2-Dichloroethene	1	rat	0 35	NOAEL	subchronic	body weight gain	32	2		1 60E+01		2 68E+01	2 4000	1 00		Yes	ATSDR
cis-1,3-Dichloropropene	1	rat	0 35				5 1			5.10E+00	1,3-Dichloropropene	8 54E+00	2 4000	1 00		Yes	IRIS
Cobalt	1	rat	0 35	LOAEL	chronic	reproduction (decreased pup growth)	1 2		Y	1.20E+00		1 07E+02	0 0075	0 12			EFA West 1998
Copper	1	mouse	0 03	NOAEL	subchronic	growth, thymic cell count, mortality	2 667	Y		2.67E+00		5 45E+01	0 1243	0 52			EFA West 1998
Decahydronaphthalene	1	rat	0 28				50			5.00E+01	Naphthalene	1 87E+02	1 0000	1 00	Yes	Yes	EFA West 1998
delta-BHC	1	mouse	0 03				0 05			5.00E-02	Lindane	1 87E-01	1 0000	1 00	Yes	Yes	EFA West 1998
Dibenz(a,h)anthracene	1	mouse	0 03				1 31			1.31E+00	Benzo(a)pyrene	6 26E-01	0 1280	78 7100			EFA West 1998
Dibenzofuran	1	mouse	0 03				1000			1.00E+03	Anthracene	1 42E+04	0 1610	1 00		Yes	IRIS
Dibromochloromethane	1	rat	0 35	NOAEL	subchronic	hepatic lesions	21 4	2		1.07E+01		1 95E+01	2 1900	1 00		Yes	IRIS
Dibromomethane	1	rat	0 35				5 85			5.85E+00	Methylene chloride	3 33E+00	7 3400	1 00		Yes	Sample et al 1996
Dichlorobenzenes	1	rat	0 35				75			7.50E+01	1,4-Dichlorobenzene	5 95E+02	0 3980	1 00		Yes	ATSDR
Dichlorodifluoromethane	1	rat	0 35	NOAEL	chronic	growth	15			1.50E+01		2 74E+01	2 1900	1 00		Yes	IRIS
Dieldrin	1	rat	0 35	NOAEL	chronic	reproduction	0 02			2.00E-02		2 86E-03	0 0240	267 0800			Sample et al 1996
Diethylphthalate	1	mouse	0 03	NOAEL	*	body weight gain	1625			1.63E+03		4 09E+03	1 5500	1 00		Yes	ATSDR
Dimethyl phthalate	1	mouse	0 03				1625			1.63E+03	Diethylphthalate	4 09E+03	1 5500	1 00		Yes	ATSDR
Dimethylphenol isomer	1	rat	0 35				50			5.00E+01	2,4-Dimethylphenol	1 09E+02	1 8100	1 00		Yes	IRIS
Di-n-butylphthalate	1	rat	0 35	NOAEL	chronic	reproduction (decreased pup weight)	120			1.20E+02		2 17E+03	0 0971	1 00		Yes	ATSDR
Di-n-octyl phthalate	1	rat	0 35	NOAEL	chronic	reproduction	350			3.50E+02		6 33E+03	0 0971	1 00		Yes	ATSDR
Endosulfan Sulfate	1	rat	0 35	NOAEL	subchronic	reproduction	0 15	Y		1.50E-01		1 70E+00	0 2370	1 00		Yes	Sample et al 1996
Endrin	1	dog	14	NOAEL	chronic	neurologic/systemic	0 025			3.02E-02		7 30E-01	0 0382	1 00		Yes	ATSDR
Ethylbenzene	1	rat	0 35	NOAEL	subchronic	liver and kidney toxicity	97 1	2		4.86E+01		2 86E+02	0 5850	1 00		Yes	IRIS
Fluoranthene	1	mouse	0 03	NOAEL	subchronic	liver and kidney toxicity, hematology	125	2		6.25E+01		1 02E+02	2 4660	1 00		Yes	IRIS
Fluorene	1	mouse	0 03	NOAEL	subchronic	hematology	125	2		6.25E+01		1 49E+03	0 0410	1 00		Yes	IRIS
Formaldehyde	1	dog	12	NOAEL	chronic	reproduction	9 4			1.32E+01		4 92E+01	1 0000	1 00	Yes	Yes	Sample et al 1996
Freon 113	1	human	70				273			4.25E+02	1,1,2-Trichloro-1,2,2-trifluoroethane	1 59E+03	1 0000	1 00	Yes	Yes	IRIS
Heptachlor	1	rat	0 1	LOAEL	chronic	weight gain, prostate androgenic receptor effects	0 13		Y	1.30E-01		3 70E+00	0 0115	1 00		Yes	EFA WEST 1998
Heptachlor Epoxide	1	dog	14	LOAEL	chronic	liver toxicity	0 0125		5	3.53E-03		7 95E-02	0 0512	1 00		Yes	IRIS
Hexachlorobenzene	1	rat	0 35	NOAEL	chronic	liver toxicity	0 08			8.00E-02		2 99E-01	1 0000	1 00	Yes	Yes	IRIS
Hexachlorobutadiene	1	rat	0 35	NOAEL	chronic	kidney toxicity	0 2			2.00E-01		4 15E+00	0 0669	1 00		Yes	ATSDR
Hexachlorocyclopentadiene	1	rat	0 35	NOAEL	subchronic	stomach lesions	6	2		3.00E+00		1 12E+01	1 0000	1 00	Yes	Yes	IRIS[d]
Hexachloroethane	1	rat	0 35	NOAEL	subchronic	kidney toxicity	1	2		5.00E-01		1 87E+00	1 0000	1 00	Yes	Yes	IRIS
Hexanal	1	rat	0 35				570			5.70E+02	Hexane	2 13E+03	1 0000	1 00	Yes	Yes	HEAST FY 1997
Hexavalent Chromium	1	rat	0 35	NOAEL	chronic	growth	1 28			1.28E+00		1 23E+01	1 0000	1 00	Yes	Yes	Sample et al 1996
HMX	1	mouse	0 03	NOAEL	subchronic	mortality	30	2		1.50E+01		5 60E+01	1 0000	1 00	Yes	Yes	Talmage et al 1999
Hydrazine	1	mouse	0 03	LOAEL	chronic	survival and histopathology	0 059		5	1.18E-02	1,2 dimethylhydrazine	8 24E-05	609 0000	1 00		Yes	ATSDR
Indeno(1,2,3-cd)pyrene	1	mouse	0 03				1 31			1.31E+00	Benzo(a)pyrene	2 25E+01	0 1100	1 00		Yes	EFA West 1998
Isophorone	1	dog	14	NOAEL	subchronic	kidney toxicity	150	2		1.06E+02		3 96E+02	1 0000	1 00	Yes	Yes	IRIS
Isopropylbenzene	1	rat	0 35				97 1			9.71E+01	Ethylbenzene	9 49E+02	0 2970	1 00		Yes	IRIS
Lead	1	rat	0 35	NOAEL	chronic	kidney function	1			1.00E+00		4 47E+01	0 0388	0 27			Region 9 BTAG 2002
Lindane	1	rat	0 176	NOAEL	chronic	reproduction, development	0 05			5.00E-02		1 87E-01	1 0000	1 00	Yes	Yes	EFA West 1998
m,p-Xylene	1	rat	0 35				150			1.50E+02	Xylenes	9 30E+02	0 5480	1 00		Yes	Condie et al 1988
Manganese	1	mouse	0 0346	LOAEL	subchronic	reproductive organ toxicity	13 7		Y	1.37E+01		5 22E+02	0 0790	0 05			EFA West 1998
Mercury	1	mink	1	NOAEL	chronic	reproduction	1 01			1.01E+00		4 89E+00	0 6630	1 69			Sample et al 1996
Methyl Isobutyl Ketone	1	rat	0 35				1771			1.77E+03	2-Butanone	2 85E+02	26 3000	1 00		Yes	IRIS
Methyl mercury	1	rat	0 1875	NOAEL	chronic	reproductive, developmental	0 25			2.50E-01		9 34E-01	1 0000	1 00	Yes	Yes	EFA West 1998
Methyl tert-butyl ether	1	rat	0 35	LOAEL	subchronic	mortality	143	2	5	1.43E+01		5 40E+00	11 1000	1 00		Yes	ATSDR
Methylene chloride	1	rat	0 35	NOAEL	chronic	organ toxicity	5 85			5.85E+00		3 33E+00	7 3400	1 00		Yes	Sample et al 1996
Methylphenol	1	rat	0 35				50			5.00E+01	2-Methylphenol	1 87E+02	1 0000	1 00	Yes	Yes	IRIS
Molybdenum	1	mouse	0 03	NOAEL	chronic	reproduction	0 26		Y	2.60E-01		9 71E-01	1 0000	1 00	Yes	Yes	Sample et al 1996
Monochlorobenzene	1	rat	0 35				75			7.50E+01	1,4-Dichlorobenzene	2 80E+02	1 0000	1 00	Yes	Yes	ATSDR
Monomethylhydrazine	1	mouse	0 03	LOAEL	chronic	survival and histopathology	0 059		5	1.18E-02	1,2 dimethylhydrazine	4 41E-02	1 0000	1 00	Yes	Yes	ATSDR
Naphthalene	1	rat	0 28	NOAEL	chronic	reproductive, systemic effects	50			5.00E+01		3 17E+01	1 0590	50 6100			EFA West 1998
n-Butylbenzene	1	rat	0 35				97 1			9.71E+01	Ethylbenzene	1 04E+03	0 1140	1 00		Yes	IRIS
Nickel	1	rat	0 35	LOAEL	chronic	reproduction (decreased pup viability)	0 133		Y	1.33E-01		3 49E+00	0 0179	1 06			EFA West 1998
Nitrobenzene	1	mouse	0 03	LOAEL	subchronic	organ toxicity	4 6	2	5	4.60E-01		1 72E+00	1 0000	1 00	Yes	Yes	IRIS
N-Nitrosodimethylamine	1	rat	0 35				13			1.30E+01	Tetryl	6 67E-01	82 7000	1 00		Yes	Talmage et al 1999
N-Nitrosodi-n-propylamine	1	rat	0 35				13			1.30E+01	Tetryl	6 67E-01	82 7000	1 00		Yes	Talmage et al 1999
N-Nitrosodiphenylamine	1	rat	0 35				13			1.30E+01	Tetryl	6 67E-01	82 7000	1 00		Yes	Talmage et al 1999
Nonane	1	rat	0 35				570			5.70E+02	Hexane	2 13E+03	1 0000	1 00	Yes	Yes	HEAST FY 1997
n-Propylbenzene	1	rat	0 35				97 1			9.71E+01	Ethylbenzene	5 71E+02	0 5850	1 00		Yes	IRIS
OCDD	0 0001	rat	0 35				0 000001			1.00E-02	2,3,7,8-TCDD	3 40E-02	0 0001	11 0110			TEF from Van den Berg et al 1998
OCDF	0 0001	rat	0 35				0 000001			1.00E-02	2,3,7,8-TCDD	3 40E-02	0 0004	11 0110			TEF from Van den Berg et al 1998
o-Xylene	1	rat	0 35				150			1.50E+02	Xylenes	8 54E+02	0 6090	1 00		Yes	Condie et al 1988
PCB-105	0 0001	rat	0 35				0 000001			1.00E-02	2,3,7,8-TCDD	5 48E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-114	0 0005	rat	0 35				0 000001			2.00E-03	2,3,7,8-TCDD	1 10E-02	0 0090	6 6670			TEF from Van den Berg et al 1998

Table 2c

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (CA VOLE)
AEROJET SUPERFUND SITE

Chemical	TEF	*Test Species* Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value *(mg/kg-day)*	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV *(mg/kg-day)*	Toxicity Value Surrogate[a]	Mammalian ESL[b] *(mg/kg soil)*	Plant AF[c] *(unitless)*	Invertebrate AF[c] *(unitless)*	Default Plant BAF *(unitless)*	Default Invertebrate BAF *(unitless)*	TRV Initial Compilation Source
PCB-118	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	5 48E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-123	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	5 48E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-126	0 1	rat	0 35				0 000001			1 00E-05	2,3,7,8-TCDD	5 48E-05	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-156	0 0005	rat	0 35				0 000001			2 00E-03	2,3,7,8-TCDD	1 10E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-157	0 0005	rat	0 35				0 000001			2 00E-03	2,3,7,8-TCDD	1 10E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-167	0 00001	rat	0 35				0 000001			1 00E-01	2,3,7,8-TCDD	5 48E 01	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-169	0 01	rat	0 35				0 000001			1 00E-04	2,3,7,8-TCDD	5 48E-04	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-189	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	5 48E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-77	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	5 48E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-81	0 0001	rat	0 35				0 000001			1 00E-02	2,3,7,8-TCDD	5 48E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
Pentachlorophenol	1	rat	0 35	NOAEL	chronic	liver and kidney toxicity	3			3 00E+00		7 11E-01	9 6151	74 6800			Schwetz et al 1978 (IRIS)
Pentanal	1	rat	0 35				570			5 70E+02	Hexane	2 13E+03	1 0000	1 00	Yes	Yes	HEAST FY 1997
Perchlorate	1	rat	0 35	LOAEL	chronic	changes in fetal TSH, T_3, and T_4 levels	0 0085		5	1 70E-03		6 35E-03	1 0000	1 00	Yes	Yes	USEPA 2002, Argus 2001
Phenanthrene	1	mouse	0 03				75			7 50E+01	Pyrene	3 58E+01	3 8370	45 4900			IRIS
Phenol	1	rat	0 35	NOAEL	chronic	reproduction	60			6 00E+01		4 48E+01	5 5500	1 00		Yes	IRIS
p-Isopropyltoluene	1	rat	0 35				150			1 50E+02	Xylenes	8 54E+02	0 6090	1 00		Yes	Condie et al 1988
Pyrene	1	mouse	0 03	NOAEL	subchronic	kidney toxicity	75	2		3 75E+01		8 01E+01	1 8520	1 00		Yes	IRIS
Pyridine	1	rat	0 35	NOAEL	subchronic	liver toxicity	1	2		1 00E-01		1 07E+00	1 8520	1 00		Yes	IRIS
RDX	1	rat	0 35	NOAEL	chronic	organ toxicity	10			1 00E+01		3 19E+00	12 2000	9 9100			Talmage et al 1999
sec-Butylbenzene	1	rat	0 35				97 1			9 71E+01	Ethylbenzene	5 71E+02	0 5850	1 00		Yes	IRIS
Selenium	1	rats	0 35	NOAEL	chronic	hepatic lesions	0 05			5 00E-02		2 63E-01	0 6719	0 99			EFA West 1998
Silver	1	mouse	0 03	LOAEL	chronic	*	0 375		Y	3 75E-01		5 95E+00	0 0140	2 05			EPA Region 6
Styrene	1	dog	14	NOAEL	subchronic	growth, hematology	200	2		1 41E+02		6 66E+02	0 7640	1 00		Yes	IRIS
tert-Butylbenzene	1	rat	0 35				97 1			9 71E+01	Ethylbenzene	1 33E+03	0 1720	1 00		Yes	IRIS
Tetrachloroethene	1	mouse	0 011	LOAEL	subchronic	behavior	5	2	5	5 00E-01		3 81E+00	0 4200	1 00		Yes	Fredriksson et al 1993
Tetramethylcyclohexane Isomer	1	rat	0 35				150			1 50E+02	Xylenes	8 54E+02	0 6090	1 00		Yes	Condie et al 1988
Tetryl	1	rat	0 35	NOAEL	subchronic	organ weight, kidney, blood cell counts	13	2		6 50E+00		2 43E+01	1 0000	1 00	Yes	Yes	Talmage et al 1999
Thallium	1	rat	0 35	NOAEL	subchronic	hair loss	0 48	2		2 40E-01		8 97E-01	1 0000	1 00	Yes	Yes	EFA West 1998
Thiobismethane	1	rabbit	1 13				11			1 10E+01	Carbon disulfide	4 11E+01	1 0000	1 00	Yes	Yes	IRIS
Toluene	1	mouse	0 03	LOAEL	chronic	behavior	2 88		5	5 76E-01		2 11E+00	1 0200	1 00		Yes	Kostas and Hotchin 1981
Total xylenes	1	rat	0 35	LOAEL	subchronic	liver and kidney toxicity	150	2	5	1 50E+01		8 54E+01	0 6090	1 00		Yes	Condie et al 1988
trans-1,2-Dichloroethene	1	mouse	0 03	NOAEL	subchronic	organ toxicity	452	2		2 26E+02		3 79E+02	2 4000	1 00		Yes	ATSDR
trans-1,3-Dichloropropene	1	rat	0 35	LOAEL	chronic	organ toxicity	5 1		5	1 02E+00		3 81E+00	1 0000	1 00	Yes	Yes	IRIS
Trichloroethene	1	mouse	0 03	LOAEL	subchronic	liver toxicity	0 7	Y	Y	7 00E-01		1 76E+00	1 5500	1 00		Yes	Sample et al 1996
Trichlorofluoromethane	1	rat/mice	0 35	LOAEL	chronic	survival and histopathology	349		5	6 98E+01		2 01E+02	1 3400	1 00		Yes	IRIS
Trimethyl benzene	1	rat	0 35				150			1 50E+02	Xylenes	8 54E+02	0 6090	1 00		Yes	Condie et al 1988
Unsymetricaldimethylhydrazine	1	mouse	0 03	LOAEL	chronic	survival and histopathology	0 059		5	1 18E-02	1,2 dimethylhydrazine	4 41E-02	1 0000	1 00	Yes	Yes	ATSDR
Vanadium	1	rat	0 26	NOAEL	chronic	reproduction	0 21			2 10E-01		6 26E+00	0 0049	1 00		Yes	Sample et al 1996
Vinyl acetate	1	rat	0 35	NOAEL	chronic	pup body weight gain	117			1 17E+02		4 37E+02	1 0000	1 00	Yes	Yes	ATSDR
Vinyl chloride	1	rat	0 35	NOAEL	chronic	longevity	0 17			1 70E-01		6 35E-01	1 0000	1 00	Yes	Yes	Sample et al 1996
Zinc	1	mouse	0 0255	LOAEL	chronic	pancreatic,adrenal	9 6		Y	9 60E+00		5 45E+01	0 3662	3 20			EFA West 1998

Notes

(a) # Indicates no appropriate structurally related surrogate available Surrogate chosen is the lowest within the chemical group

(b) Food and incidental soil intake values calculated as described in Table X

California Vole Exposure Factors

Default dest mouse bodyweight (kg)	0 044	Based on mean adult weight (Sample 1994)
Ingestion rate(kg/day-kg body weight) =	0 261	= 0 0115/0 044 - Ingestion rate of Meadow vole listed in Nagy (2001) = 0 0115 kg
Fraction plant consumed (dry weight) (unitless) =	0 9	Food will consist of 90 percent plant tissue and 10 percent invertebrate tissue
Fraction invertebrate consumed (dry weight) (unitless) =	0 1	
Soil consumed (dry weight) at 2 4% of intake (kg/day kg bodyweight) =	0 0063	2 4 percent of food ingestion rate based on meadow vole (Beyer and others 1994)

*ESL = (TRV/((((%Plant * Plant BAF)+(%Invert * Invert BAF)) * Total Ingestion Rate (kg/day-kg bw) + Soil Consumed(kg/day-kg bw))))*

ESL = (Kxx/(((D261*Nxx)+(D262*Oxx))*D260)+(D263))) xx = Column number

(c) BAFs are based on literature or a default of 1 (see BAF spreadsheets for source)

(d) Secondary study selected because primary study was an anecdotal account of human cataract formation, not necessarily relevant to ecological endpoints

(e) BMDL10

* Indicates that experimental detail not available in cited source document.

BAF - bioaccumulation factor

ESL - ecological screening level

kg - kilogram

LOAEL - lowest-observable-adverse-effect level

mg - milligram

NOAEL - no-observable-adverse-effect-level

PCB - polychlorinated biphenyl

SVOC - semivolatile organic compound

TEF - toxicity equivalence factor

TRV - toxicity reference value

UF - uncertainty factor

Table 2c

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL MAMMALS (CA VOLE)
AEROJET SUPERFUND SITE

(Page 5 of 5)

Chemical	TEF	Test Species Common Name	Test Species Body Weight (kg)	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	Subchronic to Chronic UF	LOAEL to NOAEL UF	Rodent NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Mammalian FSI[b] (mg/kg soil)	Plant AF[c] (unitless)	Invertebrate AF[c] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	TRV Initial Compilation Source

VOC - volatile organic compound

Y - uncertainty factor used to derive TRV was included by original source

Table 2d

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL AVIAN SPECIES (AMERICAN ROBIN)
AEROJET SUPERFUND SITE

Chemical	TEF	Test Species Common Name	Form for exposure chemical	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	LD_{50} to NOAEL UF	Subchronic to Chronic UF	LOAEL to NOAEL UF	Avian NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Avian ESL[b] (mg/kg soil)	Plant BAF[a] (unitless)	Invertebrate BAF[a] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	Initial Compilation Source
1,2,3,4,6,7,8-HpCDD	0 01	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-02				1 43E-02	2,3,7,8-TCDD	3 80E-01	0 0007	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,6,7,8-HpCDF	0 01	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-03				1 43E-03	2,3,7,8-TCDD	2 55E-02	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8,9-HpCDF	0 01	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-03				1 43E-03	2,3,7,8-TCDD	2 55E-02	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8-HxCDD	0 05	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				2 86E-04				2 86E-04	2,3,7,8-TCDD	5 11E-03	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8-HxCDF	0 10	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 55E-03	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,6,7,8-HxCDD	0 01	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-03				1 43E-03	2,3,7,8-TCDD	2 55E-02	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,6,7,8-HxCDF	0 10	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 55E-03	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8,9-HxCDD	0 10	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 55E-03	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8,9-HxCDF	0 10	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 55E-03	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8-PeCDD	1 00	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-05				1 43E-05	2,3,7,8-TCDD	2 55E-04	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8-PeCDF	0 10	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 55E-03	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2-Dichloroethane	1 00	Chicken		NOAEL	chronic	reproduction	17 2				1 72E+01		2 93E+02	5 4000	1 00		Yes	Sample et al 1996
1,3-Dinitrobenzene	1 00	Red-Winged Blackbird		LD_{50}	acute	mortality	42 2	100			4 22E-01		7 47E+00	1 00	1 00	Yes	Yes	Schafer, 1972
2,3,4,6,7,8-HxCDF	0 10	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 55E-03	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,3,4,7,8-PeCDF	1 00	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-05				1 43E-05	2,3,7,8-TCDD	2 55E-04	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,3,7,8-TCDD	1 00	Ring-Necked Pheasant	2,3,7,8-TCDD	NOAEL	chronic	reproduction	1 43E-05				1 43E-05		2 55E-04	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
2,3,7,8-TCDF	1 00	Chicken	2,3,7,8-TCDF	LOAEL	sub-chronic	mortality	0 000001		Y	Y	1 00E-06		1 79E-05	0 0065	1 00		Yes	Sample et al 1996
2,4-Dinitrophenol	1	Red-Winged Blackbird	2,4-Dinitrophenol	LD_{50}	acute	mortality	13 3	100			1 33E-01		2 35E+00	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
2-Nitroaniline	1	Red-Winged Blackbird	2-Nitroaniline	LD_{50}	acute	mortality	750	100			7 50E+00		1 33E+02	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
3-Nitroaniline	1	Red-Winged Blackbird	3-Nitroaniline	LD_{50}	acute	mortality	133	100			1 33E+00		2 35E+01	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
4,4'-DDE	1	Brown Pelican		LOAEL	chronic	reproduction	0 0028			Y	2 80E-03	4,4'-DDT	8 13E-04	0 1360	67 5500			Sample et al 1996
4,4'-DDT	1	Brown Pelican		LOAEL	chronic	reproduction	0 0028			Y	2 80E-03		7 52E-04	0 0280	73 0400			Sample et al 1996
4-Chloroaniline	1	House Sparrow		LD_{50}	acute	mortality	100	100			1 00E+00		1 73E+01	3 3900	1 00		Yes	Schafer et al 1983[c]
4-Methylphenol	1	Red-Winged Blackbird		LD_{50}	acute	mortality	96	100			9 60E-01		1 67E+01	2 9300	1 00		Yes	Schafer et al 1983[c]
4-Nitroaniline	1	Red-Winged Blackbird		LD_{50}	acute	mortality	75	100			7 50E-01		1 33E+01	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
Acenaphthene	1	Red-Winged Blackbird		LD_{50}	acute	mortality	101	100			1 01E+00		5 11E-01	0 2100	38 7500			Schafer et al 1983[c]
Acetone	1	Japanese Quail		NOAEL	acute	*	10928		2		5 46E+03		6 55E+04	53 3000	1 00		Yes	Hill and Camardese, 1986[d]
alpha-BHC	1	Japanese Quail	benzene hexachloride (mixed isomers)	NOAEL	chronic	reproduction	0 563				5 63E-01		1 00E+01	0 1570	1 00		Yes	Sample et al 1996
Aluminum	1	Mallard Duck	aluminum sulfate	NOAEL	chronic	reproduction	109 7				1 10E+02		1 51E+04	0 0029	0 04			Sample et al 1996
Aniline Surrogate	1	Red-Winged Blackbird	Aniline	LD_{50}	acute	mortality	562	100			5 62E+00		9 94E+01	1 00	1 00		Yes	Schafer et al 1983[c]
Anthracene	1	Red-Winged Blackbird		LD_{50}	acute	mortality	111	100			1 11E+00		1 96E+01	1 00	1 00		Yes	Schafer et al 1983[c]
Aroclor 1242	1	Screech Owl	Aroclor 1242	NOAEL	chronic	reproduction	0 41				4 10E-01		7 32E+00	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1254	1	Chicken	Aroclor 1254	LOAEL	chronic	reproduction	0 09			Y	9 00E-02		1 61E+00	0 0090	1 00		Yes	EFA West 1998
Arsenic	1	Mallard Duck	sodium arsenite	NOAEL	chronic	growth/development	5 14				5 14E+00		3 11E+02	0 0375	0 22			Sample et al 1996
Barium	1	Chicken	barium hydroxide	NOAEL	sub-chronic	mortality	20 8		Y		2 08E+01		2 12E+03	0 1560	0 09			Sample et al 1996
Benzoic Acid	1	Red-Winged Blackbird		LD_{50}	acute	mortality	100	100			1 00E+00		*1 72E+01*	3 2100	1 00		Yes	Schafer et al 1983[c]
Benzyl Alcohol	1	Red-Winged Blackbird		LD_{50}	acute	mortality	100	100			1 00E+00		1 77E+01	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
beta-BHC	1	Japanese Quail	benzene hexachloride (mixed isomers)	NOAEL	chronic	reproduction	0 563				5 63E-01		9 96E+00	1 00	1 00	Yes	Yes	Sample et al 1996
Bis(2-ethylhexyl)phthalate	1	*Ringed Dove*		NOAEL	*sub-chronic*	*reproduction*	*1 12*		Y		*1 11E+00*		*1 98E+01*	*0 0016*	1 00		Yes	*Sample et al 1996*
Boron	1	Mallard Duck	boric acid	NOAEL	chronic	reproduction	28 8				2 88E+01		5 10E+02	1 00	1 00		Yes	Sample et al 1996
Cadmium	1	Mallard Duck	cadmium chloride	LOAEL	chronic	growth/development	0 08			5	1 60E-02		4 02E-02	0 5857	7 71			EFA West 1998
Chlordane	1	*European Starling*	*2,4-Dinitrophenol*	*LD50*	*acute*	*mortality*	*30 8*	*100*			*3 08E-01*		5 45E+00	*1 00*	*1 00*		Yes	*Stickel et al 1979[e]*
Copper	1	Broiler chicks	*	NOAEL	sub-chronic	weight gain	2 3		Y		2 30E+00		7 33E+01	0 1243	0 52			EFA West 1998
delta-BHC	1	Japanese Quail	benzene hexachloride (mixed isomers)	NOAEL	chronic	reproduction	0 563				5 63E-01		9 96E+00	1 00	1 00		Yes	Sample et al 1996
Dieldrin	1	*Barn Owl*		NOAEL	chronic	reproduction	*0 077*				*7 70E-02*		5 66E-03	*0 0240*	*267 0800*			*Sample et al 1996*
Dimethylphthalate	1	Red-Winged Blackbird		LD_{50}	acute	mortality	100	100			1 00E+00		1 76E+01	1 5500	1 00		Yes	Schafer et al 1983[c]
Di-n-butylphthalate	1	Ringed Dove		LOAEL	chronic	reproduction	0 11			Y	1 10E-01		1 96E+00	0 0971	1 00		Yes	Sample et al 1996
Di-n-octylphthalate	1	Ring-Necked Pheasant	Phthalic acid, Dioctyl ester	LD_{50}	acute	mortality	883 6	100			8 84E+00		1 56E+02	1 00	1 00	Yes	Yes	*Hill et al , 1975[f]*
Endosulfan Sulfate	1	Gray Partridge		NOAEL	chronic	reproduction	10				1 00E+01		1 78E+02	0 2370	1 00		Yes	Sample et al 1996
Endrin	1	Screech Owl		LOAEL	chronic	reproduction	0 01			Y	1 00E-02		1 78E-01	0 0382	1 00		Yes	Sample et al 1996
Fluorene	1	Red-Winged Blackbird		LD_{50}	acute	mortality	101	100			1 01E+00		1 80E+01	0 0410	1 00		Yes	Schafer et al 1983[c]
Heptachlor	1	Japanese Quail		LOAEL	acute	mortality	13 358		2	5	1 34E+00		2 38E+01	0 0115	1 00		Yes	Hill and Camardese, 1986[d]
Hexachlorobenzene	1	Japanese Quail		NOAEL	acute	mortality	54 5		2		2 73E+01		4 82E+02	1 00	1 00	Yes	Yes	Hill and Camardese, 1986[d]
Hexachlorobutadiene	1	Japanese Quail		NOAEL	chronic	*	3 185				3 19E+00		5 68E+01	0 0669	1 00		Yes	Schwetz et al 1974
Lead	1	Japanese Quail	lead acetate	LOAEL	chronic	reproduction	0 014			5	2 80E-03		1 50E-01	0 0388	0 27			EFA West 1998
Lindane	1	*Mallard Duck*		*LOAEL*	*chronic*	*reproduction*	*2*			*Y*	*2 00E+00*		*3 54E+01*	*1 00*	*1 00*	Yes	Yes	Sample et al 1996
Manganese	1	Japanese Quail		NOAEL	chronic	development, behavior	77 6			Y	7 76E+01		9 85E+03	0 0790	0 05			EFA West 1998
Mercury	1	Japanese Quail	mercuric chloride	NOAEL	chronic	reproduction	0 45				4 50E-01		4 91E+00	0 6630	1 69			Sample et al 1996
Methyl Mercury	1	*Mallard Duck*	methyl mercury dicyandiamide	*LOAEL*	*chronic*	*reproduction*	*0 039*			*Y*	*3 90E-02*		*4 26E-01*	*0 6630*	*1 69*			*EFA West 1998*
Molybdenum	1	Chicken	sodium molybdate	LOAEL	chronic	reproduction	3 5			Y	3 50E+00		6 19E+01	1 00	1 00	Yes	Yes	Sample et al 1996
Nickel	1	Mallard Duck	nickel sulfate	NOAEL	sub-chronic	growth/development	1 38		Y		1 38E+00		2 44E+01	0 0179	1 06			EFA West 1998
OCDD	*0 0001*	Ring-Necked Pheasant	*2,3,7,8-TCDD/TEF*				*1 43E-01*				*1 43E-01*	*2,3,7,8-TCDD*	*2 53E-01*	*0 0001*	*11 0110*			*TEF from Van den Berg et al 1998*
OCDF	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-01				1 43E-01	2,3,7,8-TCDD	2 53E-01	0 0004	11 0110			TEF from Van den Berg et al 1998
PCB-105	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-01				1 43E-01	2,3,7,8-TCDD	4 15E-01	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-114	*0 0001*	Ring-Necked Pheasant	*2,3,7,8-TCDD*				*1 43E-01*				*1 43E-01*	*2,3,7,8-TCDD*	*4 15E-01*	*0 0090*	*6 6670*			*TEF from Van den Berg et al 1998*
PCB-118	0 00001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E+00				1 43E+00	2,3,7,8-TCDD	4 15E+00	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-123	0 00001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E+00				1 43E+00	2,3,7,8-TCDD	4 15E+00	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-126	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD				*1 43E-04*				*1 43E-04*	*2,3,7,8-TCDD*	*4 15E-04*	*0 0090*	6 6670			*TEF from Van den Berg et al 1998*
PCB-156	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-01				1 43E-01	2,3,7,8-TCDD	4 15E-01	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-157	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-01				1 43E-01	2,3,7,8-TCDD	4 15E-01	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-167	0 00001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E+00				1 43E+00	2,3,7,8-TCDD	4 15E+00	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-169	0 001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-02				1 43E-02	2,3,7,8-TCDD	4 15E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-189	0 00001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E+00				1 43E+00	2,3,7,8-TCDD	4 15E+00	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-77	0 05	Ring-Necked Pheasant	2,3,7,8-TCDD				2 86E-04				2 86E-04	2,3,7,8-TCDD	8 30E-04	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-81	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-04				1 43E-04	2,3,7,8-TCDD	4 15E-04	0 0090	6 6670			TEF from Van den Berg et al 1998
Pentachlorophenol	1	Japanese Quail		LD_{50}	acute	mortality	871	100			8 71E+00		2 28E+00	9 6151	74 6800			Hill and Camardese, 1986[d]

Table 2d

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL AVIAN SPECIES (AMERICAN ROBIN)
AEROJET SUPERFUND SITE

(Page 2 of 2)

Chemical	TEF	Test Species Common Name	Form for exposure chemical	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	LD_{50} to NOAEL UF	Subchronic to Chronic UF	LOAEL to NOAEL UF	Avian NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Avian ESL[b] (mg/kg soil)	Plant BAF[b] (unitless)	Invertebrate BAF[b] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	Initial Compilation Source
Phenanthrene	1	Red-Winged Blackbird		LD_{50}	acute	mortality	113	100			1 13E+00		4 86E-01	3 8370	45 4900			Schafer et al 1983*
Phenol	1	Red-Winged Blackbird		LD_{50}	acute	mortality	113	100			1 13E+00		1 92E+01	5 5500	1 00		Yes	Schafer et al 1983*
Selenium	1	Mallard Duck	selenomethionine	NOAEL	chronic	reproduction	0 23				2 30E-01		4 14E+00	0 6719	0 99			EFA West 1998
Vanadium	1	Mallard Duck	vanadyl sulfate	NOAEL	chronic	mortality	11 4				1 14E+01		2 04E+02	0 0049	1 00		Yes	Sample et al 1996
Zinc	1	Chicken	zinc sulfate	NOAEL	chronic	reproduction	14 5				1 45E+01		8 62E+01	0 3662	3 20			Sample et al 1996

Notes

(a) Food and incidental soil intake values calculated as described in Table 3

(b) BAFs are based on literature data or default of 1 See appropriate BAF spreadsheet for BAF source

(c) In the Schafer et al 1972 and 1983 studies birds were dosed by oral gavage on a mg/kg bodyweight basis

(d) In the Hill and Camardese 1986 study 14 day old quail were administed test compound in feed

Feed concentration was converted to daily dose by dividing intake by bodyweight

Bodyweight for a 14 day old quail was estimated to be 0 04125kg *from Sefton and Siegel 1974*

Intake was calculated from reported food consumption of control and low dose groups over the 5 day exposure period

pentachlorophenol 0 0116 kg/day calculated using the overall average control group values reported in the study

acetone 0 01127 kg/day calculated using the average of control and treatment group food consumption in the acetone exposure

heptachlor 0 01082 kg/day calculated using the average of control group food consumption in the heptachlor exposure

hexachlorobenzene 0 01087 kg/day calculated using the average of control and treatment group food consumption in the hexachlorobenzene exposure

(e) Stickel et al 1979 exposed birds to 150 ppm in diet for 6 days Using an approximate body weight for an adult starling (obtained from Stickel et al 1983)

Intake was calculated using the equation of Nagy (1987), the daily intake is 0 398 x (82 1g)^0 85 = 16 87 g The concentration in food may be converted to a daily dose as follows

150 mg/kg food x 16 87 g/day x 1 kg/1000 g = 0 0821 kg = 30 8 mg kg/day

(f) The study by Hill et al (1975) as cited in USEPA ECOTOX exposed 10 day old phesants n-dioctylphthalate at 5000 ppm in feed for 5-6 days

The LC50 was reported as greater than the maximum concentration fed Intake was calculated using the equation of Nagy (1987)

assuming a body weight for a juvenile Galliformes of approximately 0 04125 (Sefton and Siegel, 1974) as follows 0 648(41 25) 0 651= 7 29 g/day

for the calculation of dose 5000 mg/kg in feed x 7 29 g/day x 1kg/1000g * 1/0 04125 kg BW = 883 6 mg/kg BW - day

American Robin Exposure Factors

Body weight (kg)	7 70E-02	Based on mean adult weight (Sample 1994)
Ingestion rate (Nagy 2001 IR for robin),(kg/day-kg body weight) =	5 14E-02	Ingestion rate of robin listed in Nagy (2001) = 0 00396
Fraction plant consumed (dry weight) (unitless)=	1 00E-02	Food will consist of 99 percent invertebrate tissue (conservative estimate)
Fraction invertebrate consumed (dry weight) (unitless) =	9 90E-01	
Fraction Soil consumed (dry weight) at 10% of invertebrate intake (kg/day-kg bodyweight) =	9 90E-02	10% of of invertebrate prey consumed (Beyer and others 1994)

ESL = (TRV/((((*Plant + Plant BAF)+(*Invert + Invert BAF) + (Fraction Soil Consumed(kg/day-kg bw)))* Total Ingestion Rate (kg/day-kb bw)))

ESL = (kxx/((((E111*Nxx)+(E112*Oxx))+(E113))*(E110))) xx = Column number

* Indicates experimental detail not available in cited source document

BAF - bioaccumulation factor

ESL - ecological screening level

kg - kilogram

LD_{50} - lethal dose for 50% of study population

LOAEL - lowest-observable adverse-effect-level

mg - milligram

NOAEL - no-observable-adverse-effect-level

PCB - polychlorinated biphenyl

SVOC semivolatile organic compound

TEF - toxicity equivalency factor

TRV - toxicity reference value

UF - uncertainty factor

VOC - volatile organic compound

Y - uncertainty factor used to derive TRV was included by original source

Table 2e

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL AVIAN SPECIES (MOURNING DOVE)
AEROJET SUPERFUND SITE

Chemical	TEF	Test Species Common Name	Form for exposure chemical	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	LD_{50} to NOAEL UF	Subchronic to Chronic UF	LOAEL to NOAEL UF	Avian NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Avian ESL[b] (mg/kg soil)	Plant BAF[b] (unitless)	Invertebrate BAF[b] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	Initial Compilation Source
1,2,3,4,6,7,8-HpCDD	0 01	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-02				1 43E-02	2,3,7,8-TCDD	2 61E+00	0 0007	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,6,7,8-HpCDF	0 01	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-03				1 43E-03	2,3,7,8-TCDD	2 52E-01	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8,9-HpCDF	0 01	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-03				1 43E-03	2,3,7,8-TCDD	2 48E-01	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8-HxCDD	0 05	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				2 86E-04				2 86E-04	2,3,7,8-TCDD	5 04E-02	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,4,7,8-HxCDF	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 48E-02	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,6,7,8-HxCDD	0 01	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-03				1 43E-03	2,3,7,8-TCDD	2 52E-01	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,6,7,8-HxCDF	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 48E-02	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8,9-HxCDD	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 52E-02	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8,9-HxCDF	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 48E-02	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8-PeCDD	1	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-05				1 43E-05	2,3,7,8-TCDD	2 52E-03	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
1,2,3,7,8-PeCDF	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 48E-02	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
1,2-Dichloroethane	1	Chicken		NOAEL	chronic	reproduction	17 2				1 72E+01		5 98E+01	5 4000	1 00		Yes	Sample et al 1996
1,3-Dinitrobenzene	1	Red-Winged Blackbird		LD_{50}	acute	mortality	42 2	100			4 22E-01		7 32E+00	1 00	1 00	Yes	Yes	Schafer, 1972[c]
2,3,4,6,7,8-HxCDF	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-04				1 43E-04	2,3,7,8-TCDD	2 48E-02	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,3,4,7,8-PeCDF	1	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-05				1 43E-05	2,3,7,8-TCDD	2 48E-03	0 0065	1 00		Yes	TEF from Van den Berg et al 1998
2,3,7,8-TCDD	1	Ring-Necked Pheasant	2,3,7,8-TCDD	NOAEL	chronic	reproduction	1 43E-05				1 43E-05		2 52E-03	0 0046	1 00		Yes	TEF from Van den Berg et al 1998
2,3,7,8-TCDF	1	Chicken	2,3,7,8-TCDF	LOAEL	sub-chronic	mortality	0 000001		Y	Y	1 00E-06		1 73E-04	0 0065	1 00		Yes	Sample et al 1996
2,4-Dinitrophenol	1	*Red-Winged Blackbird*	*2,4-Dinitrophenol*	LD_{50}	*acute*	*mortality*	13 3	100			*1 33E-01*		2 31E+00	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
2-Nitroaniline	1	Red-Winged Blackbird	2-Nitroaniline	LD_{50}	acute	mortality	750	100			7 50E+00		1 30E+02	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
3-Nitroaniline	1	Red-Winged Blackbird	3-Nitroaniline	LD_{50}	acute	mortality	133	100			1 33E+00		2 31E+01	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
4,4'-DDE	1	Brown Pelican		LOAEL	chronic	reproduction	0 0028			Y	2 80E-03	4,4'-DDT	5 88E-02	0 1360	67 5500			Sample et al 1996
4,4'-DDT	1	*Brown Pelican*		LOAEL	*chronic*	*reproduction*	*0 0028*			Y	*2 80E-03*		6 24E-02	0 0280	73 0400			*Sample et al 1996*
4-Chloroaniline	1	House Sparrow		LD_{50}	acute	mortality	100	100			1 00E+00		5 48E+00	3 3900	1 00		Yes	Schafer et al 1983[c]
4-Methylphenol	1	Red-Winged Blackbird		LD_{50}	acute	mortality	96	100			9 60E-01		6 06E+00	2 9300	1 00		Yes	Schafer et al 1983[c]
4-Nitroaniline	1	Red-Winged Blackbird		LD_{50}	acute	mortality	75	100			7 50E-01		1 30E+01	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
Acenaphthene	1	Red-Winged Blackbird		LD_{50}	acute	mortality	101	100			1 01E+00		2 78E+01	0 2100	38 7500			Schafer et al 1983[c]
Acetone	1	*Japanese Quail*		NOAEL	*acute*	*	*10928*		2		5 46E+03		1 96E+03	53 3000	*1 00*		Yes	*Hill and Camardese, 1986*[d]
alpha-BHC	1	Japanese Quail	benzene hexachloride (mixed isomers)	NOAEL	chronic	reproduction	0 563				5 63E-01		4 13E+01	0 1570	1 00		Yes	Sample et al 1996
Aluminum	1	Mallard Duck	aluminum sulfate	NOAEL	chronic	reproduction	109 7				1 10E+02		2 16E+04	0 0029	0 04			Sample et al 1996
Aniline Surrogate	1	Red-Winged Blackbird	Aniline	LD_{50}	acute	mortality	562	100			5 62E+00		9 75E+01	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
Anthracene	1	Red-Winged Blackbird		LD_{50}	acute	mortality	111	100			1 11E+00		1 93E+01	1 00	1 00		Yes	Schafer et al 1983[c]
Aroclor 1242	1	Screech Owl	Aroclor 1242	NOAEL	chronic	reproduction	0 41				4 10E-01		6 95E+01	0 0090	1 00		Yes	Sample et al 1996
Aroclor 1254	1	Chicken	Aroclor 1254	LOAEL	chronic	reproduction	0 09			Y	9 00E-02		1 53E+01	0 0090	1 00		Yes	EFA West 1998
Arsenic	1	Mallard Duck	sodium arsenite	NOAEL	*chronic*	*growth/development*	5 14				5 14E+00		7 36E+02	0 0325	0 22			*Sample et al 1996*
Barium	1	Chicken	barium hydroxide	NOAEL	sub-chronic	mortality	20 8		Y		2 08E+01		1 59E+03	0 1560	0 09			Sample et al 1996
Benzoic Acid	1	Red-Winged Blackbird		LD_{50}	acute	mortality	100	100			1 00E+00		5 78E+00	3 2100	1 00		Yes	Schafer et al 1983[c]
Benzyl Alcohol	1	Red-Winged Blackbird		LD_{50}	acute	mortality	100	100			1 00E+00		1 73E+01	1 00	1 00	Yes	Yes	Schafer et al 1983[c]
beta-BHC	1	Japanese Quail	benzene hexachloride (mixed isomers)	NOAEL	chronic	reproduction	0 563				5 63E-01		9 77E+00	1 00	1 00	Yes	Yes	Sample et al 1996
Bis(2-ethylhexyl)phthalate	1	*Ringed Dove*		NOAEL	*sub-chronic*	*reproduction*	*1 11*		Y		*1 11E+00*		*2 01E+02*	*0 0016*	*1 00*		*Yes*	*Sample et al 1996*
Boron	1	Mallard Duck	boric acid	NOAEL	chronic	reproduction	28 8				2 88E+01		5 00E+02	1 00	1 00	Yes	Yes	Sample et al 1996
Cadmium	1	Mallard Duck	cadmium chloride	LOAEL	chronic	growth/development	0 08			5	1 60E-02		4 04E-01	0 5857	7 71			EFA West 1998
Chlordane	1	European Starling	2,4-Dinitrophenol	LD50	acute	mortality	30 8	100			3 08E-01		5 34E+00	1 00	1 00	Yes	Yes	Stickel et al 1979[e]
Copper	1	Broiler chicks	*	NOAEL	sub-chronic	weight gain	2 3		Y		2 30E+00		1 97E+02	0 1243	0 52			EFA West 1998
delta-BHC	1	*Japanese Quail*	benzene hexachloride (mixed isomers)	NOAEL	*chronic*	reproduction	0 563				5 63E-01		9 77E+00	*1 00*	*1 00*	Yes	Yes	*Sample et al 1996*
Dieldrin	1	Barn Owl		NOAEL	chronic	reproduction	0 0177				7 70E-02		5 24E-01	0 0240	267 0800			Sample et al 1996
Dimethylphthalate	1	Red-Winged Blackbird		LD_{50}	acute	mortality	100	100			1 00E+00		1 16E+01	1 5500	1 00		Yes	Schafer et al 1983[c]
Di-n-butylphthalate	1	Ringed Dove		LOAEL	chronic	reproduction	0 11			Y	1 10E-01		1 05E+01	0 0971	1 00		Yes	Sample et al 1996
Di-n-octylphthalate	1	Ring-Necked Pheasant	Phthalic acid, Dioctyl ester	LD_{50}	acute	mortality	883 6	100			8 84E+00		1 53E+02	1 00	1 00	Yes	Yes	Hill et al , 1975[f]
Endosulfan Sulfate	1	Gray Partridge		NOAEL	chronic	reproduction	10				1 00E+01		5 62E+02	0 2370	1 00		Yes	Sample et al 1996
Endrin	1	Screech Owl		LOAEL	chronic	reproduction	0 01			Y	1 00E-02		1 35E+00	0 0382	1 00		Yes	Sample et al 1996
Fluorene	1	Red-Winged Blackbird		LD_{50}	acute	mortality	101	100			1 01E+00		1 33E+02	0 0410	1 00		Yes	Schafer et al 1983[c]
Heptachlor	1	Japanese Quail		LOAEL	acute	mortality	13 358		2	5	1 34E+00		2 21E+02	0 0115	1 00		Yes	Hill and Camardese, 1986[d]
Hexachlorobenzene	1	*Japanese Quail*		NOAEL	acute	mortality	54 5		2		2 73E+01		4 73E+02	*1 00*	*1 00*	Yes	Yes	*Hill and Camardese, 1986*[d]
Hexachlorobutadiene	1	Japanese Quail		NOAEL	chronic	*	3 185				3 19E+00		3 57E+02	0 0669	1 00		Yes	Schwetz et al 1974
Lead	1	Japanese Quail	lead acetate	LOAEL	chronic	reproduction	0 014			5	2 80E-03		3 96E-01	0 0388	0 27			EFA West 1998
Lindane	1	Mallard Duck		LOAEL	chronic	reproduction	2			Y	2 00E+00		3 47E+01	1 00	1 00	Yes	Yes	Sample et al 1996
Manganese	1	Japanese Quail		NOAEL	chronic	development, behavior	77 6			Y	7 76E+01		8 57E+03	0 0790	0 05			EFA West 1998
Mercury	1	Japanese Quail	mercuric chloride	NOAEL	chronic	reproduction	0 45				4 50E-01		1 11E+01	0 6630	1 69			Sample et al 1996
Methyl Mercury	1	Mallard Duck	methyl mercury dicyandiamide	LOAEL	chronic	reproduction	0 039			Y	3 90E-02		9 65E-01	0 6630	1 69			EFA West 1998
Molybdenum	1	Chicken	sodium molybdate	*LOAEL*	*chronic*	*reproduction*	*3 5*			Y	*3 50E+00*		*6 07E+01*	*1 00*	*1 00*	Yes	Yes	*Sample et al 1996*
Nickel	1	Mallard Duck	nickel sulfate	NOAEL	sub-chronic	growth/development	1 38		Y		1 38E+00		2 16E+02	0 0179	1 06			EFA West 1998
OCDD	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-01				1 43E-01	2,3,7,8-TCDD	1 33E+01	0 0001	11 0110			TEF from Van den Berg et al 1998
OCDF	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD/TEF				1 43E-01				1 43E-01	2,3,7,8-TCDD	1 33E+01	0 0004	11 0110			TEF from Van den Berg et al 1998
PCB-105	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-01				1 43E-01	2,3,7,8-TCDD	1 61E+01	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-114	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-01				1 43E-01	*2,3,7,8-TCDD*	1 61E+01	*0 0090*	6 6670			*TEF from Van den Berg et al 1998*
PCB-118	0 00001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E+00				1 43E+00	2,3,7,8-TCDD	1 61E+02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-123	0 00001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E+00				1 43E+00	2,3,7,8-TCDD	1 61E+02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-126	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-04				1 43E-04	2,3,7,8-TCDD	1 61E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-156	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-01				1 43E-01	2,3,7,8-TCDD	1 61E+01	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-157	0 0001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-01				1 43E-01	2,3,7,8-TCDD	1 61E+01	0 0090	6 6670			*TEF from Van den Berg et al 1998*
PCB-167	0 00001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E+00				1 43E+00	2,3,7,8-TCDD	1 61E+02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-169	*0 001*	*Ring-Necked Pheasant*	*2,3,7,8-TCDD*				*1 43E-02*				*1 43E-02*	*2,3,7,8-TCDD*	*1 61E+00*	*0 0090*	*6 6670*			*TEF from Van den Berg et al 1998*
PCB-189	0 00001	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E+00				1 43E+00	2,3,7,8-TCDD	1 61E+02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-77	0 05	Ring-Necked Pheasant	2,3,7,8-TCDD				2 86E-04				2 86E-04	2,3,7,8-TCDD	3 22E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
PCB-81	0 1	Ring-Necked Pheasant	2,3,7,8-TCDD				1 43E-04				1 43E-04	2,3,7,8-TCDD	1 61E-02	0 0090	6 6670			TEF from Van den Berg et al 1998
Pentachlorophenol	1	Japanese Quail		LD_{50}	acute	mortality	871	100			8 71E+00		1 59E+01	9 6151	74 6800			Hill and Camardese, 1986[d]

Table 2c

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL AVIAN SPECIES (MOURNING DOVE)
AEROJET SUPERFUND SITE

Chemical	TEF	Test Species Common Name	Form for exposure chemical	Endpoint	Study Type	Effect to Test Organism	Toxicity Value (mg/kg-day)	LD_{50} to NOAEL UF	Subchronic to Chronic UF	LOAEL to NOAEL UF	Avian NOAEL-Equiv TRV (mg/kg-day)	Toxicity Value Surrogate[a]	Avian ESL[b] (mg/kg soil)	Plant BAF[b] (unitless)	Invertebrate BAF[b] (unitless)	Default Plant BAF (unitless)	Default Invertebrate BAF (unitless)	Initial Compilation Source
Phenanthrene	1	Red-Winged Blackbird		LD_{50}	acute	mortality	113	100			1 13E+00		4 93E+00	3 8370	45 4900			Schafer et al 1983[c]
Phenol	1	Red-Winged Blackbird		LD_{50}	acute	mortality	113	100			1 13E+00		3 83E+00	5 5500	1 00		Yes	Schafer et al 1983[c]
Selenium	1	Mallard Duck	selenomethionine	NOAEL	chronic	reproduction	0 23				2 30E-01		5 68E+00	0 6719	0 99			EPA West 1998
Vanadium	1	Mallard Duck	vanadyl sulfate	NOAEL	chronic	mortality	11 4				1 14E+01		2 00E+03	0 0049	1 00		Yes	Sample et al 1996
Zinc	1	Chicken	zinc sulfate	NOAEL	chronic	reproduction	14 5				1 45E+01		5 64E+02	0 3662	3 20			Sample et al 1996

Notes

(a) Food and incidental soil intake values calculated as described in Table \

(b) BAFs are based on literature data or default of 1 See appropriate BAF spreadsheet for BAF source

(c) In the Schafer et al 1972 and 1983 studies birds were dosed by oral gavage on a mg/kg bodyweight basis

(d) In the Hill and Camardese, 1986 study, 14 day old quail were administed test compound in feed

Feed concentration was converted to daily dose by dividing intake by bodyweight

Bodyweight for a 14 day old quail was estimated to be 0 04125kg from Sefton and Siegel, 1974

Intake was calculated from reported food consumption of control and low dose groups over the 5 day exposure period

pentachlorophenol 0 0116 kg/day calculated using the overall average control group values reported in the study

acetone 0 01127 kg/day calculated using the average of control and treatment group food consumption in the acetone exposure

heptachlor 0 01082 kg/day calculated using the average of control group food consumption in the heptachlor exposure

hexachlorobenzene 0 01087 kg/day calculated using the average of control and treatment group food consumption in the hexachlorobenzene exposure

(e) Stickel et al 1979, exposed birds to 150 ppm in diet for 6 days Using an approximate body weight for an adult starling (obtained from Stickel et al 1983)

Intake was calculated using the equation of Nagy (1987) the daily intake is 0 398 x (82 1g) 0 85 = 16 87 g The concentration in food may be converted to a daily dose as follows

150 mg/kg food x 16 87 g/day x 1 kg/1000 g / 0 0821 kg = 30 8 mg/kg/day

(f) The study by Hill et al (1975) as cited in USEPA ECOTOX, exposed 10 day old pheasants n-dioctylphthalate at 5000 ppm in feed for 5-6 days

The LC50 was reported as greater than the maximum concentration fed Intake was calculated using the equation of Nagy (1987), assuming a body weight for a juvenille Galliformes of approximately 0 04125 (Sefton and Siegel 1974) as follows 0 648(41 25) 0 651 = 7 29 g/day

for the calculation of dose 5000 mg/kg in feed x 7 29 g/day x 1kg/1000g * 1/0 04125 kg BW = 883 6 mg/kg BW day

American Robin Exposure Factors

Body weight (kg)	0 1092	Based on mean body weight of mourning dove (Griffing and others 1972, MacMillen 1962 as cited in OEHHA Database)
Ingestion rate (Nagy 2001 IR for robin),(kg/day-kg body weight) =	0 05	Calculated with body weight of 109 2 grams using the equation for the food requirement for intake of dry matter for galliformes (food ingestion rate = [0 088(109 2)^0 891]/1000) (Nagy 2001)
Fraction plant consumed (dry weight) (unitless)=	0 99	Food will consist of 99 percent invertebrate tissue (conservative estimate)
Fraction invertebrate consumed (dry weight) (unitless) =	0 01	
Fraction Soil consumed (dry weight) at 9 3% of intake (kg/day-kg bodyweight) =	0 093	9 3 percent of food ingestion rate from wild turkey (similar feeding habits) (Beyer and others 1994)

ESL = (TRV/((((%Plant * Plant BAF)+(*nInvert * Invert BAF) + (Soil Consumed(kg/day-kg bw))) * Total Ingestion Rate (kg/day-kb bw)))

ESL = (kxx/(((((E111*Nex)+(E112*Oxe))+(E113))*(E110))) xx = Column number

* Indicates experimental detail not available in cited source document

BAF - bioaccumulation factor

ESL - ecological screening level

kg - kilogram

LD_{50} - lethal dose for 50% of study population

LOAEL lowest-observable adverse-effect-level

mg - milligram

NOAEL - no-observable-adverse-effect-level

PCB - polychlorinated biphenyl

SVOC - semivolatile organic compound

TEF - toxicity equivalency factor

TRV toxicity reference value

UF - uncertainty factor

VOC - volatile organic compound

Y uncertainty factor used to derive TRV was included by original source

Table 2f

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL INVERTEBRATES
AEROJET SUPERFUND SITE

Chemical	Chemical Group	Test Species Common Name	Growth Medium	Exposure (days)	Endpoint	Response Parameter	Subchronic to Chronic UF	LOEC to NOEC UF	Invertebrate ESL (mg/kg soil)	Initial Compilation Source
2,3,7,8-TCDD	Dioxin	Earthworm	*	85	LOEC	*		Y	500	EPA Combustor Guidance
Arsenic	Metal	Earthworm	soil & manure	56	LOEC	cocoons/worm	Y	Y	0.25	EPA Combustor Guidance
Cadmium	Metal	Earthworm	*	120	NOEC	cocoon production			10	EPA Combustor Guidance
Chromium	Metal	Earthworm	OECD soil	21	NOEC	growth			10	ORNL
Copper	Metal	Earthworm	*	56	NOEC	cocoon production			32	EPA Combustor Guidance
Hexavalent Chromium	Metal	Earthworm	*	60	LOEC	reduced survival		Y	0.2	EPA Combustor Guidance
Lead	Metal	Earthworm	*	120	NOEC	*			100	EPA Combustor Guidance
Mercury	Metal	Earthworm	soil & dung	60	LOEC	survival, cocoon production		Y	0.10	ORNL (BMD)
Methyl mercury	Metal	Earthworm	*	84	NOEC	segment regeneration			2.50	ORNL
Nickel	Metal	Earthworm	*	100	NOEC	cocoon production			100	EPA Combustor Guidance
Selenium	Metal	Earthworm	*	chronic	LOEC	cocoon production		Y	8	EPA Combustor Guidance
Zinc	Metal	Earthworm	*	56	NOEC	cocoon production			199	EPA Combustor Guidance
Aroclor 1016	PCB	Earthworm	*	acute	NOEC	*			2510	EPA Combustor Guidance
Aroclor 1254	PCB	Earthworm	*	acute	NOEC	*			2510	EPA Combustor Guidance
1,4-Dichlorobenzene	SVOC	Earthworm	sandy soil	14	LOEC	survival LC_{50}		Y	20	ORNL (BMD)
2,4,5-Trichlorophenol	VOC	Earthworm	sandy soil	14	LOEC	survival LC_{50}		Y	9	ORNL (BMD)
2,4,6-Trichlorophenol	SVOC	Earthworm	horse manure	56	LOEC	cocoon production		Y	10	ORNL (BMD)
4-Nitrophenol	SVOC	Earthworm	sandy soil	56	LOEC	cocoon production		Y	7	ORNL (BMD)
Benzo(a)pyrene	SVOC	Woodlouse		28	NOEC	growth			25000	EPA Combustor Guidance
Dimethyl phthalate	SVOC	Earthworm	horse manure	56	NOEC	cocoon production			200	ORNL (BMD)
Fluorene	SVOC	Enchytraeid	sandy soil	21	NOEC	NOEC reproduction			27	Sverdrup et al. 2002
Nitrobenzene	SVOC	Earthworm	*	14 (subchronic)	LOEC	*	Y	Y	40	EPA Combustor Guidance
N-Nitrosodiphenylamine	SVOC	Earthworm	horse manure	56	LOEC	cocoon production		Y	20	ORNL (BMD)
Pentachlorophenol	SVOC	Earthworm	*	21 (chronic)	NOEC	hatching success			6	EPA Combustor Guidance
Phenol	SVOC	Earthworm	horse manure	56	NOEC	cocoon production			30	ORNL (BMD)
1,2,3-Trichlorobenzene	VOC	Earthworm	sandy soil	14	LOEC	survival LC_{50}		Y	20	ORNL (BMD)
1,2,4-Trichlorobenzene	VOC	Earthworm	OECD soil	14	LOEC	survival LC_{50}		Y	20	ORNL (BMD)
1,2-Dichloropropane	VOC	Earthworm	horse manure	56	NOEC	growth			700	ORNL (BMD)
Pyrene	SVOC	Enchytraeid	sandy soil	21	NOEC	NOEC reproduction			18	Sverdrup et al. 2002
Fluoranthene	SVOC	Enchytraeid	sandy soil	21	NOEC	NOEC reproduction			38	Sverdrup et al. 2002
Phenanthrene	SVOC	Enchytraeid	sandy soil	21	NOEC	NOEC reproduction			34	Sverdrup et al. 2002
Carbazole	SVOC	Enchytraeid	sandy soil	21	NOEC	NOEC reproduction			34	Sverdrup et al. 2002
Dibenzofuran	SVOC	Enchytraeid	sandy soil	21	NOEC	NOEC reproduction			62	Sverdrup et al. 2002
Chlorobenzene	VOC	Earthworm	sandy soil	14	LOEC	survival LC_{50}		Y	40	ORNL (BMD)

Notes:

These data are concentration and not dose based

* Indicates experimental detail not available in cited source document

Table 2f

CALCULATION OF SOIL ECOLOGICAL SCREENING LEVELS FOR TERRESTRIAL INVERTEBRATES
AEROJET SUPERFUND SITE

Chemical	Chemical Group	Test Species Common Name	Growth Medium	Exposure (days)	Endpoint	Response Parameter	Subchronic to Chronic UF	LOEC to NOEC UF	Invertebrate ESL (mg/kg soil)	Initial Compilation Source

BMD) indicated a Bench Mark Dose calculated by primary source, incorporating appropriate uncertainty factors.
SVOC - semi-volatile organic compound
LD_{50} - lethal concentration for 50% of study population
LOAEL - lowest-observable-adverse-effect-level
NOAEL - no-observable-adverse-effect-level
UF - uncertainty factor
Y - uncertainty factor used to derive TRV was included by original source

Table 2g

EVALUATION OF METALS BIOACCUMULATION FACTORS FOR PLANTS
AEROJET SUPERFUND SITE

(Page 1 of 1)

Taxa	Analyte	Transfer Type	Summary statistics for BAFs				Parameters for log-linear uptake model					BCF (kg soil/kg tissue) DW	Reference
			N	Minimum	Median	Maximum	N	Slope	Intercept	R-square	p (model)		
Plants	Aluminum	soil-to-biota	28	0.00058	0.00287	0.0112	na	na	na	na	na	NA	Bechtel-Jacobs 1998
Plants	Antimony	soil-to-biota	17	0.003	0.037	0 22	17	0 937	-3 233	0.79	0.0001	NA	EPA 2003
Plants	Arsenic	soil-to-biota	122	0 00006	0.03752	9.0741	122	0 564	-1 992	0.15	0 0001	NA	Bechtel-Jacobs 1998
Plants	Barium	soil-to-biota	28	0 036	0.156	0.92	na	na	na	na	na	NA	Bechtel-Jacobs 1998
Plants	Beryllium	soil-to-biota	na	na	0.01	na	na	na	na	na	na	NA	Baes et al. 1984
Plants	Cadmium	soil-to-biota	207	0.0087	0.58571	22.8788	207	0.546	-0.475	0.45	0.0001	NA	Bechtel-Jacobs 1998
Plants	Chromium	soil-to-biota	26	0.021	0.041	0.48	na	na	na	na	na	NA	Bechtel-Jacobs 1998
Plants	Cobalt	soil-to-biota	28	0.0019	0.0076	0 045	na	na	na	na	na	NA	Bechtel-Jacobs 1998
Plants	Copper	soil-to-biota	180	0 0011	0.12432	7.4	180	0 394	0 668	0 31	0.0001	NA	Bechtel-Jacobs 1998
Plants	Lead	soil-to-biota	189	0 00011	0.0388	10 6011	189	0.561	-1 328	0 24	0 0001	NA	Bechtel-Jacobs 1998
Plants	Manganese	soil-to-biota	28	0.0199	0.079	0.433	na	na	na	na	na	NA	Bechtel-Jacobs 1998
Plants	Mercury	soil-to-biota	142	0.00145	0.663	12.23	na	na	na	na	na	NA	Bechtel-Jacobs 1998
Plants	Nickel	soil-to-biota	111	0.00217	0.01786	22.2143	111	0.748	-2 223	0 37	0 0001	NA	Bechtel-Jacobs 1998
Plants	Selenium	soil-to-biota	158	0.02	0.67189	77	158	1.104	-0 677	0.63	0 0001	NA	Bechtel-Jacobs 1998
Plants	Silver	soil-to-biota	10	0.0029	0.014	0 04	na	na	na	na	na	NA	Bechtel-Jacobs 1998
Plants	Vanadium	soil-to-biota	21	0 00173	0.00485	0.0097	na	na	na	na	na	NA	Bechtel-Jacobs 1998
Plants	Zinc	soil-to-biota	220	0.00855	0.38616	34.2857	220	0 554	1.575	0 4	0.0001	NA	Bechtel-Jacobs 1998

Highlighted data represent recommended selected bioaccumulation data

Regression Formula: *ln*(tissue concentration) = *Y*-intercept + slope * (*ln* [soil concentration])

BAF	Bioaccumulation factor
BCF	Bioconcentration factor
EPA	Environmental Protection Agency
ln	Natural log
N	Number of studies or observations
na	Not available
NA	Not applicable
p	Probability

Baes, C F., III, R.D Sharp, A.L Sjoreen, and R W Shor. 1984. A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture, ORNL-5786, Health and Safety Research Division, Oak Ridge National Laboratory, Oak Ridge, TN. 150pp

Bechtel-Jacobs. 1998. Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-133

U S EPA (U S Environmental Protection Agency 2003 "Guidance for Developing Ecological Soil Screening Levels" November

Table 2h

EVALUATION OF METALS BIOACCUMULATION FACTORS FOR INVERTEBRATES
AEROJET SUPERFUND SITE

Taxa	Analyte	Transfer Type	Summary statistics for BAFs				Parameters for log-linear uptake model					Default	Reference
			N	Minimum	Median	Maximum	N	Slope	Intercept	R-square	p (model)		
Earthworms	Aluminum	soil-to-biota	20	0.008	0.043	0 197	na	na	na	na	na	NA	Sample and others 1998
Earthworms	Antimony	na	na	na	na	na	na	na	na	na	na	1	Default
Earthworms	Arsenic	soil-to-biota	53	0 006	0.224	0 925	na	na	na	na	na	NA	Sample and others 1999
Earthworms	Barium	soil-to-biota	20	0.005	0.091	0.31	na	na	na	na	na	NA	Sample and others 1998
Earthworms	Beryllium	soil-to-biota	12	0	0.045	1 429	na	na	na	na	na	NA	Sample and others 1998
Earthworms	Cadmium	soil-to-biota	226	0 253	7.708	190	226	0 795	2 114	0.67	0 0001	NA	Sample and others 1999
Earthworms	Chromium	soil-to-biota	67	0 021	0.306	11 416	67	0.067	2.481	0.0026	0.68	NA	Sample and others 1999
Earthworms	Cobalt	soil-to-biota	17	0.031	0.122	0 321	na	na	na	na	na	NA	Sample and others 1999
Earthworms	Copper	soil-to-biota	197	0.002	0.515	5.492	197	0.264	1 675	0 18	0.0001	NA	Sample and others 1999
Earthworms	Lead	soil-to-biota	245	0	0.266	228.261	245	0 807	-0.218	0 58	0 0001	NA	Sample and others 1999
Earthworms	Manganese	soil-to-biota	36	0.012	0.054	0.228	36	0.682	-0.809	0.34	0.0002	NA	Sample and others 1999
Earthworms	Mercury	soil-to-biota	30	0 03	1.693	33	29	-0.15	4.17	0 02	0.42	NA	Sample and others 1998
Earthworms	Molybdenum	soil-to-biota	na	na	na	na	na	na	na	na	na	1	Default
Earthworms	Nickel	soil-to-biota	31	0.033	1.059	7.802	31	-0.26	3.677	0.06	0.19	NA	Sample and others 1999
Earthworms	Selenium	soil-to-biota	14	0 3	0.985	13.733	13	0.733	-0.075	0 43	0.016	NA	Sample and others 1999
Earthworms	Silver	soil-to-biota	10	0 001	2.045	19.5	na	na	na	na	na	NA	Sample and others 1998
Earthworms	Vanadium	soil-to-biota	na	na	na	na	na	na	na	na	na	1	Default
Earthworms	Zinc	soil-to-biota	244	0 025	3.201	49 51	244	0.328	4.449	0 45	0 0001	NA	Sample and others 1999

Highlighted data represent recommended selected bioaccumulation data

Regression Formula *ln*(tissue concentration) = Y-intercept + slope * (*ln* [soil concentration])

BAF	Bioaccumulation factor
BCF	Bioconcentration factor
EPA	Environmental Protection Agency
ln	Natural log
N	Number of studies or observations
na	Not available
NA	Not applicable
p	Probability

Sample, B.E., J J Beauchamp, R.A Efroymson, G.W Suter,II, and T L Ashwood 1998 Development and Validation of Bioaccumulation Models for Earthworms. Oak Ridge National Laboratory, Oak Ridge TN 93 pp, ES/ER/TM-220

Sample, B E , J J Beauchamp, R A Efroymson, G W Suter,II 1999 Literature-derived bioaccumulation models for earthworms development and validation Environ Toxicol. Chem 18 2110-2120

Table 2i

EVALUATION OF ORGANICS BIOACCUMULATION FACTORS FOR PLANTS
AEROJET SUPERFUND SITE

Taxa	Analyte	Transfer Type	Summary statistics for BAFs				Parameters for log-linear uptake model					Soil to Plant BTF (DW) (ORNL RAIS)	Selected Reference
			N	Minimum	Median	Maximum	N	Slope	Intercept	R-square	p (model)		
Plants	1,1,1-Trichloroethane	soil-to-biota	na	na	na	na	na	na	na	na	na	1.41E+00	ORNL RAIS, 2003
Plants	1,1,2-Trichloroethane	soil-to-biota	na	na	na	na	na	na	na	na	na	3.13E+00	ORNL RAIS, 2003
Plants	1,1-Dichloroethane	soil-to-biota	na	na	na	na	na	na	na	na	na	3.58E+00	ORNL RAIS, 2003
Plants	1,1-Dichloroethene	soil-to-biota	na	na	na	na	na	na	na	na	na	2.27E+00	ORNL RAIS, 2003
Plants	1,2,3,4,6,7,8-HpCDD	soil-to-biota	na	na	na	na	na	na	na	na	na	7.05E-04	ORNL RAIS, 2003
Plants	1,2,3-Trichlorobenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	1.57E-01	ORNL RAIS, 2003
Plants	1,2,4-Trichlorobenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	1.84E-01	ORNL RAIS, 2003
Plants	1,2,4-Trimethylbenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	3.09E-01	ORNL RAIS, 2003
Plants	1,2-Dibromo-3-chloropropane	soil-to-biota	na	na	na	na	na	na	na	na	na	7.54E-01	ORNL RAIS, 2003
Plants	1,2-Dichlorobenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	4.03E-01	ORNL RAIS, 2003
Plants	1,2-Dichloroethane	soil-to-biota	na	na	na	na	na	na	na	na	na	5.40E+00	ORNL RAIS, 2003
Plants	1,2-Dichloroethene	soil-to-biota	na	na	na	na	na	na	na	na	na	2.40E+00	ORNL RAIS, 2003
Plants	1,2-Dichloropropane	soil-to-biota	na	na	na	na	na	na	na	na	na	2.78E+00	ORNL RAIS, 2003
Plants	1,3,5-Trimethylbenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	4.09E-01	ORNL RAIS, 2003
Plants	1,3-Dichlorobenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	3.53E-01	ORNL RAIS, 2003
Plants	1,4-Dichlorobenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	3.98E-01	ORNL RAIS, 2003
Plants	1,4-Dioxane	soil-to-biota	na	na	na	na	na	na	na	na	na	5.55E+01	ORNL RAIS, 2003
Plants	2,3,7,8-TCDD	soil-to-biota	na	na	na	na	na	na	na	na	na	4.55E-03	ORNL RAIS, 2003
Plants	2,3,7,8-TCDF	soil-to-biota	na	na	na	na	na	na	na	na	na	6.51E-03	ORNL RAIS, 2003
Plants	2,4-Dimethylphenol	soil-to-biota	na	na	na	na	na	na	na	na	na	1.81E+00	ORNL RAIS, 2003
Plants	2-Butanone (MEK)	soil-to-biota	na	na	na	na	na	na	na	na	na	2.63E+01	ORNL RAIS, 2003
Plants	2-Chlorotoluene	soil-to-biota	na	na	na	na	na	na	na	na	na	4.09E-01	ORNL RAIS, 2003
Plants	2-Hexanone	soil-to-biota	na	na	na	na	na	na	na	na	na	6.17E+00	ORNL RAIS, 2003
Plants	2-Methylnaphthalene	soil-to-biota	na	na	na	na	na	na	na	na	na	2.27E-01	ORNL RAIS, 2003
Plants	2-Methylphenol	soil-to-biota	na	na	na	na	na	na	na	na	na	2.89E+00	ORNL RAIS, 2003
Plants	4,4'-DDD	soil-to-biota	7	0.00035	0.028	0 08	na	na	na	na	na	1 28E-02	EPA 2003 (see footnote 1)
Plants	4,4'-DDE	soil-to-biota	3	0.075	0.136	0 62	na	na	na	na	na	6.69E-03	EPA 2003
Plants	4,4'-DDT	soil-to-biota	7	0.00035	0.028	0 08	na	na	na	na	na	3.93E-03	EPA 2003
Plants	4-Chloroaniline	soil-to-biota	na	na	na	na	na	na	na	na	na	3.39E+00	ORNL RAIS, 2003
Plants	4-Methyl-2-pentanone (MIBK)	soil-to-biota	na	na	na	na	na	na	na	na	na	6.77E+00	ORNL RAIS, 2003
Plants	4-Methylphenol	soil-to-biota	na	na	na	na	na	na	na	na	na	2.93E+00	ORNL RAIS, 2003
Plants	Acenaphthene	soil-to-biota	na	na	na	na	na	na	na	na	na	2.10E-01	ORNL RAIS, 2003
Plants	Acenaphthylene	soil-to-biota	na	na	na	na	na	na	na	na	na	2.04E-01	ORNL RAIS, 2003
Plants	Acetone	soil-to-biota	na	na	na	na	na	na	na	na	na	5.33E+01	ORNL RAIS, 2003
Plants	Acetophenone	soil-to-biota	na	na	na	na	na	na	na	na	na	4.73E+00	ORNL RAIS, 2003
Plants	Aldrin	soil-to-biota	na	na	na	na	na	na	na	na	na	6.78E-03	ORNL RAIS, 2003
Plants	alpha BHC	soil-to-biota	na	na	na	na	na	na	na	na	na	1.57E-01	ORNL RAIS, 2003
Plants	alpha Endosulfan	soil-to-biota	na	na	na	na	na	na	na	na	na	2.37E-01	ORNL RAIS, 2003
Plants	alpha-Chlordane	soil-to-biota	na	na	na	na	na	na	na	na	na	9.84E-03	ORNL RAIS, 2003
Plants	Benzene	soil-to-biota	na	na	na	na	na	na	na	na	na	2.27E+00	ORNL RAIS, 2003
Plants	Benzo(a)anthracene	soil-to-biota	1	0.53704	0.537	0.54	na	na	na	na	na	2.27E+00	EPA 2003
Plants	Benzo(a)pyrene	soil-to-biota	7	0 01964	0 066	0.2	7	0.636	-2.053	0.61	0.04	1.81E-02	EPA 2003

Table 2i

EVALUATION OF ORGANICS BIOACCUMULATION FACTORS FOR PLANTS
AEROJET SUPERFUND SITE

Taxa	Analyte	Transfer Type	Summary statistics for BAFs				Parameters for log-linear uptake model					Soil to Plant BTF (DW) (ORNL RAIS)	Selected Reference
			N	Minimum	Median	Maximum	N	Slope	Intercept	R-square	p (model)		
Plants	Benzo(b)fluoranthene	soil-to-biota	6	0.01627	0.173	0 48	na	na	na	na	na	1 11E-02	EPA 2003
Plants	Benzo(e)pyrene	soil-to-biota	4	0.10169	0.19	0 27	na	na	na	na	na	1 77E-02	EPA 2003
Plants	Benzo(ghi)perylene	soil-to-biota	7	0 05278	0 131	1 31	7	1.299	-2.585	0.81	0.006	5.70E-03	EPA 2003
Plants	Benzo(k)fluoranthene	soil-to-biota	4	0 08	0.255	0 36	na	na	na	na	na	1.14E-02	EPA 2003
Plants	Benzoic acid	soil-to-biota	na	na	na	na	na	na	na	na	na	3.21E+00	ORNL RAIS, 2003
Plants	beta Endosulfan	soil-to-biota	na	na	na	na	na	na	na	na	na	2.37E-01	ORNL RAIS, 2003
Plants	bis (2-ethylhexyl) phthalate	soil-to-biota	na	na	na	na	na	na	na	na	na	1.57E-03	ORNL RAIS, 2003
Plants	Bromide	soil-to-biota	na	na	na	na	na	na	na	na	na	1.67E+01	ORNL RAIS, 2003
Plants	Bromodichloromethane	soil-to-biota	na	na	na	na	na	na	na	na	na	2.70E+00	ORNL RAIS, 2003
Plants	Bromoform	soil-to-biota	na	na	na	na	na	na	na	na	na	1.59E+00	ORNL RAIS, 2003
Plants	Carbon disulfide	soil-to-biota	na	na	na	na	na	na	na	na	na	2.93E+00	ORNL RAIS, 2003
Plants	Carbon tetrachloride	soil-to-biota	na	na	na	na	na	na	na	na	na	8.96E-01	ORNL RAIS, 2003
Plants	Chlordane	soil-to-biota	na	na	na	na	na	na	na	na	na	9.84E-03	ORNL RAIS, 2003
Plants	Chlorobenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	8.84E-01	ORNL RAIS, 2003
Plants	Chloroform	soil-to-biota	na	na	na	na	na	na	na	na	na	2.81E+00	ORNL RAIS, 2003
Plants	Chloromethane	soil-to-biota	na	na	na	na	na	na	na	na	na	1.15E+01	ORNL RAIS, 2003
Plants	Chlorpyrifos	soil-to-biota	na	na	na	na	na	na	na	na	na	5.26E-02	ORNL RAIS, 2003
Plants	Chrysene	soil-to-biota	4	0.16216	0.784	1 05	na	na	na	na	na	1 70E-02	EPA 2003
Plants	cis-1,2-Dichloroethene	soil-to-biota	na	na	na	na	na	na	na	na	na	2.40E+00	ORNL RAIS, 2003
Plants	Cyanide	soil-to-biota	na	na	na	na	na	na	na	na	na	5.40E+01	ORNL RAIS, 2003
Plants	Dibenz(ah)anthracene	soil-to-biota	4	0.06977	0.128	0 23	na	na	na	na	na	0.004	EPA 2003
Plants	Dibenzofuran	soil-to-biota	na	na	na	na	na	na	na	na	na	1.61E-01	ORNL RAIS, 2003
Plants	Dibromochloromethane	soil-to-biota	na	na	na	na	na	na	na	na	na	2.19E+00	ORNL RAIS, 2003
Plants	Dichlorobenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	3.98E-01	ORNL RAIS, 2003
Plants	Dichlorodifluoromethane (Freon 12)	soil-to-biota	na	na	na	na	na	na	na	na	na	2.19E+00	ORNL RAIS, 2003
Plants	Dieldrin	soil-to-biota	41	0.00855	0.024	1 64	41	0.841	-3.271	0.24	0 001	3 82E-02	EPA 2003
Plants	Diethyl phthalate	soil-to-biota	na	na	na	na	na	na	na	na	na	1.55E+00	ORNL RAIS, 2003
Plants	Dimethyl phthalate	soil-to-biota	na	na	na	na	na	na	na	na	na	4.60E+00	ORNL RAIS, 2003
Plants	di-n-butyl phthalate	soil-to-biota	na	na	na	na	na	na	na	na	na	9.71E-02	ORNL RAIS, 2003
Plants	Disulfoton	soil-to-biota	na	na	na	na	na	na	na	na	na	1.84E-01	ORNL RAIS, 2003
Plants	Dysprosium	soil-to-biota	na	na	na	na	na	na	na	na	na	1.00E-02	ORNL RAIS, 2003
Plants	Endosulfan	soil-to-biota	na	na	na	na	na	na	na	na	na	2.37E-01	ORNL RAIS, 2003
Plants	Endosulfan I	soil-to-biota	na	na	na	na	na	na	na	na	na	2.37E-01	ORNL RAIS, 2003
Plants	Endosulfan II	soil-to-biota	na	na	na	na	na	na	na	na	na	2.37E-01	ORNL RAIS, 2003
Plants	Endosulfan sulfate	soil-to-biota	na	na	na	na	na	na	na	na	na	2.37E-01	ORNL RAIS, 2003
Plants	Endrin	soil-to-biota	na	na	na	na	na	na	na	na	na	3.82E-02	ORNL RAIS, 2003
Plants	Endrin aldehyde	soil-to-biota	na	na	na	na	na	na	na	na	na	2.24E-02	ORNL RAIS, 2003
Plants	Ethylbenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	5.85E-01	ORNL RAIS, 2003
Plants	Ethylene dibromide	soil-to-biota	na	na	na	na	na	na	na	na	na	2.85E+00	ORNL RAIS, 2003
Plants	Fluoranthene	soil-to-biota	7	0 26838	2.466	6.03	na	na	na	na	na	4 03E-02	EPA 2003
Plants	Fluorene	soil-to-biota	4	0 01089	0.041	0 06	na	na	na	na	na	1 49E-01	EPA 2003
Plants	Fluoride	soil-to-biota	na	na	na	na	na	na	na	na	na	2.89E+01	ORNL RAIS, 2003

Table 2i

EVALUATION OF ORGANICS BIOACCUMULATION FACTORS FOR PLANTS
AEROJET SUPERFUND SITE

(Page 3 of 4)

Taxa	Analyte	Transfer Type	Summary statistics for BAFs				Parameters for log-linear uptake model					Soil to Plant BTF (DW) (ORNL RAIS)	Selected Reference
			N	Minimum	Median	Maximum	N	Slope	Intercept	R-square	p (model)		
Plants	gamma BHC	soil-to-biota	na	na	na	na	na	na	na	na	na	1.57E-01	ORNL RAIS, 2003
Plants	gamma-Chlordane	soil-to-biota	na	na	na	na	na	na	na	na	na	9.84E-03	ORNL RAIS, 2003
Plants	Heptachlor	soil-to-biota	na	na	na	na	na	na	na	na	na	1.15E-02	ORNL RAIS, 2003
Plants	Heptachlor epoxide	soil-to-biota	na	na	na	na	na	na	na	na	na	5.12E-02	ORNL RAIS, 2003
Plants	Hexachlorobutadiene	soil-to-biota	na	na	na	na	na	na	na	na	na	6.69E-02	ORNL RAIS, 2003
Plants	HpCDD (total)	soil-to-biota	na	na	na	na	na	na	na	na	na	7.05E-04	ORNL RAIS, 2003
Plants	Hydrazine	soil-to-biota	na	na	na	na	na	na	na	na	na	8.09E+02	ORNL RAIS, 2003
Plants	Indeno(123 cd)pyrene	soil-to-biota	2	0.07143	0.11	0 15	na	na	na	na	na	5 19E-03	EPA 2003
Plants	Isopropylbenzene (cumene)	soil-to-biota	na	na	na	na	na	na	na	na	na	2.97E-01	ORNL RAIS, 2003
Plants	m,p-Xylenes	soil-to-biota	na	na	na	na	na	na	na	na	na	5.48E-01	ORNL RAIS, 2003
Plants	Malathion	soil-to-biota	na	na	na	na	na	na	na	na	na	1.67E+00	ORNL RAIS, 2003
Plants	Methanol	soil-to-biota	na	na	na	na	na	na	na	na	na	1 08E+02	ORNL RAIS, 2003
Plants	Methoxychlor	soil-to-biota	na	na	na	na	na	na	na	na	na	4 48E-02	ORNL RAIS, 2003
Plants	Methyl tert-butyl ether (MTBE)	soil-to-biota	na	na	na	na	na	na	na	na	na	1.11E+01	ORNL RAIS, 2003
Plants	Methylene Chloride	soil-to-biota	na	na	na	na	na	na	na	na	na	7.34E+00	ORNL RAIS, 2003
Plants	Naphthlene	soil-to-biota	7	0.29412	1.059	4.19	na	na	na	na	na	4.79E-01	EPA 2003
Plants	n-butylbenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	1.14E-01	ORNL RAIS, 2003
Plants	Neodymium	soil-to-biota	na	na	na	na	na	na	na	na	na	1.00E-02	ORNL RAIS, 2003
Plants	Nitrogen, ammonia (N)	soil-to-biota	na	na	na	na	na	na	na	na	na	2.43E+02	ORNL RAIS, 2003
Plants	Nitrogen, nitrate (N)	soil-to-biota	na	na	na	na	na	na	na	na	na	2.93E+01	ORNL RAIS, 2003
Plants	Nitroguanidine	soil-to-biota	na	na	na	na	na	na	na	na	na	1 27E+02	ORNL RAIS, 2003
Plants	n-Nitrosodimethylamine (NDMA)	soil-to-biota	na	na	na	na	na	na	na	na	na	8.27E+01	ORNL RAIS, 2003
Plants	n-Propylbenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	2.74E-01	ORNL RAIS, 2003
Plants	OCDD	soil-to-biota	na	na	na	na	na	na	na	na	na	1.25E-04	ORNL RAIS, 2003
Plants	OCDF	soil-to-biota	na	na	na	na	na	na	na	na	na	4.14E-04	ORNL RAIS, 2003
Plants	o-Xylene	soil-to-biota	na	na	na	na	na	na	na	na	na	6.09E-01	ORNL RAIS, 2003
Plants	Total PCBs	soil-to-biota	na	na	na	na		0.5357	0.3474			8.96E-03	Air Force 2003
Plants	PCDDs (summed)	soil-to-biota	na	na	na	na	na	na	na	na	na	8.84E-03	ORNL RAIS, 2003
Plants	PCDFs (summed)	soil-to-biota	na	na	na	na	na	na	na	na	na	4.81E-03	ORNL RAIS, 2003
Plants	Pentachlorophenol	soil-to-biota	3600	4.70E-03	9.615071	25277.54	na	na	na	na	na	1.40E-02	ORNL RAIS, 2003
Plants	Perchlorate	soil-to-biota	na	na	na	na	na	na	na	na	na	1	Default
Plants	Phenanthrene	soil-to-biota	7	0.69243	3.837	7.92	na	na	na	na	na	1.02E-01	EPA 2003
Plants	Phenol	soil-to-biota	na	na	na	na	na	na	na	na	na	5.55E+00	ORNL RAIS, 2003
Plants	Phorate	soil-to-biota	na	na	na	na	na	na	na	na	na	3.39E-01	ORNL RAIS, 2003
Plants	Propane	soil-to-biota	na	na	na	na	na	na	na	na	na	1.67E+00	ORNL RAIS, 2003
Plants	Pyrene	soil-to-biota	7	0.19324	1.852	3.7	na	na	na	na	na	5.85E-02	EPA 2003
Plants	RDX	soil-to-biota	18	1 44E-02	0.4296	20.48	na	na	na	na	na	1.22E+01	EPA 2003
Plants	sec-butylbenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	1.37E-01	ORNL RAIS, 2003
Plants	Stirophos	soil-to-biota	na	na	na	na	na	na	na	na	na	3.53E-01	ORNL RAIS, 2003
Plants	Styrene	soil-to-biota	na	na	na	na	na	na	na	na	na	7.64E-01	ORNL RAIS, 2003
Plants	Sulfate (SO4)	soil-to-biota	na	na	na	na	na	na	na	na	na	7.24E+02	ORNL RAIS, 2003
Plants	Sulfotep	soil-to-biota	na	na	na	na	na	na	na	na	na	1.91E-01	ORNL RAIS, 2003

Table 2i

EVALUATION OF ORGANICS BIOACCUMULATION FACTORS FOR PLANTS
AEROJET SUPERFUND SITE

Taxa	Analyte	Transfer Type	Summary statistics for BAFs				Parameters for log-linear uptake model					Soil to Plant BTF (DW) (ORNL RAIS)	Selected Reference
			N	Minimum	Median	Maximum	N	Slope	Intercept	R-square	p (model)		
Plants	t-butylbenzene	soil-to-biota	na	na	na	na	na	na	na	na	na	1.72E-01	ORNL RAIS, 2003
Plants	Terbium	soil-to-biota	na	na	na	na	na	na	na	na	na	1.00E-02	ORNL RAIS, 2003
Plants	Tetrachloroethene	soil-to-biota	na	na	na	na	na	na	na	na	na	4.20E-01	ORNL RAIS, 2003
Plants	TNT	soil-to-biota	2	7.00E-05	0.1595	0 32	na	na	na	na	na	1.8	EPA 2003
Plants	Toluene	soil-to-biota	na	na	na	na	na	na	na	na	na	1.02E+00	ORNL RAIS, 2003
Plants	Total PCBs	soil-to-biota	na	na	na	na	na	na	na	na	na	8.96E-03	ORNL RAIS, 2003
Plants	trans-1,2-Dichloroethene	soil-to-biota	na	na	na	na	na	na	na	na	na	2.40E+00	ORNL RAIS, 2003
Plants	Trichloroethene	soil-to-biota	na	na	na	na	na	na	na	na	na	1.55E+00	ORNL RAIS, 2003
Plants	Trichlorofluoromethane (Freon 11)	soil-to-biota	na	na	na	na	na	na	na	na	na	1.34E+00	ORNL RAIS, 2003
Plants	Vinyl chloride	soil-to-biota	na	na	na	na	na	na	na	na	na	4.48E+00	ORNL RAIS, 2003
Plants	Xylenes (total)	soil-to-biota	na	na	na	na	na	na	na	na	na	6.09E-01	ORNL RAIS, 2003

Highlighted data represent recommended bioaccumulation data

Notes

1- Plant bioaccumulation data were unavailable; bioaccumulation data for DDE is assumed to be representative BAFs reported in dry weight

BAF	Bioaccumulation factor
BTF	Biotransfer factor
EPA	Environmental Protection Agency
DW	Dry weight
N	Number of studies or observations
na	Not available
p	Probability
ORNL	Oak Ridge National Laboratory
RAIS	Risk Assessment Information System

ORNL RAIS - http://risk.lsd.ornl.gov/

U.S. Air Force. 2003 Toxicity Profiles for the Ecological Risk Assessments at Vandenberg Air Force Base, California. Prepared by tetra Tech, Inc Lafayette, California.

U.S EPA (U.S. Environmental Protection Agency. 2003 "Guidance for Developing Ecological Soil Screening Levels" November.

Table 2j

EVALUATION OF ORGANICS BIOACCUMULATION FACTORS FOR INVERTEBRATES
AEROJET SUPERFUND SITE

Taxa	Analyte	Transfer Type	Summary statistics for BAFs				Parameters for log-linear uptake model					Selected Reference
			N	Minimum	Median	Maximum	N	Slope	Intercept	R-square	p (model)	
Earthworms	Dieldrin	soil-to-biota	6300	1 73	267.08	7.70E+05	na	na	na	na	na	EPA 2003
Earthworms	DDT	soil-to-biota	6300	0.59	116.61	3 70E+04	na	na	na	na	na	EPA 2003
Earthworms	DDD	soil-to-biota	6300	0 27	67.55	4 00E+04	na	na	na	na	na	EPA 2003
Earthworms	DDE	soil-to-biota	6300	0.12	73.04	3.80E+04	na	na	na	na	na	EPA 2003
Earthworms	Pentachlorophenol	soil-to-biota	6300	0.23	74.68	4.90E+04	na	na	na	na	na	EPA 2003
Earthworms	PAHs	soil-to-biota	6300	0 08	50.61	5.30E+04	na	na	na	na	na	EPA 2003
Earthworms	Acenaphthene	soil-to-biota	6300	0.08	38.75	10997 33	na	na	na	na	na	EPA 2003
Earthworms	Anthracene	soil-to-biota	6300	0.14	44	6535 99	na	na	na	na	na	EPA 2003
Earthworms	Benzo(a)anthracene	soil-to-biota	6300	0.03	34.45	28284 23	na	na	na	na	na	EPA 2003
Earthworms	Benzo(b)fluoranthene	soil-to-biota	6300	0 1	72.78	52905 02	na	na	na	na	na	EPA 2003
Earthworms	Benzo(k)fluoranthene	soil-to-biota	6300	0.08	71.3	27972 71	na	na	na	na	na	EPA 2003
Earthworms	Benzo(ghi)perylene	soil-to-biota	6300	0 35	61.08	24226 89	na	na	na	na	na	EPA 2003
Earthworms	Benzo(a)pyrene	soil-to-biota	6300	0.14	31.47	11628.95	na	na	na	na	na	EPA 2003
Earthworms	Chrysene	soil-to-biota	6300	0 1	61.78	15876 65	na	na	na	na	na	EPA 2003
Earthworms	Dibenzo(ah)anthracene	soil-to-biota	6300	0 21	78.71	11605 75	na	na	na	na	na	EPA 2003
Earthworms	Naphthalene	soil-to-biota	6300	0.14	50.61	15394 11	na	na	na	na	na	EPA 2003
Earthworms	Phenanthrene	soil-to-biota	6300	0.08	45.49	11607.82	na	na	na	na	na	EPA 2003
Earthworms	PCB	soil-to-biota	31	0	6.667	65 227	31	1.36	1.41	0 89	0 0001	Sample and others 1998
Earthworms	TCDD	soil-to-biota	19	1 191	11.011	42 068	19	1.182	3.53	0 94	0.0001	Sample and others 1998
Earthworms	TNT	soil-to-biota	6300	0 02	19.57	5424	na	na	na	na	na	EPA 2003
Earthworms	RDX	soil-to-biota	6300	0 04	9.91	2570	na	na	na	na	na	EPA 2003

Highlighted data represent recommended bioaccumulation data

BAFs reported in dry weight

Regression Formula *ln*(tissue concentration) = *Y*-intercept + slope * (*ln* [soil concentration])

For BAFs not listed above, a BAF will be estimated based on the Log Octanol-water Partition Coefficient (log Kow) using the following equation from EPA 2003 BAF = 10 (logKow - 0 6) / [foc x 10(0 983 logKow +0 00028)]
Chemical specific log Kows will be from ORNL RAIS http://rais.ornl.gov/cgi-bin/tox/TOX_select?select=est
foc will be set to 1% (0 01) per EPA 2003

BAF	Bioaccumulation factor
EPA	Environmental Protection Agency
foc	Fraction of organic carbon in soil
N	Number of studies or observations
na	Not available
ORNL	Oak Ridge National Laboratory
p	Probability
RAIS	Risk Assessment Information System

Sample, B E , J J Beauchamp, R A Efroymson, G W Suter II, and T L Ashwood 1998 Development and Validation of Bioaccumulation Models for Small Mammals, ES/ER/TM-219, Oak Ridge National Laboratory, Oak Ridge, TN

Travis, C C , and A D Arms 1988 Bioconcentration of organics in beef, milk and vegetation Environ Sci Technol. 22. 271-274

U S EPA (U S Environmental Protection Agency 2003. "Guidance for Developing Ecological Soil Screening Levels " November

APPENDIX B

RESPONSES TO AGENCY COMMENTS

Responses to Regional Water Quality Control Board Comments on the White Paper - Ecological Risk Assessment, Aerojet Superfund Site, Sacramento County, California

Below are Aerojet's responses to comments on the White Paper - Ecological Risk Assessment provided by the Regional Water Quality Control Board (RWQCB) in letter dated April 19, 2006. The text of each comment is repeated verbatim in bold, followed by the response. Any changes that were made to the white paper are presented in italics.

Comment 1: Page 2, second bullet. Should modify first sentence to state: "Site chemicals that are at concentrations that are similar to background . . .".

Response: The sentence will be modified as requested.

Comment 2: Page 2, third bullet. Groundwater is known to seep into Buffalo Creek as verified by concentrations of perchlorate detected periodically in Buffalo Creek at Station S-1 in Aerojet's Site-wide NPDES permit. It is believed that the water is perched groundwater from rainfall infiltration and leakage from Rebel Hill Ditch, which receives discharge from GET A and GET B. In addition, it is believed that groundwater discharges to Alder Creek, at least *in the eastern portion of* Aerojet. *It is not clear why treated groundwater* will not be evaluated as treated groundwater is discharged from GETs A, B, ARGET and GET E/F to ground and/or to Buffalo Creek.

Response: There are several issues identified in the comment, as follows:

1. Assuming that the RI/FS verifies that the source of perchlorate in Buffalo Creek is groundwater seepage, then this will be evaluated as a source to surface water, regardless of whether or not the ultimate source is treated or untreated groundwater.

2. Constituents in Alder Creek were evaluated by Aerojet in the PGOU Risk Assessment. No significant ecological risk was identified based on comparison of constituent concentrations to screening benchmarks, and completion of a Rapid Bioassessment per the request of the USEPA .

3. Treated groundwater will not be evaluated as an exposure medium for aquatic life. However, if it is identified as a potential source through migration to surface water, then treated groundwater will be evaluated in the SLERA.

Page 2, third bullet will be modified as follows:

Treated and untreated groundwater will not be evaluated as an exposure medium for aquatic life in the ERA. Untreated groundwater is not known to discharge to surface water bodies within the OUs, but this will be verified during the OU-specific remedial investigation. If treated or untreated groundwater is found to discharge to surface water bodies, it will be evaluated in the SLERA as a potential source. Otherwise, groundwater data will not be evaluated in the SLERA. (1, 2).

Comment 3: Page 3, first bullet. Would it not make sense to conduct a more recent biological survey? Aerojet operations have changed significantly over the last two decades and biological activity may have responded to those changes.

Response: Biological surveys of the areas encompassed by each OU will be conducted prior to conducting the RI, such as the one completed for the BOU and included as Appendix B in the RI/FS Field Sampling Plan (31 July 2006). A biological survey of the Boundary Operable Unit (BOU) was completed in 2002-2004. These biological surveys are considered to provide sufficient information to characterize receptors and pathways for purposes of the SLERAs to be conducted for each OU.

Page 3, first bullet will be modified as follows:

The Problem Formulation for each OU will be presented in the OU-specific Field-Sampling Plan. Information to be presented includes COPCs, exposure factors, receptors, endpoints, and toxicity reference values (TRVs). Plant and animal lists and habitat maps, including potential Threatened and Endangered (T/E) species and wetlands, will be prepared based on historical as well as more recent biological surveys conducted at the site, such as the sitewide biological surveys conducted in 2002-2004, and included in the OU-specific Field-Sampling Plans.

Comment 4: Page 4, second bullet. Wetlands should be delineated in any case, as they will need to be identified when developing remedial alternatives.

Potential wetlands identified by visual observation as part of the OU-specific biological surveys. The formal delineation of all potential wetlands on the Aerojet site is beyond the scope of the RI/FS and not typically required to support the development of a SLERA. If chemicals are present at concentrations that could impact wetland related species, then a formal wetland delineation of the impacted area will be conducted to support the development of a Baseline Ecological Risk Assessment. In addition, if a remedial alternative is selected that results in potential disturbance of a potential wetland, a formal wetland delineation will be conducted on the area that will be disturbed. No other wetland delineations will be completed under the RI/FS.

The third bullet in Section 1.3 has been revised as follows:

If chemicals are present at concentrations that could impact wetland related species, then a formal wetland delineation of the impacted area will be conducted to support the development of a BERA. Additionally, if a remedial alternative is selected that results in potential disturbance of a wetland, a formal wetland delineation will be conducted on the area that will be disturbed. No other wetland delineations will be completed as part of the RI/FS. (2)

Comment 5: **Table 1. This table is titled "Ecological Screening Levels for Soil Vapor Intrusion Pathway." Soil vapor intrusion issues are associated with the soil vapor intrusion into buildings and it is difficult to discern the ecological concern inside the building. If the values are to represent levels of concern for the inhalation pathway, then the title should be so modified.**

Response: The title of the table has been revised to "Ecological Screening Levels for Inhalation of Soil Vapor Pathway".

Comment 6: **Table 2. 1,3-butadiene should be included until it is determined that it should not be included.**

Response: Table 2 presents ecological screening levels for constituents in soil. Because a USEPA approved methodology for the analysis of 1,3-butadiene in soil does not exist, soil and sediment samples are not analyzed for that compound. No ESLs are available for that compound in soil and sediment.

Comment 7 **Tables, General Comment. Should a table for screening values for pollutants in sediment be developed? If aquatic species are found in the biological evaluation of the site, then additional screening values for protection of the aquatic species need to be presented.**

Ecological screening levels for chemical constituents in sediment were provided in Table C.7-7 in Appendix C of the Final RI/FS Field Sampling Plan for the BOU (31 July 2006) and will be included in each of the OU-specific Field Sampling Plans.

AEROJET

P O Box 13222
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September 25, 2006

Dr Ned Black
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San Francisco, CA 94105

Mr. J. Michael Eichelberger
State of California
HERD
Dept. of Toxic Substances Control
8810 Cal Center Drive
Sacramento, CA 95826-3200

RE: White Paper – Ecological Risk Assessment - Source Area OUs, Aerojet Superfund Site, Sacramento County, California

Dear Dr. Black and Mr Eichelberger:

Aerojet General Corporation (Aerojet) has modified the attached white paper based on comments received from the State of California, Regional Water Quality Control Board. The white paper summarizes Aerojet's approach for conducting the Ecological Risk Assessment for the Source Area Operable Units at the Aerojet Superfund Site. Responses to comments are included as Appendix B.

Please review the modifications and provide written comments/approval of the attached document by October 20, 2006. If you have any specific questions or comments regarding this submittal, please contact Chris Fennessy at (916) 355-3341 (e-mail Christopher.Fennessy@Aerojet.com).

Sincerely,

Cindy Caulk

Cindy Caulk
Program Coordinator

cc: Ms. Penelope McDaniel, USEPA
Mr. Ed Cargile, DTSC
Mr. Alexander MacDonald, RWQCB
Dr David Berry, DTSC
Mr. Michael Anderson, DTSC
CM Fennessy, Aerojet
GB Swanick, Aerojet
Mr. Tom Lea, CH2M Hill