

US EPA ARCHIVE DOCUMENT

**TABLE 4-1
CALCULATION OF SITE-SPECIFIC BACKGROUND CONCENTRATIONS FOR METALS IN SOIL**

**RFI PHASE II REPORT
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN**

Sample ID	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Cu mg/kg	Pb mg/kg	Mn mg/kg	Hg mg/kg	Ni mg/kg	Se mg/kg	Ag mg/kg	Tl mg/kg	V mg/kg	Zn mg/kg
RFI-05-09(0.2-2.2)	0.01 UJ	6.1	33 J	0.33 J	0.25 J	56 J	3.6 J	40 J	28 J	440 J	0.008 U	28 J	0.200	0.079 J	0.13 J	12 J	47 J
RFI-36-01(0.5-2.5)	0.01 UJ	5.5	62	0.41	0.29	12	5.2	17	62 J	270	0.040 J	13	0.570 J	0.370	0.11 J	16	94
RFI-55-01(01-03)	0.01 UJ	8.3	53 J	0.65	0.14	16	7.5	13	9	310 J	0.040 J	18	1.300 J	0.062 J	0.17 J	27	45
RFI-BG-01(00-02)	0.03 J	7.2 J	78 J	0.43	0.33 J	17 J	6.7 J	18 J	48 J	410	0.029 J	15 J	0.018 U	0.110 J	0.19 J	24 J	84 J
RFI-BG-02(00-02)		10.0 J	110 J	0.67	0.39 J	22 J	10.0 J	16 J	30 J	610	0.041 J	22 J	0.160 J	0.098 J	0.28 J	36 J	75 J
RFI-BG-03(00-02)	0.01 J	6.3 J	49 J	0.34	0.27 J	14 J	5.7 J	14 J	32 J	360	0.019 J	14 J	0.038 J	0.056 J	0.14 J	25 J	66 J
RFI-BG-04(00-02)		8.7 J	98 J	0.59	0.40 J	19 J	9.0 J	15 J	38 J	510	0.034 J	18 J	0.210 J	0.079 J	0.25 J	31 J	77 J
RFI-BG-05(00-02)	0.04 J	6.8 J	26 J	0.22	0.38 J	14 J	4.7 J	19 J	84 J	360	0.006 J	14 J	0.130 J	0.055 J	0.13 J	14 J	73 J
RFI-BG-06(00-02)	0.06 J	6.5 J	45 J	0.27	0.30 J	37 J	3.8 J	30 J	58 J	340	0.023 J	21 J	0.300 J	0.149 J	0.13 J	11 J	65 J
RFI-BG-07(00-02)	0.11 J	9.9 J	140 J	0.72	0.97 J	35 J	6.3 J	47 J	150 J	610	0.094	20 J	0.310 J	0.230 J	0.25 J	23 J	200 J
RFI-BG-08(00-02)	0.03 J	8.5 J	80 J	0.42	0.34 J	16 J	6.7 J	13 J	30 J	500	0.056 J	14 J	0.039 J	0.094 J	0.15 J	24 J	85 J
RFI-BG-09(00-02)	0.01 J	6.5 J	60 J	0.47	0.33 J	16 J	6.4 J	17 J	45 J	380	0.076	19 J	0.051 J	0.086 J	0.16 J	22 J	87 J
RFI-BG-10(00-02)	0.04 J	5.5 J	150 J	0.89	1.10	47 J	3.8 J	29 J	190 J		0.027 J	17 J	0.120 J	0.260 J	0.10 J	14 J	J
Count	11	13	13	13	13	13	13	13	13	12	13	13	13	13	13	13	12
Detected	8	13	13	13	13	13	13	13	13	12	12	13	12	13	13	13	12
Minimum	0.01	5.5	26	0.22	0.14	12	3.6	13	9	270	0.006	13	0.018	0.055	0.10	11	45
Median	0.03	6.8	62	0.43	0.33	17	6.3	17	45	395	0.034	18	0.160	0.094	0.15	23	76
Maximum	0.11	10.0	150	0.89	1.10	56	10.0	47	190	610	0.094	28	1.300	0.370	0.28	36	200
0.95 Bootstrap UCL	0.09	8.1	96	0.59	0.59	32	7.1	29	94	478	0.052	20	0.519	0.188	0.20	25	110
Site-Specific Background	0.09	8.1	96	0.59	0.59	32	7.1	29	94	480	0.052	20	0.519	0.188	0.20	25	110
MI State Background		5.8	75		1.20	18	6.8	32	21	440	0.130	20	0.410	1.000			47

Notes:

- Sb = Antimony. Co = Cobalt. Se = Selenium.
As = Arsenic. Cu = Copper. Ag = Silver.
Ba = Barium. Pb = Lead. Tl = Thallium.
Be = Beryllium. Mn = Manganese. V = Vanadium.
Cd = Cadmium. Hg = Mercury. Zn = Zinc.
Cr = Chromium Ni = Nickel.
- Concentrations for nondetects (U-qualified data) are 0.5 times the quantitation limits.
- Data Qualifiers:
J = Estimated concentration.
UJ = Not detected at the quantitation limit (estimated).
- The manganese concentration of 2,100 mg/kg, from sample RFI-BG-10(00-02), is suspected to be from a different data population and is excluded from UCL calculations.
- The zinc concentration of 720 mg/kg, from sample RFI-BG-10(00-02), is suspected to be from a different data population and is excluded from UCL calculations.
- Michigan default background values are included for reference.
- mg/kg = Milligrams per kilogram.
- UCL = Upper Confidence Limit.

**TABLE 4-2
ESTIMATED RISKS AND HAZARD QUOTIENTS FOR SITE-SPECIFIC BACKGROUND METALS CONCENTRATIONS**

**GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN
RFI PHASE II REPORT**

Chemical	CASRN	Carc Class	Site Specific Background (mg/kg)	Routine Worker Soil Contact Cancer Criteria (mg/kg)	Routine Worker Soil Contact Noncancer Criteria (mg/kg)	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HI	Residential Soil Contact Cancer Criteria (mg/kg)	Residential Soil Contact Noncancer Criteria (mg/kg)	Residential Soil Contact Risk	Residential Soil Contact HI	Recreator Soil Contact Risk	Recreator Soil Contact HI
Antimony	7440-36-0		8.6E-02		8.2E+02		1.1E-04		1.1E+02		7.9E-04		9.9E-05
Arsenic	7440-38-2	A	8.1E+00	2.7E+00	4.4E+02	3.0E-06	1.8E-02	3.9E-01	7.5E+01	2.1E-05	1.1E-01	2.6E-06	1.4E-02
Barium	7440-39-3	NC	9.6E+01										
Beryllium	7440-41-7	B1	5.9E-01	2.2E+03	3.7E+03	2.6E-10	1.6E-04	1.3E+03	5.4E+02	4.4E-10	1.1E-03	5.5E-11	1.4E-04
Cadmium	7440-43-9	B1	5.9E-01	3.0E+03	1.3E+03	2.0E-10	4.4E-04	1.8E+03	2.4E+02	3.3E-10	2.4E-03	4.1E-11	3.0E-04
Chromium (total)	7440-47-3		3.2E+01	4.5E+02	5.9E+03	7.1E-08	5.4E-03	2.7E+02	8.2E+02	1.2E-07	3.9E-02	1.5E-08	4.9E-03
Cobalt	7440-48-4	B1	7.1E+00	1.9E+03	2.0E+04	3.7E-09	3.6E-04	1.1E+03	4.6E+03	6.2E-09	1.5E-03	7.7E-10	1.9E-04
Copper	7440-50-8	D	2.8E+01		8.2E+04		3.5E-04		1.1E+04		2.6E-03		3.2E-04
Lead	7439-92-1	B2	9.3E+01										
Manganese	7439-96-5	D	4.8E+02		7.2E+04		6.6E-03		2.5E+04		1.9E-02		2.4E-03
Mercury	7439-97-6	D	5.2E-02		6.7E+01		7.8E-04		3.4E+01		1.5E-03		1.9E-04
Nickel	7440-02-0	A	2.0E+01	2.2E+04		8.9E-10		1.3E+04		1.5E-09		1.9E-10	
Selenium	7782-49-2	D	5.2E-01		1.0E+04		5.1E-05		1.4E+03		3.8E-04		4.7E-05
Silver	7440-22-4	D	1.9E-01		6.7E+03		2.8E-05		1.2E+03		1.5E-04		1.9E-05
Thallium	7440-28-0		2.0E-01		1.4E+02		1.4E-03		1.9E+01		1.0E-02		1.3E-03
Vanadium	7440-62-2		2.5E+01		1.4E+04		1.7E-03		1.9E+03		1.3E-02		1.6E-03
Zinc	7440-66-6	ID	1.1E+02		6.1E+05		1.8E-04		8.2E+04		1.3E-03		1.7E-04
Sum:						3E-06	4E-02			2E-05	2E-01	3E-06	3E-02

Notes:

Carc Class = EPA Weight-of-Evidence Cancer Classification

The calculation of risk-based criteria is discussed in Section 6.5.

Cancer criteria are calculated at a target cancer risk of 10⁻⁶.

Noncancer criteria are calculated at a target hazard index of 1.

Risk estimates for recreators are calculated by prorating the residential risk estimates by 0.125 to account for an exposure time of 2 hours/event, as discussed in section 6.5.2.6.