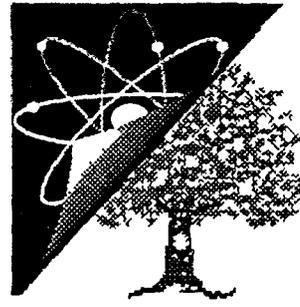
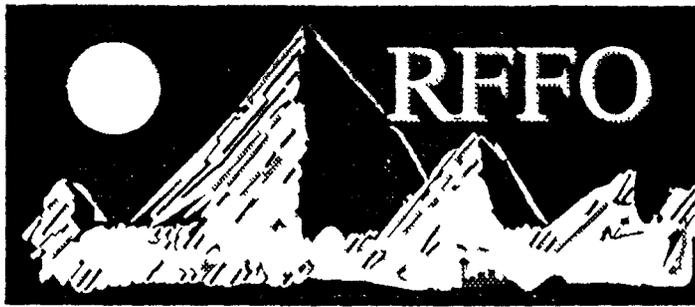


ADMIN RECORD



Rocky Flats Field Office
Looking Toward the Future

Date Nov 8, 1994

UNCLASSIFIED FAX

ROCKY FLATS FIELD OFFICE
DEPARTMENT OF ENERGY
P. O. BOX 928
GOLDEN, CO 80402-0928

TO Bill Fraser
Bonnie Lavelle

FAX 303-966-7557
PHONE 294-1081

FROM Paul Singh
PHONE 303-966-3490

FAX 303-966-4871
VERIFY 303-966-4538

MESSAGE Response to OU6 COC TMs If there is still a problem we will schedule a meeting Otherwise we will transmit these with the final document I am not sending these to CDPHE You can forward these to them I you want to

DOCUMENT CLASSIFICATION
REVIEW WAIVER PER
CLASSIFICATION OFFICE

November 3, 1994

DRAFT RESPONSES TO EPA/CDPHE COMMENTS ON OU6 COC TECHNICAL MEMORANDUM:

- 1 It is not clear if the "ten times" rule for evaluating laboratory contamination was correctly applied. This information should be included in the discussion of elimination criteria.

Response Data were validated by the validation contractor in accordance with approved data validation procedures (e.g., OU6 Quality Assurance Addendum, RFETS Quality Assurance Project Plan, EPA Laboratory Data Validation Functional Guidelines for Evaluating Inorganics and Organics), including application of the X5 and X10 rule for analytes also detected in laboratory method blanks. In addition, results for acetone and methylene chloride in pond water samples were evaluated due to the presence of these two compounds in an equipment rinsate. In this case, the qualifiers for two acetone results and three methylene chloride results out of 50 samples were changed from "B" to "U" based on application of the X10 rule. In both cases, the change in qualifiers resulted in a new maximum detected concentration, however, both methylene chloride and acetone were identified as COCs in pond surface water and all results were used in detection frequency calculations. This information will be added to the COC technical memorandum (see Attachment 1).

- 2 The actual distributions and a table showing the comparison to the log-normal based UTL (Sic). An objective statistical parameter (such as an appropriate correlation coefficient) should be pre-set to determine if data are normally or log-normally distributed. It is not sufficient to state that the decision was based on a best-fit evaluation.

Response Comparison of normal versus log-normal probability plots is the recommended test for checking normality in Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance (EPA 1992). The normal and log-normal probability plots for each of the ten analytes eliminated as PCOCs, based on log-normal UTL comparison, will be included in Appendix A (examples included as Attachment 2).

- 3 To verify the frequency of detection evaluation, the range of SQLs should be reviewed to determine if frequency of detection elimination criteria are applicable to the data set. If SQLs are elevated above health-based standards such as PRGs, the chemical should not be automatically eliminated based on low frequency of detection.

Response Ranges of SQLs will be presented on the tables showing detection frequency in Sections 3 through 8 and Appendix B for those compounds detected at less than 5% frequency. If an infrequently detected compound has results that were qualified as nondetect, but have SQLs significantly higher than the detected concentrations or CRDL, further evaluation of the effect on detection frequency will be performed.

- 4 Until additional speciation data become available and a more comprehensive background is conducted, it is prudent to consider nickel in OU6 to be above background and in a potentially carcinogenic form

Response In researching this issue, the only evidence of nickel use at RFETS is in the form of nickel carbonyl. The nickel carbonyl gas was destroyed by burning, either in the 1957 fire in Building 771 or by explosive charges. In 1972, explosive charges were used to destructively vent cylinders and ignite any residual gas. The empty cylinders were then buried in the Present Landfill (IHSS 114) at RFETS. One of the locations where this compound was destroyed, IHSS 195 in OU16, is included in the No Further Action Record of Decision (DOE 1992) for this operable unit. The Final No Further Action Justification Document for OU16 presents a strong case for alleviating concern that nickel exists at RFETS in a potentially carcinogenic form. Additional justification for exclusion of nickel as a carcinogenic COC for OU6 follows.

The only forms of nickel known to be carcinogenic are nickel refinery dust and nickel subsulfide via the inhalation route (see Attachment 3). The limited toxicity information on nickel carbonyl available on IRIS (USEPA 1994) indicates that this compound is a probable human carcinogen. This is based upon observations of pulmonary carcinomas and malignant tumors at various sites in rats administered nickel carbonyl by inhalation and intravenous injection. Although this compound is suspected of causing lung cancer in humans through the inhalation route, there is inadequate data for human carcinogenicity. The low survival rate for both control and treated animals in the rat studies preclude a quantitative risk estimate, therefore, no toxicity values (either RfD/RfC or slope factors) are available. In addition, several studies summarized in the Hazardous Substance Data Base (1994) report that low absorption from the GI tract causes nickel compounds to be essentially nontoxic after ingestion.

Nickel carbonyl exists as a flammable gas or as a colorless liquid. Some applicable physical properties include boiling point, 43°C, melting point, -19.3°C, density/specific gravity, 1.318 @ 17°C, vapor density, 5.95 @ 50°C, vapor pressure, 400 MM Hg @ 25.8°C. Nickel carbonyl is highly volatile at room temperature and readily decomposes in the presence of oxygen. In fact, oxidation is so rapid that combustion and/or explosion occur in air. Oxidizing agents rapidly decompose the vapor, liberating carbon monoxide [$\text{Ni}(\text{CO})_4 \rightarrow \text{Ni} + \text{CO}$] and forming a corresponding nickel salt. The resulting salt will depend on the ambient conditions and available atmospheric compounds present at the time of decomposition. Residual nickel can combine with oxygen in the atmosphere to form very fine-grained nickel oxide ($2\text{Ni} + \text{O}_2 \rightarrow 2\text{NiO}$) (Brady and Humiston 1982). And, under ambient conditions in moist air, it can decompose to form nickel carbonate ($\text{Ni} + \text{H}_2\text{CO}_3 \rightarrow \text{NiCO}_3 + \text{H}_2$) (NRCC 1981, Miller 1994). In the atmosphere at concentrations near the ppb level, nickel carbonyl has a half-life of about 30 minutes (Seiler et al. 1988, NRCC 1981).

Samples, probably of air, from the lip of the well where cylinders were destroyed in 1972 indicated nickel carbonyl concentrations of approximately 10 ppm being released (Rocky Flats Plant 1992). However, because of the above physical properties and fate and transport characteristics of nickel carbonyl, it is unlikely that any of this compound remains onsite after 20 years. Therefore, both the inhalation and ingestion routes of exposure to human receptors are incomplete at OU6 and nickel should not be evaluated as a carcinogen.

- 5 The assumption that all chromium is in the +3 form must be supported, it does not appear valid based on the site history.

Response The following information is provided to support the assumptions that (1) total chromium (Cr) measured in soil samples is Cr+3 and (2) Cr+6 is not a contaminant in OU6 soils.

Cr+3 is the most stable and prevalent form of Cr found in the environment and in most soils Cr will be present in the Cr+3 oxidation state. Cr+6 is reduced to Cr+3 under ambient conditions and in the presence of soil organic matter. Even under highly oxidizing conditions outside of a controlled environment, Cr+6 accounts for only about 5 to 10 percent of total Cr (McGrath and Smith 1990, ATSDR 1992, and EPA 1989). Therefore, under normal ambient conditions, Cr in soil would be expected to be in the Cr+3 oxidation state.

A limited speciation study was performed during OU2 surface soil sampling. In the six usable sample results for Cr+6, Cr+6 was not detected (SQLs approximately 1 mg/kg, CRDL either 2 or 10 mg/kg). Total chromium was detected in these samples in concentrations ranging from 9 to 16 mg/kg. Of the samples with useable Cr+6 results, one sample was collected in the Northeast Trenches area south of the B-series ponds, one was collected in IHSS 216 2 (East Spray Field) where chromium-contaminated wastewater is thought to have been sprayed, and four were collected further east in the buffer zone. These data suggest that Cr+6 does not occur in elevated concentrations in OU6 surface soils, even where chromium-bearing wastewater may have been disposed.

In OU6 surface soil samples, Cr was within background levels according to the formal statistical tests (see Attachment 4). However, a single sample result of 35 mg/kg, detected in the Triangle Area, exceeded the background UTL_{99/99} of 24.8 mg/kg. A comparison of the 35 mg/kg chromium concentration to the risk-based concentration (RBC) for Cr+6 in residential soil of 1.37×10^3 mg/kg (DOE 1994) indicates that further evaluation of Cr+6 in risk assessment is unwarranted. It is an unfortunate consequence of the agreed-upon COC selection process that a single sample result above the background UTL is sufficient to cause the analyte to be identified as an OU-wide PCOC and be retained for evaluation in a concentration/toxicity screen to identify

OU-wide COCs Because no statistical difference from background was identified, it can be concluded that Cr is naturally occurring in surface soils and the prevalent form would be Cr+3

- 6 The broad rationale applied to eliminate metals as COCs for groundwater due to correlation with TSS levels and local geochemical conditions appears generally sound, but the Risk Assessment Template includes a comparison of PRGs and site data as a final professional judgement check before eliminating chemicals For OU6 this comparison indicates

<u>Chemical</u>	<u>Max. OU6 Conc</u>	<u>PRG</u>
Antimony	194	15
Beryllium	32	0.0016
Manganese	6200	180
Arsenic	18	0.0038

Given the magnitude of these differences, we feel it would be prudent to include these as COCs for groundwater They can be eliminated later if risks are shown to be insignificant

Response In correspondence (Ref SHWM-FF) from Martin Hestmark of USEPA Region VIII to Steve Slaten of DOE, dated October 7, 1994, OU2 received conditional approval on their COC technical memorandum with the understanding that a quantitative risk assessment on antimony, beryllium, manganese, and arsenic in groundwater is conducted and the results included in the uncertainty analysis (rather than in the risk characterization) section of the HHRA In this way, it is assumed that the risk from these metals will not be added in with the risks from other analytes For consistency, DOE will take the same approach for dealing with these metals in OU6 groundwater samples as has been recommended for OU2

- 7 Manganese should be evaluated in the concentration/toxicity screen before judgement is applied It is included in the table on page 39, in contradiction of the statements that it is to be eliminated

Response Manganese was inadvertently left on the table on page 39 The table on page 39 should be identical to Table 6-6, which shows the correct COCs in pond sediment

- 8 The argument presented for eliminating arsenic as a COC in sediment is inconclusive Unless a better case can be made for elimination, it should be retained

Response It is the DOE position that the arguments presented in the text support a conclusion that arsenic in stream sediment is within background (see Attachment 5) and should not be considered a PCOC. The argument excluding arsenic as a PCOC in stream sediment is consistent with the arguments excluding manganese and barium in stream sediment, which were not discussed in EPA's comments.

Arsenic failed only the Gehan test which shows that the distribution of analytical results for arsenic in stream sediment was statistically different from the distribution of background data. However, the maximum concentration of arsenic in stream sediment (5.8 mg/kg) is well below the background maximum of 17.3 mg/kg, and is also below the background UTL_{99/99} (10 mg/kg) and the background mean plus two standard deviations (7.4 mg/kg). Therefore, although the distribution of arsenic in stream sediment is statistically different from background, the maximum concentration is well below other comparison criteria. In addition, surface soil is the most logical source of arsenic in stream sediment since the streams do not receive sediment from other contaminant sources. However, arsenic in surface soil was determined not to be statistically different from background. Therefore, since the maximum concentration of arsenic in stream sediment is below background comparison criteria and arsenic is not above background in surface soil, which is the largest source of sediment in stream beds, arsenic is excluded from consideration as a COC in stream sediment.

References

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Hazardous Substance Data Base (HSDB) 1994 Database provided on TOMES, Micromedix

McGrath, S. P. and S. Smith 1990 "Chromium and Nickel" In B. J. Alloway, ed. Heavy Metals in Soil. New York: John Wiley & Sons

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National Research Council of Canada 1981 Effects of Nickel in the Canadian Environment NRCC No. 18568, p. 56

Seiler, H. G., H. Sigel, and A. Sigel (eds.) 1988 Handbook on the Toxicity of Inorganic Compounds. New York, NY: Marcel Dekker, Inc., p. 454

U S Department of Energy (DOE) 1992 Final No Further Action Justification Document for the Rocky Flats Plant Low-Priority Sites (Operable Unit 16) Golden, Colorado October

U S Environmental Protection Agency (USEPA) 1992 Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities Addendum to Interim Final Guidance Office of Solid Waste, Permits and State Programs Division, U S Environmental Protection Agency Washington D C June

USEPA 1984 Control of Metals and HCL Emissions from Hazardous Waste Incinerators Technical Background Document Office of Solid Waste August

USEPA 1994 Integrated Risk Information System (IRIS) On-line database

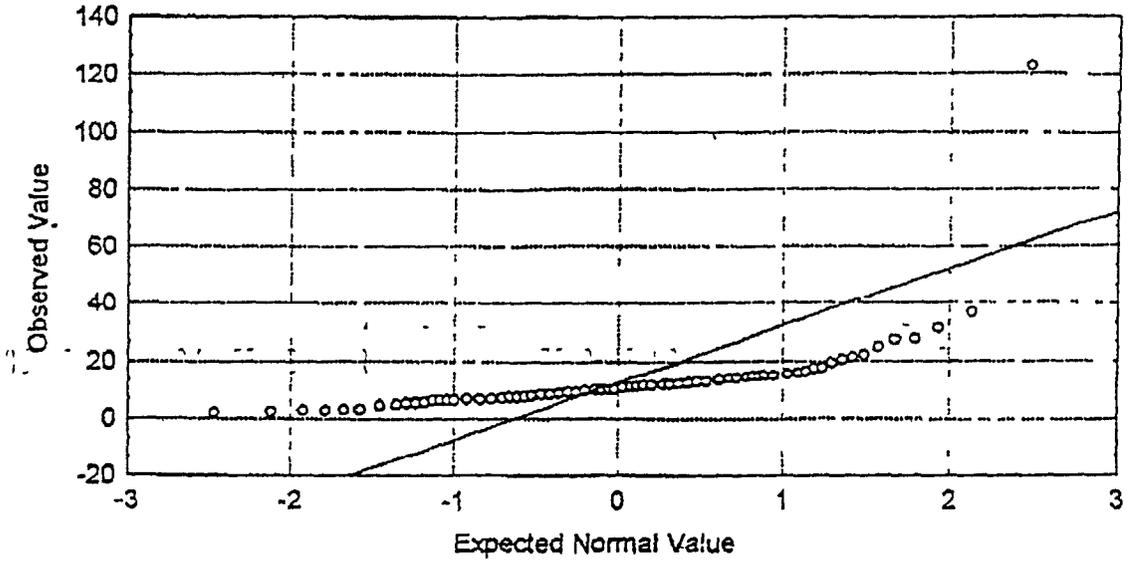
TABLE 17.3 F
EQUIPMENT RINSEATE ANALYTES DETECTED IN POND SURFACE WATER SAMPLES

Sample Date	THSS	Sample Location	Analyte	Number of Detects	Result	CRQL or RDL	Units	Laboratory Qualifier	Validation Qualifier	Quality Associated Data (y/n)
21-Sep-92	142.5	SW62292	Volatiles	1	46	10	UG/L	B	JA	Y
1-Oct-92	142.8	SW63792	ACETONE	3	10-23	10	UG/L	B	JA	N
28-Sep-92	142.9	SW64392	ACETONE	1	140	5	UG/L	B	JA	Y
5-Oct-92	142.7	SW63292	METHYLENE CHLORIDE	1	40	5	UG/L	B	JA	Y
23-Sep-92	142.6	SW62792	METHYLENE CHLORIDE	1	24	5	UG/L	B	JA	Y
21-Sep-92	142.5	SW62292	METHYLENE CHLORIDE	1	21	5	UG/L	B	JA	Y
1-Oct-92	142.8	SW63792	METHYLENE CHLORIDE	3	2-7	5	UG/L	B	JA	N

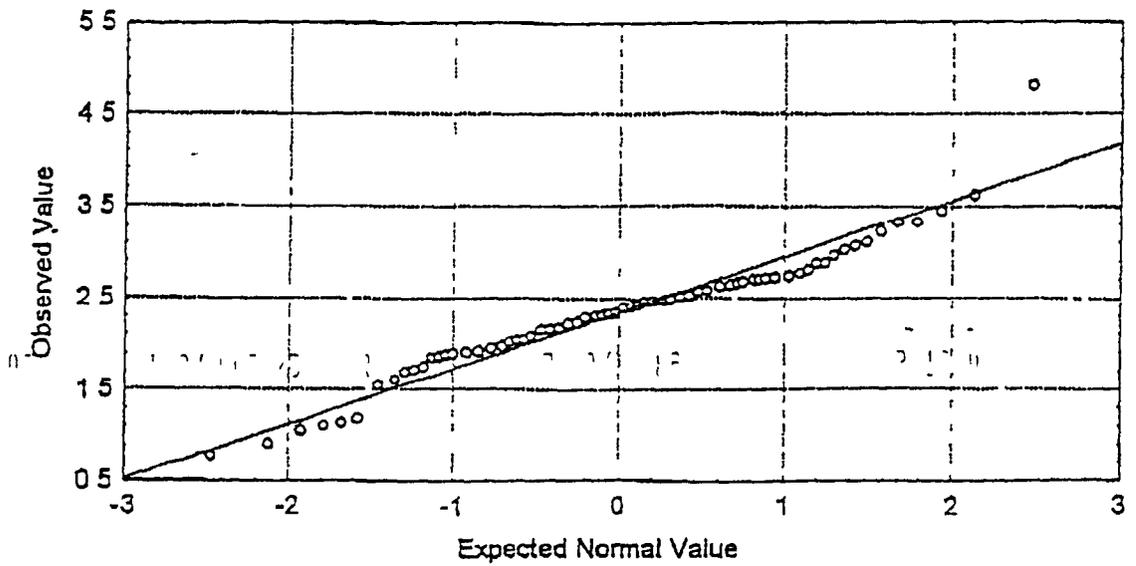
Site	Location	Method	Chemical	Result	Detection Limit	Units	Qual Lab	Chem Comments	CRQL or RDL	Units	Laboratory Qualifier	Validation Qualifier	Quality Associated Data (y/n)	
142.5	SW62002	SWU6020WC	VOACL P	ACETONE	19	10 UGA	B	JA, 49, 21-APR-93, 1856231	10	UG/L	B	JA	Y	
142.6	SW62292	SWU6022WC	VOACL P	ACETONE	50	10 UGA	B	JA, 49, 21-APR-93, 1856178	10	UG/L	B	JA	N	
142.7	SW63092	SWU6030WC	VOACL P	METHYLENE CHLORIDE	36	5 UGA	B	JA, 49, 21-APR-93, 1816137	5	UG/L	B	JA	Y	
142.7	SW63192	SWU6031WC	VOACL P	METHYLENE CHLORIDE	34	5 UGA	B	JA, 49, 21-APR-93, 1918252	5	UG/L	B	JA	Y	
142.7	SW63492	SWU6034WC	VOACL P	METHYLENE CHLORIDE	30	5 UGA	B	JA, 49, 21-APR-93, 1918015	5	UG/L	B	JA	N	
CHANGED TO														
142.5	SW62092	SWU6020WC	method	chemical	result	detection limit	units	qual lab	chem comments	CRQL or RDL <td>units <td>laboratory qualifier <td>validation qualifier <td>quality associated data </td></td></td></td>	units <td>laboratory qualifier <td>validation qualifier <td>quality associated data </td></td></td>	laboratory qualifier <td>validation qualifier <td>quality associated data </td></td>	validation qualifier <td>quality associated data </td>	quality associated data
142.5	SW62092	SWU6020WC	VOACL P	ACETONE	19	10 UGA	U	JA, 49, 21-APR-93, 1856231	10	UG/L	U	TRG	JA	Y
142.7	SW63092	SWU6030WC	VOACL P	ACETONE	50	10 UGA	U	JA, 49, 21-APR-93, 1856178	10	UG/L	U	TRG	JA	N
142.7	SW63192	SWU6031WC	VOACL P	METHYLENE CHLORIDE	36	5 UGA	U	JA, 49, 21-APR-93, 1816137	5	UG/L	U	TRG	JA	Y
142.7	SW63492	SWU6034WC	VOACL P	METHYLENE CHLORIDE	34	5 UGA	U	JA, 49, 21-APR-93, 1918252	5	UG/L	U	TRG	JA	Y
142.7	SW63492	SWU6034WC	VOACL P	METHYLENE CHLORIDE	30	5 UGA	U	JA, 49, 21-APR-93, 1918015	5	UG/L	U	TRG	JA	N

Attachment 2

OU6 Subsurface Soil COPPER
Normal Probability Plot of RESULT
 $y = -0.639 + 0.05x + \text{eps}$

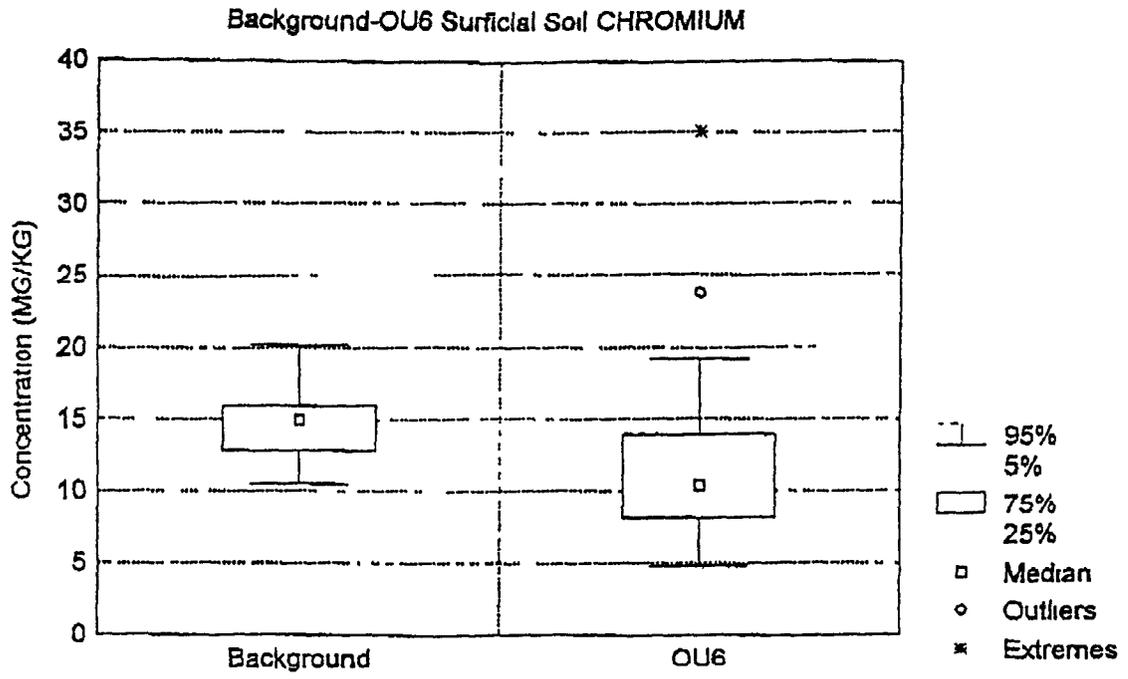


OU6 Subsurface Soil COPPER
Log-normal Probability Plot of RESULT
 $y = -3.851 + 1.644x + \text{eps}$



Contaminant	CAS	EPA-ECOA or Other FRA documents				Risk of RBC carcinogenic effects non-carcinogenic effects				
		RfD ₀ mg/kg/d	RfD ₁ mg/kg/d	CPS ₀ kg·d/mg	CPS ₁ kg·d/mg	Tap water µg/L	Ambient air µg/m ³	Fish mg/kg	Industrial soil mg/kg	Residential soil mg/kg
Contaminant										
Methyl styrene (alpha)	96639	7.00E-02				430 n	260 n	95 n	72000 n	5500 n
Methyl tertbutyl ether (MTBE)	1634044	5.00E-03	8.57E-01			180 n	3100 n	4.8 n	5100 n	390 n
Methacolor (Dual)	51218452	1.50E-01				5500 n	350 n	200 n	150000 n	12000 n
Methyuzum	21807649	2.50E-02				910 n	91 n	34 n	24000 n	2000 n
Methane	2385855	2.00E-04				0.037	0.0035	0.0018	1.6	0.35
Methylenedianiline	2212671	2.00E-01		1.80E+00		73 n	7.3 n	2.7 n	2000 n	160 n
Monochloroamine	7439987	5.00E-03				180 n	18 n	6.8 n	5100 n	390 n
Naked	10599803	1.00E-01				3700 n	370 n	140 n	100000 n	7800 n
Napropamide	300765	2.00E-03				73 n	7.3 n	2.7 n	2000 n	160 n
Nickel refinery dust	1529997	1.00E-01				3700 n	370 n	140 n	100000 n	7800 n
Nickel (soluble salts)	7440020	2.00E-02				730 n	73 n	27 n	20000 n	1600 n
Nickel subsulfide	12035722						0.0037			
Nitropryn	1929624	1.50E-03				55 n	5.5 n	2 n	1500 n	120 n
Nitrate	14797356	1.60E+00				59000 n	5900 n	2200 n	100000 n	130000 n
Nitric Oxide	10102439	1.00E-01				3700 n	370 n	140 n	100000 n	7800 n
2-Nitroaniline	14797650	1.00E-01				3700 n	370 n	140 n	100000 n	7800 n
3-Nitroaniline	88744	6.00E-05	5.71E-05			2.2 n	0.21 n	0.081 n	61 n	4.7 n
4-Nitroaniline	99092	3.00E-03				110 n	11 n	4.1 n	3100 n	230 n
Nitrobenzene	100016	3.00E-03				110 n	11 n	4.1 n	3100 n	230 n
Nitrobenzoin	98953	5.00E-04	5.71E-04			3.4 n	2.1 n	0.88 n	570 n	39 n
Nitrofurazone	67209	7.00E-02				2600 n	260 n	95 n	72000 n	5500 n
Nitrogen dioxide	59870			1.50E+00	9.40E+00	0.045	0.00067	0.0021	1.9	0.43
Nitroguanidine	10102440	1.00E+00				37000 n	3700 n	1400 n	100000 n	78000 n
4-Nitrophenol	556867	1.00E-01				3700 n	370 n	140 n	100000 n	7800 n
2-Nitropropane	100027	6.30E-02				2300 n	230 n	84 n	63000 n	4800 n
N-Nitrosodimethylamine	79469		5.71E-03			210 n	0.00067			
N-Nitrosodimethylamine	924163			5.40E+00	5.60E+00	0.012	0.0011	0.00036	0.53	0.12
N-Nitrosodimethylamine	1116547			2.80E+00		0.024	0.0022	0.0011	1	0.23
N-Nitrosodimethylamine	55185			1.50E+02	1.51E+02	0.00045	0.00041	0.00021	0.019	0.0043
N-Nitrosodimethylamine	62739			5.10E+01	4.90E+01	0.0013	0.00013	0.00002	0.026	0.013
N-Nitrosodimethylamine	84306			4.90E-03		14	1.3	0.44	590	130
N-Nitrosodimethylamine	421447			7.00E+00		0.0096	0.00089	0.00045	0.41	0.091
N-Nitrosodimethylamine	1059556			2.20E+01		0.0031	0.00028	0.00014	0.13	0.029
N-Nitrosodimethylamine	930552			2.10E+00	2.13E+00	0.032	0.0029	0.0015	1.4	0.3
m-Nitrotoluene	99081	1.00E-02				61 n	37 n	14 n	10000 n	790 n
o-Nitrotoluene	88722	1.00E-02				61 n	37 n	14 n	10000 n	790 n
p-Nitrotoluene	99990	1.00E-02				61 n	37 n	14 n	10000 n	790 n
Norflurazone	2721432	4.00E-02				1500 n	150 n	54 n	41000 n	3100 n
NuStar	85309799	7.00E-04				26 n	2.6 n	0.95 n	720 n	55
Octabromodiphenyl ether	32536520	3.00E-03				110 n	11 n	4.1 n	3100 n	230 n
OC 10-1357-tetrahydro-1357-tetraoxo	2691410	5.00E-02				1800 n	180 n	68 n	51000 n	3900 n

Attachment 4



Attachment 5

Background - OUG Stream Sediments - ARSENIC

