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DEPARTMENT OF ECOLOGY

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November 24, 1993

Implementation Memo No. 3

TO: Interested Staff

FROM: Steve Robb

Toxics Cleanup Program

SUBJECT: PQLs as Cleanup Standards

ISSUES

Two issues have been raised with regard to the use of practical quantitation limits (PQLs) in setting cleanup levels:

- The "legal" issue of PQLs as cleanup levels and whether or not PLPs have any long-term liability for sites cleaned up to the PQL level rather than the risk-based level. Can PLPs receive a covenant not to sue in these situations? Are they required to utilize institutional controls and conduct long-term monitoring?
- When risk-based compliance values are less than PQLs, what value is used in the risk summation calculation, the risk-based value or the PQL?

I. LONG-TERM LIABILITY

The Model Toxics Control Act (MTCA) states, "Where cleanup levels are below the PQL, compliance with cleanup standards will be based upon the PQL" (WAC 173-340-700(6) Measuring compliance). Also stated in the rule, "If those situations arise and the practical quantitation limit is higher than the cleanup level for that substance, the cleanup level shall be considered to have been attained, subject to subsection (4) of this section..." (WAC 173-340-707(2) Analytical considerations). Therefore, the PQL becomes the compliance value, and PLPs who attain the PQL are eligible for a covenant not to sue. WAC 173-340-707(4) places one additional burden, however, and that is a requirement for periodic review of the cleanup action in which the department, in reviewing the cleanup action, shall "...consider the availability of improved analytical techniques." Therefore, any covenant must have a reopener which would allow the department to take action if necessary.

Long-term monitoring is not required as long as the remedy does not specifically involve containment. However, it is possible that the remaining unquantified risk at a site could be sufficient to cause concern. This situation makes it very important for project managers to require PLPs to attempt to quantify those contaminants which have high PQLs. We need to avoid situations in which PLPs may leave unquantified contamination and that upon periodic review new analytical data demonstrates that further action is necessary. The rule supports the use of special analytical methods and/or institutional

controls to address this situation.

WAC 173-340-707(3) gives project managers the flexibility to require special sampling and analytical methods. PQLs should not be used to justify unnecessarily high compliance levels. In cases where the risk-based cleanup level is less than the PQL, site managers should calculate, using the appropriate formula, the risk the contaminant would represent if it were present at the PQL concentration. As this risk approaches the 1x10-5 level, serious consideration should be given to use of surrogate measures of the hazardous substance or development of specialized sample collection and/or analysis techniques. If the risk posed by a contaminant concentration at the PQL level exceeds the 1x10-5 level, project managers should consider requiring special analytical methods which can quantify the contaminant concentration at least to the 1x10-5 level.

In support of this approach, the Responsiveness Summary (RS) acknowledges that in meeting its mission to protect human health and the environment, Ecology cannot ignore concentrations below current quantitation limits. In doing so, the RS states, we would be placing "...human health and the environment 'at the mercy of analytic quantitation limits' and would be inconsistent with the statute's overriding objectives" (p. 107).

Finally, WAC 173-340-440(1)(a) requires institutional controls "...when the department determines such controls are required to assure the continued protection of human health and the environment or the integrity of the cleanup action." In situations where the PQL is above cleanup levels (i.e. exceed the 1x10-5 level), project managers should evaluate the need for institutional controls, particularly if special analytical methods are inadequate.

II. RISK SUMMATION CALCULATIONS BASED ON PQLs

MTCA requires the development of cleanup levels that are protective of human health and the environment. For carcinogenic substances, protection is defined as a cumulative site risk that does not exceed 1 in 100,000 (1x10-5). However, our inability to reliably measure some contaminant concentrations at calculated risk-based levels hinders our ability to measure total site risk.

In some situations the risk posed by a single contaminant at the PQL concentration outweighs the risk of all the other contaminants put together. Using such a PQL risk value in the risk summation calculation will negate the usefulness of both the risk summation and the 1x10-5 cumulative site risk requirement. In this situation, to calculate overall site risk, use the risk-based cleanup level rather than the PQL. The other contaminant concentrations can then be adjusted downward, as necessary, so the adjusted total site risk does not exceed 1x10-5. The final list of compliance levels should show the single contaminant at the PQL value and the other contaminants at their adjusted levels.

When adjusting individual cleanup levels to meet the one in a hundred thousand total risk standard at sites with multiple contaminants becomes necessary, do not adjust a contaminant below its PQL. For example, the cleanup level for trichloroethylene (TCE) in groundwater is 3.98 ppb and the PQL is 0.5 ppb. If higher cleanup levels for other compounds required the TCE cleanup level to be adjusted downward, it should not be adjusted below 0.5 ppb.

One final clarification regarding risk summation is warranted. Method B specifically establishes cleanup levels based on a risk of one in a million for individual carcinogenic contaminants. When multiple contaminants and/or multiple pathways of exposure are involved, MTCA allows for a cumulative site risk of no more than one in a hundred thousand (e.g., WAC 173-340-720(5)). The one

in a hundred thousand risk level is intended to serve as a cap, or ceiling, on the cumulative site risk at cleanup sites with multiple contaminants and is not a goal.

For example, when the cumulative site risk total is 8x10-5, cleanup levels for individual constituents must be adjusted downward until the cumulative site risk is equal to or less than 1x10-5. Alternately, at sites where the total cumulative site risk is 8x10-6, for example, no downward adjustment is necessary, since the risk does not exceed 1x10-5. However, adjustment upward for individual contaminants is not permitted under MTCA since individual contaminants must still meet the 1x10-6 (or 1x10-5 for Method C) limit.

Risk Communication

How we portray risk to the public is important to the implementation of the rules. When cleanup levels are based on PQL values, Ecology site managers should explain that technical limitations may prohibit us from measuring contaminants at levels that correspond to a risk of 1x10-6. This explanation should be part of the Cleanup Action Plan (CAP) and any public hearings where cleanup levels and risk are discussed. The CAP should include a list of risk-based levels as well as a list of the compliance levels.

Analytical Guidelines

- Know your expected PQLs. Communicate with your laboratory if you have any doubts, special expectations, or special analytical needs. Before your analytical work is requested, be sure that the results to be provided by your laboratory will meet your requirements.
- With the analytical results, the estimates of the PQLs for each sample matrix along with an explanation of how the PQL was determined should be provided by the laboratory.
- Appropriate quality assurance and quality control (QA/QC) data should be provided by the laboratory for all sets of samples.

What Are The PQLs?

There is no definitive list of PQLs. However, Ecology has put together tables of PQLs, MDLs (method detection limits), and comparisons to Method B numbers for groundwater, surface water, and soil. These tables are based on surveying published methods and laboratories. There are many factors that can produce a different PQL for one sample as compared to another. However, these tables can be useful guidance. Ecology refers you to the guidance for the use of the tables and also to a discussion on the meaning of PQLs. These are found as three additional parts to this memorandum. The four parts are:

Part I: Implementation Memo No. 3--PQLs as Cleanup Standards (this document)

Part II: Guidance For The Use of Tables

Part III: MDL, PQL, and Comparisons Tables

NOTE TO USERS: The following links on this page are to Microsoft Excel documents. Windows users who do not have Microsoft Excel may view and print these documents with Excel Viewer which is available to download via FTP from Microsoft. Please note: the downloadable documents are not available for either Macintosh or Unix systems.

- Table I: Water
- Table II: Soil

Part IV: Appendix--Meaning of Quantitation Limits

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TABLE II: SOIL										
MDLs, PQLs, and Comparison of Method B Values										
			Lab PQL Range < Published PQL							
CAS	Chemical	Method	Dectector	PQL (mg/kg)		LABORATORY PQL RANGE (mg/kg)			10e-6 Method B Soil Value (mg/kg)	PQL > Soil Method B (flag=na)
83-32-9	acenaphth	8270	GC/MS	0.66		0.013	-	0.66		
83-32-9	acenaphth	8310	HPLC	1.2		0.017	-	1.2		
208-96-8	acenaphth	8270	GC/MS	0.66		0.017	-	0.66	n/c	
208-96-8	acenaphth	8310	HPLC	1.5		0.017	-	1.5	n/c	
67-64-1	acetone	8240	GC/MS	0.01		0.001	-	0.05		
107-02-8	acrolein	8030	GC-FID	0.007		0.001	-	0.01		
79-06-1	acrylamide	8015	GC-FID						2.22E-1	
107-13-1	acrylonitri	8030	GC-FID	0.005		0.001	-	0.05	1.85E+0	
5972-60-8	alachlor	505.2	GC-ECD	0.01					1.23E+1	
116-06-3	aldicarb	531.1	HPLC	0.5						
309-00-2	aldrin	8080	GC-ECD	0.003		0.0017	-	0.003	5.88E-2	
62-53-3	aniline	8270	GC/MS	0.66		0.067	-	0.66	1.75E+2	
120-12-7	anthracen	8270	GC/MS	0.66		0.017	-	0.66		
120-12-7	anthracen	8310	HPLC	0.009		0.005	-	0.009		
7440-36-0	antimony	6010	ICP	16		1.5	-	10		
7440-36-0	antimony	7041	AA	1.5		0.00025	-	1		
140-57-8	aramite	8270	GC/MS						4.00E+1	
2674-11-2	Aroclor 10	8080	GC-ECD	0.044		0.017	-	0.1		
1104-28-2	Aroclor 12	8080	GC-ECD	0.044		0.017	-	0.1	n/c	
1141-16-5	Aroclor 12	8080	GC-ECD	0.044		0.017	-	0.1	n/c	
3469-21-9	Aroclor 12	8080	GC-ECD	0.044		0.017	-	0.1	n/c	
2672-29-6	Aroclor 12	8080	GC-ECD	0.044		0.017	-	0.1	n/c	
1097-69-1	Aroclor 12	8080	GC-ECD	0.088		0.017	-	0.1	n/c	
1096-82-5	Aroclor 12	8080	GC-ECD	0.088		0.017	-	0.1	n/c	
7440-38-2	arsenic	6010	ICP	25		2.5	-	10	1.43E+0	
7440-38-2	arsenic	7060	GFAA	0.5		0.00025	-	0.5	1.43E+0	
7440-38-2	arsenic	7061	GHAA	1					1.43E+0	
1332-21-4	asbestos									
1912-24-9	atrazine	619	GC/NP	0.05					4.55E+0	
103-33-3	azobenzen	8270	GC/MS	0.33		0.033	-	0.33	9.09E+0	
56-55-3	benz[a]an	8270	GC/MS	0.66		0.0055	-	0.66	1.37E-1	
56-55-3	benz[a]an	8310	HPLC	0.009		0.005	-	0.009	1.37E-1	
71-43-2	benzene	8020	GC-PID	0.002		0.001	-	0.04	3.45E+1	
71-43-2	benzene	8240	GC/MS	0.005		0.001	-	0.01	3.45E+1	
92-87-5	benzidine	8250	GC/MS	29		0.8	-	29	4.35E-3	
50-32-8	benzo[a]p	8270	GC/MS	0.66		0.005	-	0.66	1.37E-1	
50-32-8	benzo[a]p	8310	HPLC	0.015		0.005	-	0.015	1.37E-1	
205-99-2	benzo[b]fl	8270	GC/MS	0.66		0.005	-	0.66	1.37E-1	
205-99-2	benzo[b]fl	8310	HPLC	0.012		0.005	-	0.012	1.37E-1	

191-24-2	benzo[g,h	8270	GC/MS	0.66		0.01	-	0.66	n/c	
191-24-2	benzo[g,h	8310	HPLC	0.051		0.01	-	0.051	n/c	
207-08-9	benzo[k]fl	8270	GC/MS	0.66		0.005	-	0.66	1.37E-1	
207-08-9	benzo[k]fl	8310	HPLC	0.011		0.005	-	0.011	1.37E-1	
65-85-0	benzoic ac	8270	GC/MS	3.3		0.1	-	3.3		
98-07-7	benzotrich	8270/8010	-MS/GC-H	0.05		0.05	-	0.33	7.69E-2	
100-51-6	benzyl alc	8270	GC/MS	1.3		0.033	-	1.7		
100-44-7	benzyl chl	8240	GC/MS	0.1		0.1	-	0.33	5.88E+0	
7440-41-7	beryllium	6010	ICP	0.15		0.125	-	0.25	2.33E-1	
7440-41-7	beryllium	7091	GFAA	0.1		0.125	-	0.25	2.33E-1	
111-91-1	bis(2-chlo	8270	GC/MS	0.66		0.033	-	0.66	n/c	
111-44-4	bis(2-chlo	8270	GC/MS	0.66		0.017	-	0.66	9.09E-1	
9638-32-9	bis(2-chlo	8270	GC/MS	0.66		0.067	-	0.66		
117-81-7	bis(2-ethy	8270	GC/MS	0.66		0.017	-	0.66	7.14E+1	
542-88-1	bis(chloro	8270	GC/MS	0.66		0.01	-	0.66	4.55E-3	
75-27-4	bromodich	8010	GC-Hall	0.001		0.001	-	0.1	1.61E+1	
75-27-4	bromodich	8240	GC/MS	0.005		0.001	-	0.01	1.61E+1	
75-25-2	bromoform	8010	GC-Hall	0.002		0.001	-	0.5	1.27E+2	
75-25-2	bromoform	8240	GC/MS	0.005		0.001	-	0.01	1.27E+2	
101-55-3	bromophe	8270	GC/MS	0.66		0.017	-	0.66	n/c	
85-68-7	butyl benz	8060	GC-FID	10						
85-68-7	butyl benz	8270	GC/MS	0.66		0.033	-	0.66		
85-68-7	butyl benz		GC-ECD	0.23						
7440-43-9	cadmium	6010	ICP	2		0.01	-	1		
7440-43-9	cadmium	7130	GFAA	0.05		0.05	-	0.25		
86-74-8	carbazole	8270	GC/MS	0.33					5.00E+1	
1563-66-2	carbofuran	632	HPLC	0.83						
75-15-0	carbon dis	8240	GC/MS	0.1		0.001	-	0.05		
56-23-5	carbon tet	8010	GC-Hall	0.001		0.001	-	0.01	7.69E+0	
56-23-5	carbon tet	8240	GC/MS	0.005		0.001	-	0.01	7.69E+0	
57-74-9	chlordane	8080	GC-ECD	0.009		0.009	-	0.05	7.69E-1	
	chlordane	8080	GC-ECD	0.01		0.0017	-	0.01	n/c	
	chlordane	8080	GC-ECD	0.01		0.0017	-	0.01	n/c	
3165-93-3	chloro-2-m	8270	GC/MS	0.66		0.33	-	0.66	2.17E+0	
95-69-2	chloro-2-m	8270	GC/MS	0.66		0.66	-	1.7	1.72E+0	
59-50-7	chloro-3-m	8040	GC-ECD	1.2					n/c	
59-50-7	chloro-3-m	8040	GC-FID	0.24					n/c	
106-47-8	chloroanil	8270	GC/MS	0.33		0.067	-	0.33		
108-90-7	chloroben	8010	GC-Hall	0.003		0.001	-	0.025		
108-90-7	chloroben	8020	GC-PID	0.002		0.001	-	0.01		
108-90-7	chloroben	8240	GC/MS	0.005		0.001	-	0.01		
124-48-1	chlorodibr	8010	GC-Hall	0.002		0.001	-	0.1	1.19E+1	
75-00-3	chloroetha	8010	GC-Hall	0.005		0.001	-	0.5		
75-00-3	chloroetha	8240	GC/MS	0.01		0.001	-	0.01		
110-75-8	chloroethy	8010	GC-Hall	0.001		0.001	-	0.5	n/c	
110-75-8	chloroethy	8240	GC/MS	0.01		0.001	-	0.01	n/c	

67-66-3	chloroform	8010	GC-Hall	0.0005		0.0005	-	0.05	1.64E+2	
67-66-3	chloroform	8240	GC/MS	0.005		0.001	-	0.01	1.64E+2	
74-87-3	chloromet	8010	GC-Hall	0.0008		0.0008	-	0.5	7.69E+1	
74-87-3	chloromet	8240	GC/MS	0.01		0.001	-	0.01	7.69E+1	
91-58-7	chloronap	8120	GC-Hall	0.63		0.33	-	0.63	n/c	
91-58-7	chloronap	8270	GC/MS	0.66		0.017	-	0.66	n/c	
88-73-3	chloronitro	8270	GC/MS	0.66		0.33	-	0.66	4.00E+1	
100-00-5	chloronitro	8270	GC/MS	0.66		0.33	-	0.66	5.56E+1	
95-57-8	chlorophe	8040	GC-FID	0.21		0.33	-	1.5		
95-57-8	chlorophe	8270	GC/MS	0.66		0.17	-	0.66		
95-57-8	chlorophenol;2-		GC-ECD	0.39		0.067	-	0.39		
7005-72-3	chlorophe	8270	GC/MS	0.66		0.017	-	0.66	n/c	
1897-45-6	chlorthalo	8080	GC-ECD	0.01		0.0083	-	0.01	9.09E+1	
6065-83-1	chromium	3050/7190	FAA	25		0.25	-	1		
6065-83-1	chromium	3050/7191	GFAA	0.5		0.25	-	0.5		
7440-47-3	chromium(VI) (**)								n/c	
218-01-9	chrysene	8270	GC/MS	0.66		0.01	-	0.66	1.37E-1	
218-01-9	chrysene	8310	HPLC	0.1		0.01	-	0.1	1.37E-1	
7440-50-8	copper	6010	ICP	3		0.5	-	1		
7440-50-8	copper	7211	GFAA	0.5						
108-39-4	cresol;m-	8270	GC/MS	0.66		0.033	-	0.66		
95-48-7	cresol;o-	8270	GC/MS	0.66		0.033	-	0.66		
106-44-5	cresol;p-	8270	GC/MS	0.66		0.033	-	0.66		
57-12-5	cyanide									
57-12-5	cyanide	M4500-CN	color	5		0.5	-	5		
75-99-0	dalapon, s	8150	GC-ECD	1.2		0.1	-	1.2		
94-82-6	DB;2,4-	8150	GC-ECD	0.18						
72-54-8	DDD;p,p'-	8080	GC-ECD	0.007		0.0017	-	0.007	4.17E+0	
72-55-9	DDE;p,p'-	8080	GC-ECD	0.003		0.0017	-	0.1	2.94E+0	
50-29-3	DDT;p,p'-	8080	GC-ECD	0.008		0.0017	-	0.1	2.94E+0	
84-74-2	di-n-butyl	8060	GC-ECD	0.004						
84-74-2	di-n-butyl	8270	GC/MS	1.7		0.033	-	1.7		
117-84-0	di-n-octyl	8060	GC-ECD	0.03						
117-84-0	di-n-octyl	8270	GC/MS	0.66		0.017	-	0.66		
2303-16-4	diallate	8150	GC-ECD	0.15					1.64E+1	
333-41-5	diazinon	8140	GC-FPD	0.12		0.0017	-	0.033		
53-70-3	dibenz[a,h	8270	GC/MS	0.66		0.01	-	0.66	1.37E-1	
53-70-3	dibenz[a,h	8310	HPLC	0.02		0.01	-	0.66	1.37E-1	
132-64-9	dibenzofu	8270	GC/MS	0.33		0.033	-	0.33		
124-48-1	dibromoch	8010	GC-Hall	0.0009		0.0009	-	0.1	1.19E+1	
124-48-1	dibromoch	8240	GC/MS	0.005		0.001	-	0.01	1.19E+1	
124-48-1	dibromoch	8240	GC/MS	0.005		0.001	-	0.01	1.19E+1	
1918-00-9	dicamba	8150	GC-ECD	0.054		0.01	-	0.3		
95-50-1	dichlorobe	8010	GC-Hall	0.0015		0.0015	-	0.1		
95-50-1	dichlorobe	8020	GC-PID	0.004		0.004	-	0.01		
95-50-1	dichlorobe	8120	GC-ECD	0.76		0.01	-	0.76		

95-50-1	dichlorobe	8270	GC/MS	0.66		0.017	-	0.66		
541-73-1	dichlorobe	8010	GC-Hall	0.0032		0.0032	-	0.33	n/c	
541-73-1	dichlorobe	8020	GC-PID	0.004		0.004	-	0.33	n/c	
541-73-1	dichlorobe	8120	GC-ECD	0.8		0.01	-	0.8	n/c	
541-73-1	dichlorobe	8270	GC/MS	0.66		0.017	-	0.66	n/c	
106-46-7	dichlorobe	8010	GC-Hall	0.0024		0.0024	-	0.33	4.17E+1	
106-46-7	dichlorobe	8020	GC-PID	0.003		0.003	-	0.33	4.17E+1	
106-46-7	dichlorobe	8120	GC-ECD	0.9		0.33	-	0.9	4.17E+1	
106-46-7	dichlorobe	8270	GC/MS	0.66		0.01	-	0.66	4.17E+1	
91-94-1	dichlorobe	8270	GC/MS	1.3		0.033	-	1.3	2.22E+0	
75-71-8	dichlorodi	8010	GC-Hall	0.002		0.001	-	0.02		
75-71-8	dichlorodi	8240	GC/MS	0.005		0.001	-	0.05		
75-34-3	dichloroet	8010	GC-Hall	0.0007		0.0007	-	0.01		
75-34-3	dichloroet	8240	GC/MS	0.005		0.001	-	0.1		
107-06-2	dichloroet	8010	GC-Hall	0.0003		0.0003	-	0.01	1.10E+1	
107-06-2	dichloroet	8240	GC/MS	0.005		0.001	-	0.1	1.10E+1	
156-60-5	dichloroet	8010	GC-Hall	0.001		0.001	-	0.05		
156-60-5	dichloroet	8240	GC/MS	0.005		0.001	-	0.01		
75-35-4	dichloroet	8010	GC-Hall	0.001		0.001	-	0.05	1.67E+0	
75-35-4	dichloroet	8240	GC/MS	0.005		0.001	-	0.01	1.67E+0	
540-59-0	dichloroet	8010	GC-Hall	0.001		0.001	-	0.01	n/c	
540-59-0	dichloroet	8240	GC/MS	0.005		0.001	-	0.01	n/c	
156-59-2	dichloroet	8010	GC-Hall	0.001		0.001	-	0.01		
156-59-2	dichloroet	8240	GC/MS	0.005		0.001	-	0.01		
120-83-2	dichloroph	8040	GC-FID	0.26		0.033	-	0.33		
120-83-2	dichloroph	8270	GC/MS	0.66		0.033	-	1.7		
120-83-2	dichlorophenol;2,4-		GC-ECD	0.46						
94-75-7	dichloroph	8150	GC-ECD	0.24		0.04	-	1		
78-87-5	dichloropr	8010	GC-Hall	0.0004		0.0004	-	0.1	1.47E+1	
78-87-5	dichloropr	8240	GC/MS	0.005		0.001	-	0.01	1.47E+1	
542-75-6	dichloropr	8010	GC-Hall	0.003		0.001	-	0.01	5.56E+0	
542-75-6	dichloropr	8240	GC/MS	0.005		0.001	-	0.01	5.56E+0	
	dichloropr	8010	GC-Hall	0.003		0.001	-	0.2	n/c	
	dichloropr	8240	GC/MS	0.005		0.001	-	0.01	n/c	
	dichloropr	8240	GC/MS	0.005		0.001	-	0.1	n/c	
	dichloropr	8010	GC-Hall	0.003		0.001	-	0.01	n/c	
60-57-1	dieldrin	8080	GC-ECD	0.001		0.001	-	0.01	6.25E-2	
84-66-2	diethyl ph	8060	GC-FID	21						
84-66-2	diethyl ph	8270	GC/MS	0.66		0.033	-	0.66		
84-66-2	diethyl phthalate		GC-ECD	0.33						
119-90-4	dimethoxy	8270	GC/MS	1		0.33	-	1	7.14E+1	
131-11-3	dimethyl p	8060	GC-FID	13						
131-11-3	dimethyl p	8270	GC/MS	0.66		0.01	-	0.66		
131-11-3	dimethyl phthalate		GC-ECD	0.19		0.19	-	0.33		
119-93-7	dimethylb	8270	GC/MS	1		0.33	-	1	1.09E-1	
540-73-8	dimethylh	8270	GC/MS	1		1	-	1.7	7.14E-4	

105-67-9	dimethylp	8040	GC-FID	0.21						
105-67-9	dimethylp	8270	GC/MS	0.66		0.033	-	0.66		
105-67-9	dimethylphenol;2,4-		GC-ECD	0.42						
534-52-1	dinitro-o-c	8270	GC/MS	3.3		0.033	-	3.3	n/c	
51-28-5	dinitrophe	8040	GC-FID	8.7		0.067	-	8.7		
51-28-5	dinitrophe	8270	GC/MS	3.3		0.067	-	3.3		
121-14-2	dinitrotolu	8090	GC-ECD	0.013		0.013	-	0.33		
121-14-2	dinitrotolu	8270	GC/MS	0.66		0.013	-	0.66		
606-20-2	dinitrotolu	8090	GC-ECD	0.007		0.007	-	0.66		
606-20-2	dinitrotolu	8270	GC/MS	0.66		0.013	-	0.66		
88-85-1	dinoseb	8150	GC-ECD	0.014		0.0017	-	0.05		
88-85-1	dinoseb	8270	GC/MS							
123-91-1	dioxane;1,	8240	GC/MS	0.01		0.01	-	0.5	9.09E+1	
122-66-7	diphenylh	8270	GC/MS	0.66		0.067	-	0.66	1.25E+0	
298-04-4	disulfoton	8140	GC-FPD	0.13		0.0017	-	0.13		
298-04-4	disulfoton	8270	GC/MS							
	endosulfa	8080	GC-ECD						n/c	
	endosulfa	8080	GC-ECD	0.009		0.0017	-	0.1	n/c	
	endosulfa	8080	GC-ECD	0.003		0.0017	-	0.1	n/c	
1031-07-8	endosulfa	8080	GC-ECD	0.044		0.0017	-	0.1	n/c	
145-73-3	endothall									
72-20-8	endrin	8080	GC-ECD	0.004		0.0017	-	0.1		
3494-70-5	endrin ket	8250	GC/MS						n/c	
106-89-8	epichlorohydrin								1.01E+2	
140-88-5	ethyl acryl	8020	GC-PID	0.1		0.1	-	0.33	2.08E+1	
100-41-4	ethylbenze	8020	GC-PID	0.002		0.001	-	0.04		
100-41-4	ethylbenze	8240	GC/MS	0.005		0.001	-	0.01		
106-93-4	ethylene d	8011	GC/ECD	0.002		0.002	-	0.005	1.18E-2	
107-21-1	ethylene g	8240	GC-FID	10		0.33	-	10		
96-45-7	ethylene th	*632	HPLC						2.78E+1	
206-44-0	fluoranthe	8270	GC/MS	0.66		0.005	-	0.66		
206-44-0	fluoranthe	8310	HPLC	0.14		0.01	-	0.14		
86-73-7	fluorene	8270	GC/MS	0.66		0.005	-	0.66		
86-73-7	fluorene	8300	HPLC	0.14		0.005	-	0.14		
133-07-3	folpet								2.86E+2	
67-45-8	furazolidone								2.63E-1	
531-82-8	furium								2.00E-2	
76-44-8	heptachlo	8080	GC-ECD	0.002		0.0017	-	0.1	2.22E-1	
1024-57-3	heptachlo	8080	GC-ECD	0.056		0.0017	-	0.1	1.10E-1	
118-74-1	hexachlor	8120	GC-ECD	0.034		0.034	-	0.33	6.25E-1	
118-74-1	hexachlor	8270	GC/MS	0.66		0.017	-	0.66	6.25E-1	
87-68-3	hexachlor	8120	GC-ECD	0.23		0.23	-	0.33	1.28E+1	
87-68-3	hexachlor	8270	GC/MS	0.66		0.033	-	0.66	1.28E+1	
319-84-6	hexachlor	8080	GC-ECD	0.002		0.0017	-	0.002	1.59E-1	
319-85-7	hexachlor	8080	GC-ECD	0.004		0.0017	-	0.004	5.56E-1	
319-86-8	hexachlor	8080	GC-ECD	0.006		0.0017	-	0.006		

58-89-9	hexachlor	8080	GC-ECD	0.003		0.0017	-	0.008	7.69E-1	
58-89-9	hexachlor	8270	GC/MS						7.69E-1	
77-47-4	hexachlor	8120	GC-ECD	0.27		0.27	-	0.33		
77-47-4	hexachlor	8270	GC/MS	0.66		0.033	-	0.66		
67-72-1	hexachlor	8120	GC-ECD	0.02		0.02	-	0.33	7.14E+1	
67-72-1	hexachlor	8270	GC/MS	0.66		0.033	-	0.66	7.14E+1	
591-78-6	hexanone;	8240	GC/MS	0.05		0.001	-	0.05	n/c	
302-01-2	hydrazine	8270	GC/MS	1.3					3.33E-1	
193-39-5	indeno[1,2	8270	GC/MS	0.66		0.01	-	0.66		
193-39-5	indeno[1,2	8310	HPLC	0.029		0.01	-	0.029		
78-59-1	isophoron	8090	GC-FID	3.8		0.33	-	3.8	1.05E+3	
78-59-1	isophoron	8270	GC/MS	0.66		0.033	-	0.66	1.05E+3	
78-59-1	isophorone		GC-ECD	11					1.05E+3	
7439-92-1	lead	6010	ICP	21		1.25	-	8		
7439-92-1	lead	7420	FAA	50		0.125	-	0.5		
7439-92-1	lead	7421	GFAA	0.5		0.125	-	0.5		
121-75-5	malathion	8150	GC-FPD	#VALUE!						
7439-97-6	mercury (i	7470	AA	0.002		0.125	-	0.5		
7439-97-6	mercury (i	7471	AA	0.002		0.1	-	1		
72-43-5	methoxych	8080	GC-ECD	0.12		0.0017	-	0.12		
72-43-5	methoxych	8270	GC/MS							
74-83-9	methyl bro	9011	GC-ECD	0.01		0.001	-	0.01		
78-93-3	methyl eth	8015	GC-FID	0.1		0.001	-	0.05		
78-93-3	methyl eth	8240	GC/MS	0.01		0.001	-	0.05		
108-10-1	methyl iso	8015	GC-FID	0.1		0.001	-	0.05		
108-10-1	methyl iso	8240	GC/MS	0.01		0.001	-	0.05		
298-00-0	methyl par	8140	GC-FPD	0.02		0.005	-	0.02		
94-74-6	methyl-4-c	8150	GC-ECD	50		5	-	50		
636-21-5	methylana	8270	GC/MS	0.66		0.33	-	0.66	5.56E+0	
	methylana	8270	GC/MS	0.66		0.33	-	0.66	n/c	
75-09-2	methylene	8010	GC-Hall			0.001	-	0.01	1.33E+2	
75-09-2	methylene	8240	GC/MS	0.005		0.001	-	0.01	1.33E+2	
	methylnap	8270	GC/MS	0.66		0.017	-	0.66	n/c	
2385-85-5	mirex	8270	GC/MS						5.56E-1	
91-20-3	naphthale	8100	GC-FID	0.66		0.05	-	0.66		
91-20-3	naphthale	8270	GC/MS	0.66		0.005	-	0.66		
91-20-3	naphthale	8310	HPLC	1.2		0.05	-	1.2		
vailable03	nickel, refi	6010	ICP	7.5		1	-	4		
7440-02-0	nickel, sol	7520	FAA	20						
88-74-4	nitroanilin	8270	GC/MS	3.3		0.1	-	33	n/c	
99-09-2	nitroanilin	8270	GC/MS	3.3		0.1	-	33	n/c	
100-01-6	nitroanilin	8270	GC/MS	1.6		0.1	-	33	n/c	
98-95-3	nitrobenze	8090	GC-FID	2.4		1.7	-	2.4		
98-95-3	nitrobenze	8270	GC/MS	0.66		0.033	-	0.66		
98-95-3	nitrobenzene		GC-ECD	9.2		0.33	-	9.2		
59-87-0	nitrofurazone								6.67E-1	

	nitropheno	8040	GC-FID	0.3					n/c	
	nitropheno	8270	GC/MS	0.66					n/c	
	nitrophenol;2-		GC-ECD	0.52		0.033	-	0.52	n/c	
	nitropheno	8040	GC-FID	1.9					n/c	
	nitropheno	8270	GC/MS	3.3					n/c	
	nitrophenol;4-		GC-ECD	0.47					n/c	
924-16-3	nitroso-di-	8070	-Hall/GC-N						1.85E-1	
924-16-3	nitroso-di-	8250	GC/MS	1.3		0.33	-	1.3	1.85E-1	
621-64-7	nitroso-di-	8070	-Hall/GC-N						1.43E-1	
621-64-7	nitroso-di-	8250	GC/MS	1.3		0.033	-	1.3	1.43E-1	
1116-54-7	nitrosodie	8070	-Hall/GC-N						3.57E-1	
1116-54-7	nitrosodie	8270	GC/MS	1.3		0.33	-	1.3	3.57E-1	
55-18-5	nitrosodie	8070	-Hall/GC-N						6.67E-3	
55-18-5	nitrosodie	8270	GC/MS	1.3		0.33	-	1.3	6.67E-3	
62-75-9	nitrosodim	8070	-Hall/GC-N	0.002					1.96E-2	
62-75-9	nitrosodim	8270	GC/MS	1.3		0.33	-	1.3	1.96E-2	
86-30-6	nitrosodip	8070	-Hall/GC-N	0.008					2.04E+2	
86-30-6	nitrosodip	8270	GC/MS	0.66		0.033	-	0.66	2.04E+2	
0595-95-6	nitrosome	8070	-Hall/GC-N						4.55E-2	
0595-95-6	nitrosome	8270	GC/MS	1.3		0.33	-	1.3	4.55E-2	
930-55-2	nitrosopyr	8070	-Hall/GC-N						4.76E-1	
930-55-2	nitrosopyr	8270	GC/MS	1.3		0.33	-	1.3	4.76E-1	
56-38-2	parathion	8141	GC	0.06		0.0033	-	0.06		
608-93-5	pentachlo	8270	GC/MS							
87-86-5	pentachlo	8040	GC-FID	5		0.067	-	5	8.33E+0	
87-86-5	pentachlo	8270	GC/MS	3.3					8.33E+0	
87-86-5	pentachlorophenol		GC-ECD	0.4					8.33E+0	
85-01-8	phenanthr	8270	GC/MS	0.66		0.005	-	0.66	n/c	
85-01-8	phenanthr	8310	HPLC	0.43		0.0083	-	0.43	n/c	
108-95-2	phenol	8040	GC-FID	0.094						
108-95-2	phenol	8270	GC/MS	0.66		0.1	-	1.5		
108-95-2	phenol		GC-ECD	1.5						
93-65-2	propionic	8150	GC-ECD	38		5	-	38		
129-00-0	pyrene	8270	GC/MS	0.66		0.005	-	0.66		
129-00-0	pyrene	8310	HPLC	0.18		0.01	-	0.18		
7782-49-2	selenium	6010	ICP	0.75		2.5	-	20		
7782-49-2	selenium	7740	GFAA	5		0.125	-	0.5		
7782-49-2	selenium	7741	GHAA	1						
7440-22-4	silver	6010		3.5						
7440-22-4	silver	7740		5		0.25	-	1		
7440-22-4	silver	7741		0.1		0.05	-	0.25		
122-34-9	simazine	619	GC/NP	0.33		0.033	-	0.33	8.33E+0	
100-42-5	styrene	8240	GC/MS	0.005		0.001	-	0.01	3.33E+1	
1746-01-6	TCDD;2,3,	8290	GC/MS	0.000003					6.67E-6	
	TCDF;2,3,	8290	GC/MS	0.000003					n/c	
95-94-3	tetrachloro	8270	GC/MS	0.33						

79-34-5	tetrachloro	8010	GC-Hall	0.0003		0.0003	-	0.1	5.00E+0	
79-34-5	tetrachloro	8240	GC/MS	0.005		0.001	-	0.01	5.00E+0	
127-18-4	tetrachloro	8010	GC-Hall	0.0003		0.0003	-	0.05	1.96E+1	
5216-25-1	tetrachlorotoluene;P,a,a,a-								5.00E-2	
961-11-5	tetrachlorv	8141	GC/FPD	0.4		0.005	-	0.4	4.17E+1	
108-88-3	toluene	8020	GC-PID	0.002		0.001	-	0.025		
108-88-3	toluene	8240	GC/MS	0.005		0.001	-	0.01		
95-80-7	toluene-2,4-diamine								3.13E-1	
95-53-4	toluidine;o	8270	GC/MS	0.33					4.17E+0	
8001-35-2	toxaphene	8080	GC-ECD	0.16		0.017	-	1	9.09E-1	
93-72-1	TP;2,4,5-	8150	GC-ECD	0.034		0.01	-	0.1		
120-82-1	trichlorobe	8120	GC-ECD	0.034		0.034	-	0.33		
120-82-1	trichlorobe	8270	GC/MS	0.66		0.017	-	0.66		
71-55-6	trichloroet	8010	GC-Hall	0.0003		0.0003	-	0.05		
71-55-6	trichloroet	8240	GC/MS	0.005		0.001	-	0.01		
79-00-5	trichloroet	8010	GC-Hall	0.0002		0.0002	-	0.1	1.75E+1	
79-00-5	trichloroet	8240	GC/MS	0.005		0.001	-	0.01	1.75E+1	
79-01-6	trichloroet	8010	GC-Hall	0.001		0.001	-	0.01	9.09E+1	
75-69-4	trichloroflu	8010	GC-Hall	0.002		0.001	-	0.025		
75-69-4	trichloroflu	8240	GC/MS	0.005		0.001	-	0.01		
95-95-4	trichloroph	8270	GC/MS	0.66		0.033	-	1.7		
88-06-2	trichloroph	8040	GC-FID	0.43		0.033	-	1.7	9.09E+1	
88-06-2	trichloroph	8270	GC/MS	0.66					9.09E+1	
88-06-2	trichlorophenol;2,4,6		GC-ECD	0.39					9.09E+1	
93-76-5	trichloroph	8150	GC-ECD	0.04		0.01	-	0.2		
512-56-1	trimethyl p	8270	GC/MS						2.70E+1	
108-05-4	vinyl aceta	8240	GC/MS	0.05		0.001	-	0.05		
75-01-4	vinyl chlor	8010	GC-Hall	0.002			1		5.26E-1	
75-01-4	vinyl chlor	8240	GC/MS	0.02		0.001	-	0.01	5.26E-1	
1330-20-7	xylene (tot	8020	GC-PID	0.002		0.001	-	0.04		
1330-20-7	xylene (tot	8240	GC/MS	0.005		0.001	-	0.01		
108-38-3	xylene;m-	8020	GC-PID	0.002		0.001	-	0.01		
108-38-3	xylene;m-	8240	GC/MS	0.005		0.001	-	0.01		
95-47-6	xylene;o-	8020	GC-PID	0.002		0.001	-	0.01		
95-47-6	xylene;o-	8240	GC/MS	0.005		0.001	-	0.01		
106-42-3	xylene;p-	8020	GC-PID	0.002		0.001	-	0.01	n/c	
106-42-3	xylene;p-	8240	GC/MS	0.005		0.001	-	0.01	n/c	
7440-66-6	zinc	6010	ICP	1		0.5	-	2		
7440-66-6	zinc	7951	AA	0.03						