UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

FEB 0 8 2008

Mr Chris Linendoll
Manager
Waste Water Permitting Section (MC-148)
Texas Commission on Environmental Quality
P O Box 13087
Austin, TX 78711-3087

RE. Region 6 Minimum Quantification Level Guidance

Dear Mr Shaffi.

In 1992 EPA Region 6 developed guidance on Minimum Quantification Levels (MQLs) and how they would be used in the National Pollutant Discharge Elimination System (NPDES) permit decision making process. I believe this has served as a successful benchmark in both ensuring that the regulated community submits quality effluent data and in establishing enforceable conditions in permits.

In the intervening years laboratories have made advances in the quantification levels that are typically achieved through method enhancements Additional EPA approved test methods have also become more commonly available In an effort to respond to those developments, my staff has worked with the laboratory community to revise the MQLs which we will be accepting for EPA issued permits. In a number of cases, the new MQL values are now below water quality criteria which were previously not attainable. I am enclosing the revised guidance document as well as the Headquarters memorandum on mercury methods I previously sent you on August 28, 2007 Most of our states have incorporated the Region 6 MQL values into their permitting procedures and Region 6 expects that you will revise your procedures to incorporate these revised MQLs

Should you have any questions, please feel free to contact me or have your staff contact Scott Wilson of my staff Scott can be reached by telephone at (214) 665-7511 or by E-mail at wilson.js@epa.gov.

Sincerely,

Claudia V. Hosch

Claudia V Hosch
Chief
NPDES Permits and TMDLs Branch

Enclosures

Region 6 Development of Minimum Quantification Levels October 30, 2007

Introduction

Since 1992, EPA Region 6 has used MQLs as the benchmark for decision making and compliance in NPEDS permits. MQLs serve the dual purpose of ensuring that sufficiently sensitive analytical methodology is used for analyses and for resolving data management issues where water quality limitations are below concentrations which can reasonable be quantified. EPA Region 6 is proposing to revise the MQLs to more accurately reflect effluent data in permitting and enforcement decision making and to better protect water quality by incorporating advances in analytical techniques that have occurred since our 1992 policy was implemented .

The need for such Policy was highlighted with the development of water quality-based permit limits to protect numeric criteria for toxics. This process focused attention on the analytical sensitivity used when those toxic parameters are measured. In a number of cases, numeric water quality criteria have been established at low concentrations, which cannot currently be quantified using older EPA approved analytical methodologies. One example of this is the water quality criteria to protect aquatic life for copper. The criterion has been established at 2 µg/l; whereas, the Region 6 accepted Minimum Quantification Level (MQL) for Copper established in our1992 policy is 10 µg/l.

Although this is an issue common to all states, as an example, in New Mexico's Water Quality Standards the State has established 38 numeric criteria at concentrations which are less than Region 6's 1992 established corresponding MQLs. A comparison of those 38 water quality criteria and the associated MQLs, established in 1992, is shown below in Table 1 of the Appendix. EPA Region 6 is undertaking the exercise of determining the MQLs which can be reduced.

In the fourteen intervening years laboratories have made advances in the quantification levels that are typically achieved through method enhancements and additional EPA approved test methods have been approved. EPA regulations found at 40 CFR Part 136 set acceptable methodologies for satisfying the analytical requirements of NPDES permits. In the case where there is more than one approved method there are no requirements that the most sensitive method be used. MQLs establish a benchmark to assure that analytical methodologies with acceptable sensitivities are used for NPDES permitting purposes.

A number of advances in analytical methodology, such as clean techniques for Mercury under Method 1631, have been made since Region 6's policy was established in 1992. On August 23, 2007, EPA issued a Memorandum titled "Use of Sufficiently Sensitive EPA-Approved Analytical Methods in NPDES Permits. This Memorandum establishes that while there are several approved EPA methods for analyzing for mercury "in many cases, only the most sensitive methods" are appropriate for NPDES permit requirements. Consistent with this concept and as a result of such advances in methodology, it appears that a number of the MQLs established in 1992 can be revised and will result in MQLs lower than the corresponding criteria. Therefore, EPA has explored the need to update the established MQLs.

In an effort to respond to those developments, Region 6 staff has worked with the Houston Lab to develop updated MQLs following a similar procedure as used in 1992, which considered method appropriateness and cost effectiveness. In a number of cases, the revised MQL values are now below water quality criteria levels which were previously not attainable.

Only those MQLs that are presently greater than the corresponding water quality criteria are being examined. There does not appear to be a value in reexamining those MQLs which are presently lower than the water quality criteria since no additional protection of Water Quality Standards would be afforded.

In the early 1990s Region 6 undertook a study to provide an approach and set quantification levels with which defensible permits could be written. The resulting MQLs have been used in implementing water quality based permit limits and the associated permit decision making tasks since 1992.

EPA Region 6 will begin to implement the new MQLs established in this document as it reissues permits for facilities located in New Mexico. As the revised MQLs are adopted in individual State Implementation Plans, EPA expects that they will be phased in under State issued permits.

Terminology

Analytical results are characterized by a number of different terms, including Method Detection Level and Minimum Levels. These "detection levels" convey different information about the analysis. A true detection limit connotes the lowest concentration that a given instrument can record. A quantification limit is the lowest concentration that can be measured with known accuracy. The parameters evaluated by Region 6 in establishing the 1992 MQLs were the Method Detection Level (MDL) defined by EPA at 40 CFR Part 136, Appendix B, Instrument Detection Level (IDL) defined by EPA Method 1620, the Limit of Detection (LOD) and Limit of Quantification (LOQ) described by the American Chemical Society, the Practical Quantification Level (PQL), and the Minimum Level (ML) defined by EPA in 40 CFR Part 136 "1600" series. LOD, IDL, and MDL are described as approximately three times the standard deviation obtained from replicate measurements and may be described as that value determined to be statistically significant from the measurement of a reagent blank. An IDL is determined from the analysis of a chemical in a reagent or sample matrix. LOQ and PQL are the products of an LOD or MDL and a constant factor. The LOQ and PQL are attempts to define a level of analyte that may be repeatedly measured. The ML is defined as the concentration in a sample equivalent to the concentration of the lowest point on the calibration curve.

The concept of an ML, or the lowest point on a calibration curve, was judged to be a true quantification limit. Since the comparison of instream waste concentration to water quality criteria or effluent concentrations to permit limits are both quantitative exercises best done with a measured level of a pollutant rather than an indication of its presence, Region 6 has elected to define a minimum quantification level (MQL) as the lowest concentration at which a particular

substance can be quantitatively measured. The most straightforward estimator of a minimum quantification level currently available is the lowest concentration used in the calibration of a measurement system. This method of evaluating acceptable limits of quantification has been used by EPA in other cases, namely the development of the 1624 and 1625 organic analysis methods, the regulation of dioxin from pulp and paper mills, and the development of Organic Chemical effluent limitations guidelines.

When the MQLs were established, available statistics and terms were examined to determine an analytical benchmark to select a minimum level of sensitivity for each pollutant. EPA approved methods which could be expected to achieve those minimum levels were then identified.

Establishing MQLs for Priority Pollutants

In developing the 1992 MQLs, a literature review was made of analytical methods that have been characterized by a low calibration point or minimum level. These sources of information were used to arrive at appropriate low calibration points for the available analytical methods. Similar methods have been used in reevaluation of those MQL values.

Volatile and Semivolatile Organics

When MQLs were developed in 1992, Gas chromatography-mass spectroscopy (GC-MS) as detailed in 40 CFR Part 136 Methods 624 and 625 was determined to be appropriate and cost effective means to screen an effluent for the entire set of volatile and semivolatile priority pollutants. Two sources of information were used to set appropriate low calibration points or MQLs for these methods. The Contract Laboratory Program (CLP) administered under CERCLA contains a list of priority pollutants and the associated Contract Required Quantitation Levels (CRQL). These quantitation levels were developed under the assumption that Methods 624 and 625 GC-MS were used to perform analysis on the target compounds. In 1992, Region 6 used the CRQL as the primary basis for establishing its own MQLs for organic pollutants. The Minimum Levels found in the Federal regulations describing the similar GC-MS 1624 and 1625 methods were used as a cross reference (see 40 CFR Part 136, Appendix A).

The CRQL was used to establish the MQL for sixty seven of the eighty four volatile and semivolatile pollutants. For sixty five of these compounds, the CRQL and ML were equal. The MQLs for the remaining seventeen pollutants were taken from the ML value. Some priority pollutants are not target compounds under the CERCLA program, these being acrolein, acrylonitrile, 2-chloroethyl vinyl ether, benzidine, 3,4-benzofluoranthene, and 1,2 diphenlyhydrazine. Although they are in the same order of magnitude, the MQLs of eight halogenated aliphatic hydrocarbons, hexachloroethane, 2-nitrophenol, benzopyrylene, indenopyrene, dibenzoanthrcene, and three nitrosomes are higher than the CRQL by a factor of 2 to 5, although in the same order of magnitude. These higher MLs were used as the basis for the regional MQL in recognition of the difficulty in recovery and identification of these pollutants.

Pesticides

Gas chromatography was determined to be the most sensitive analytical method for pesticides. It is also relatively inexpensive and readily available. CRQLs have been established for pesticides. The required quantification level assumes analyses using the gas chromatography method as detailed in 40 CFR Part 136, Method 608. Region 6 chose to base the MQL on the CRQL for priority pollutants pesticides, with the exception of the pesticide chlordane. The regional Environmental Services Division Laboratory located in Houston, Texas provided professional guidance in setting the MQL for chlordane at 0.2 ug/l. A CRQL has been established at 0.05 ug/l for pure alpha and gamma chlordane isomers. The pesticide listed as a priority pollutant and encountered in waste waters is technical grade chlordane, which does not provide as strong and distinctive chromatographic response as the pure isomers. Thus, chlordane is more reliably quantified at this higher level.

Metals

Region 6 used the Contract Required Detection Level (CRDL) for metals in the CERCLA CLP as the primary basis for MQLs. The EPA approved methods for the measurement of priority pollutant metals included graphite furnace and flame atomic absorption spectrometry (AA) and inductively coupled plasma (ICP). Each of these methods has a different level of sensitivity. The CRDLs reflect acceptable ICP analysis of some metals and the more sensitive graphite furnace measurement of the remainder of the set of priority metals.

The CRDL served as the basis for the MQL for four metals (Arsenic, Mercury, Selenium, and Thallium) and Cyanide, and it represented analysis by the most sensitive available technique. CRDLs were used to establish MQLs for Antimony, Tri and Hexavalent Chromium, and Zinc at levels of sensitivity attainable by ICP analysis. Those levels are sufficiently sensitive to demonstrate compliance with water quality standards. The MQL for Beryllium was based on the CRDL attainable by ICP analysis. In 1992 Beryllium was not regulated by the states in Region 6; therefore, more sensitive measurement of the pollutant was not deemed necessary for water quality based permitting decisions. Water quality criteria for Beryllium has since been adopted by New Mexico.

The CRDL for Nickel is sufficient to protect water quality when discharges to fresh water are being evaluated and was chosen as the MQL for those cases. The ambient marine criteria for Nickel are two orders of magnitude lower than the fresh water standards. To adequately assess Nickel in discharges to marine waters, a lower MQL predicating the use of graphite furnace analysis will be necessary. Region 6 previously selected an MQL for Nickel of 5 ug/l for use in marine discharges, based of the optimum concentration range described in EPA Method 249.2.

Similarly, the MQL for Cadmium, Lead, and Silver were based on the optimum lower

range described in the graphite furnace methods for these pollutants. Silver is governed by a low water quality criteria. The MQL for Silver was set to reflect the most sensitive analysis available. The lower end of the optimal range for Lead was slightly higher than the CRDL and was used to reflect the difficulty in overcoming background contamination of this metal. The optimum concentration range for Cadmium reflected a sensitivity protective of the water quality criteria for this metal and was used to set the MQL.

The CRDL has a direct relation to the low calibration standard for atomic absorption methods. The QA/QC requirements in the CLP state that one AA calibration standard must be at the CRDL for all metals except Mercury. For ICP measurements in which the lowest calibration point may not be directly related to quantitation, a demonstration of sensitivity may be made by measurement of a standard equal to the CRDL. The measurement value should be within ten percent of the known concentration. Due to the need to protect Mercury criteria in a number of impaired waters the MQL for Mercury is based on the more sensitive Method 1631E, Isotope Dilution High Resolution Gas Spectrometry / High Resolution Mass Spectrometry or method 245.7 as specified in the individual permit.

Chlorine

The 18th edition of Standard Methods for the Examination of Water and Waste Water (1992) states that the method detection limit for total residual chlorine is 10 ug/l for method number 4500-Cl E (EPA Method 330.5). Based on that information and the method described below for determining an MQL from a method detection limit, EPA is establishing a new MQL of 33 ug/l.

Discharge Specific Quantification Levels

The process of setting MQLs for the pollutants described above is a general approach to describing the minimum sensitivity that would be acceptable in evaluating discharges. The MQLs for organic pollutants have been set to evaluate scans of the entire list of organic priority pollutants by GC-MS. The measure of individual organic pollutants at trace levels may be made with greater sensitivity in many cases by a specific gas chromatography technique. This is, however, dependent on the pollutant and the matrix. If permit application information indicates that a specific pollutant regulated at a trace level is being discharged, appropriate evaluation will include a comparison of the sensitivity of GC-MS and GC tests for that specific pollutant and matrix. The most sensitive method may then be required for analysis. A matrix specific Method Detection Level may be determined for the pollutant as described in 40 CFR Part 136, Appendix B. The MDL and LOD[2] being similar descriptors and both equivalent to three standard deviations about replicate measurements, a relationship between the MDL and the LOQ is drawn as follows:

LOD = 3 s.d.
LOQ = 10 s.d.

LOQ = 10/3 LOD
LOD = MDL Minimum Quantitation Level = 3.3 MDL

EPA Region 6 included conditions in NPDES permits which allows development of discharge specific MQLs in cases where effluent matrix make the general MQL inappropriate.

Revision of Existing Minimum Quantification Levels

Information was obtained from EPA's Houston, Texas laboratory, on quantification levels which are routinely achieved by analytical laboratories in EPA Region 6. A comparison of that new information with water quality criteria and the previously established MQLs is shown below in Table 2 of the Appendix, using New Mexico's criteria as an example. The comparison demonstrates that the quantification level routinely achieved by laboratories is less than EPA's previously established MQLs in 29 out of the 38 cases examined. The current laboratory quantification levels are also lower than water quality criteria in twelve more cases than EPA's MQLs (shown in bold in Table 2 fo the Appendix). Seven of those twelve cases are for metals. Since there are ten metals with an MQL which is greater than the criteria, use of the current laboratory quantification level rather than EPA's existing MQLs would mark a significant improvement in water quality analysis used in permit decision making. Use of the lowest achievable levels shown in Table 2 would result in an additional eight parameters with quantification levels lower than water quality criteria; however, for all parameters except Mercury, EPA does not plan to use those lower levels to establish revised MQLs. Matrix effects in effluents are likely to make the lowest achievable levels difficult to reach in a number of cases. EPA Method 1631 (Oxidation / Purge and Trap / Cold Vapor Atomic Fluorescence Spectrometry) is widely available and has been show to be viable. Therefore, that more sensitive method is being required for monitoring Mercury.

The routine quantification level and existing MQLs are compared with the current CRQLs in Table 3 of the Appendix. In most cases, the CRQLs are lower than the existing MQLs. The CRQLs for most metals are slightly higher than the routine quantification levels obtained from the Houston Lab. In most cases the CRQLs are the same value as the routine quantification levels for organic pollutants and pesticides. The fact that the routine quantification levels and CRQLs are either identical or in a very close range appears to verify the routine levels and support their suitability for use as MQLs in the future, for most parameters.

Selection of MQLs

For most parameters shown in Table 3, the routine quantification level is either the same as or lower than the CRQL. The routine quantification level is being used for the revised MQL in those cases. EPA's existing MQL is shown to be equal to the CRQL for Selenium in Table 3 and is not being revised. The CRQL for Cyanide is lower than the existing MQL and is being used as the revised MQL. The CRQL for Carbon Tetrachloride is lower than the existing MQL and the routine quantification level. However, the routine quantification level is sufficiently low

to protect water quality and will be used as the revised MQL. The revised list of MQLs is shown below in Table 4 of the Appendix.

Summary

EPA has embraced Minimum Level (defined as the lowest calibration point) as a valid scientific and regulatory concept for establishing water quality based limits in the Dioxin Permitting Strategy. A Federal Advisory Committee (FAC) has been formed to address the issue of permit limits which are below analytical quantification levels. A goal of this FAC is to publish Minimum Levels reflecting matrix effects for all of the EPA approved analytical quantification methods for waste water. Until the exercise is completed, the states and regions must have some benchmark of required analytical sensitivity.

Region 6 developed MQLs in an effort to obtain reliable data with which to evaluate the universe of dischargers and protect water quality standards. In stipulating these calibration points to permittees, an easily identified baseline for quantification on which the decision to impose permit limits was established.

APPENDIX

Table 1: List of MQLs Presently Higher than New Mexico's Numeric Criteria

Parameter	Numeric Criteria (ug/l)	Existing EPA MQL (ug/l)
Aluminum	87	100
Arsenic	2.3	10
Beryllium	4	5
Copper	2	10
Mercury	0.012	0.2
Nickel	13	40
Selenium	0.25	5
Silver	0.21	2
Thallium	2	10
Cyanide	2.6	20
2,3,7,8-TCDD	0.00000014	0.00001
Acrylonitrile	6.6	50
Carbon Tetrachloride	4.4	10
Pentachlorophenol	15	50
Benzidine	0.0054	50
Benzo(a)anthracene	0.49	10
Benzo(a)pyrene	0.49	10
3,4-Benzofluoranthene	0.49	10
Benzo(k)fluoranthene	0.49	10
Chrysene	0.49	10
Dibenzo(a,h)anthracene	0.49	20
3,3'-Dichlorobenzidine	0.77	50
1,2-Diphenylhydrazene	5.4	20
Hexachlorobenzene	0.0077	10
Indo(1,2,3-cd)pyrene	0.49	20
Aldrin	0.0014	0.05
Chlordane	0.022	0.2
4,4'-DDT	0.001	0.1
Dieldrin	0.0014	0.1
Alpha-endosulfan	0.056	0.1
Beta-endosulfan	0.056	0.1
Endrin	0.036	0.1
Heptachlor	0.0021	0.05
Heptachlor epoxide	0.0011	1.0
PCBs	0.0017	1.0
Toxaphene	0.0002	5.0
Chlorine	11	100

Table 2: Comparison of Existing MQLs with Quantification Levels Reported by EPA's Houston, Texas Laboratory

Parameter	Numeric Criteria (ug/l)	Existing EPA MQL (ug/l)	R6 Routine Level (ug/l)	Achievable (ug/l)
Aluminum	**87**	**100**	**2.5** [*1]	
Arsenic	**2.3**	**10**	**0.5** [*1]	**0.005** [*2]
Beryllium	**4**	**5**	**0.5** [*1]	
Copper	**2**	**10**	**0.5** [*1]	
Lead	**5**	**5**	**0.5** [*1]	
Mercury	**0.012**	**0.2**		**0.0002** [*3]
Nickel	**13**	**40**	**0.5** [*1]	
Selenium	0.25	5	10 [*1]	3 [*4]
Silver	0.21	2	0.5 [*1]	
Thallium	**2**	**10**	**0.5** [*1]	
Cyanide	2.6	20 [*9]		
2,3,7,8-TCDD	0.00000014	0.00001 [*5]		
Acrylonitrile	6.6	50	20 [*6]	
Carbon Tetrachloride	**4.4**	**10**	**2** [*6]	**0.5**
Pentachlorophenol	**15**	**50**	**5** [*7]	**1**
Benzidine	0.0054	50 [*7]		
Benzo(a)anthracene	0.49	10	5 [*7]	0.2
Benzo(a)pyrene	0.49	10	5 [*7]	
3,4-Benzofluoranthene	0.49	10		0.5
Benzo(k)fluoranthene	0.49	10	5 [*7]	0.2
Chrysene	0.49	10	5 [*7]	0.2
Dibenzo(a,h)anthracene	0.49	20	5 [*7]	0.2
3,3'-Dichlorobenzidine	0.77	50	5 [*7]	
1,2-Diphenylhydrazene	5.4	20 [*7]		
Hexachlorobenzene	0.0077	10	5 [*7]	0.01
Indo(1,2,3-cd)pyrene	0.49	20	5 [*7]	0.2
Aldrin	0.0014	0.05	0.01 [*8]	0.004
Chlordane	0.022	0.2	0.2 [*8]	0.01
4,4'-DDT	0.001	0.1	0.02 [*8]	0.001
Dieldrin	0.0014	0.1	0.02 [*8]	
Alpha-endosulfan	**0.056**	**0.1**	**0.01** [*8]	**0.004**
Beta-endosulfan	**0.056**	**0.1**	**0.02** [*8]	**0.008**
Endrin	**0.036**	**0.1**	**0.02** [*8]	**0.008**
Heptachlor	0.0021	0.05	0.01 [*8]	0.004
Heptachlor epoxide	0.0011	1.0	0.01 [*8]	0.004
PCBs	0.0017	1.0	0.2 [*8]	0.08
Toxaphene	0.0002	5.0	0.3 [*8]	0.06
Chlorine	11	100	33 [*10]	

Footnotes

*1 EPA Method 200.8 - Inductively Coupled Plasma / Mass Spectrometry
*2 EPA Method 1632 - Hydride Atomic Absorption
*3 EPA Method 1631 - Oxidation / Purge and Trap / Cold Vapor Atomic Fluorescence Spectrometry
*4 EPA Method 200.9 - Graphite Furnace Atomic Absorption Spectrometry
*5 EPA Method 1613 - Isotope Dilution High Resolution Gas Spectrometry / High Resolution Mass Spectrometry
*6 EPA Method 624 - Gas Chromatography/Mass Spectrometry (GC/MS) (Purgeables)
*7 EPA Method 625 - Gas Chromatography/Mass Spectrometry (GC/MS) (Base Nuetrals and Acids)
*8 EPA Method 608 - Gas Chromatography with Electron Capture Detector
*9 EPA Method 335.2 - Titrimetric, Spectrophotometric
*10 EPA Method 330.5 - Spectrophotometric

Note: EPA Method 200.8 has been used for NPDES permits and approved as an alternate test procedure. The final method approval will be published in late 2006.

Table 3: Comparison of Existing and Laboratory Reported Quantification Levels with CRQLs

Parameter	Existing EPA MQL (ug/l)	R6 Routine Level (ug/l)	Achievable (ug/l)	CRQL (ug/l)
Aluminum	100	2.5 *1		200
Arsenic	10	0.5 *1	0.005 *2	1 *1
Beryllium	5	0.5 *1		1 *1
Copper	10	0.5 *1		2 *1
Lead	5	0.5 *1		1 *1
Mercury	0.2		0.0002 *3	0.2 *9
Nickel	40	0.5 *1		1 *1
Selenium	5	10 *1	3 *4	5 *1
Silver	2	0.5 *1		1 *1
Thallium	10	0.5 *1		1 *1
Cyanide	20			10 *10
2,3,7,8-TCDD	0.00001 *5			0.00001 *5
Acrylonitrile	50	20 *6		
Carbon Tetrachloride	10	2 *6	0.5	0.5 *6
Pentachlorophenol	50	5 *7	1	5 *7
Benzidine	50 *7			
Benzo(a)anthracene	10	5 *7	0.2	5 *7
Benzo(a)pyrene	10	5 *7		5 *7
3,4-Benzofluoranthene	10		0.5	
Benzo(k)fluoranthene	10	5 *7	0.2	5 *7
Chrysene	10	5 *7	0.2	5 *7
Dibenzo(a,h)anthracene	20	5 *7	0.2	5 *7
3,3'-Dichlorobenzidine	50	5 *7		5 *7
1,2-Diphenylhydrazene	20 *7			
Hexachlorobenzene	10	5 *7	0.01	5 *7
Indo(1,2,3-cd)pyrene	20	5 *7	0.2	5 *7
Aldrin	0.05	0.01 *8	0.004	0.01 *8
Chlordane	0.2	0.2 *8	0.01	
4,4'-DDT	0.1	0.02 *8	0.001	0.02 *8
Dieldrin	0.1	0.02 *8		0.02 *8
Alpha-endosulfan	0.1	0.01 *8	0.004	0.01 *8
Beta-endosulfan	0.1	0.02 *8	0.008	0.02 *8
Endrin	0.1	0.02 *8	0.008	0.01 *8
Heptachlor	0.05	0.01 *8	0.004	0.01 *8
Heptachlor epoxide	1.0	0.01 *8	0.004	0.01 *8
PCBs	1.0	0.2 *8	0.08	
Toxaphene	5.0	0.3 *8	0.06	1.0 *8

Chlorine	100	

Footnotes

*1 EPA Method 200.8 - Inductively Coupled Plasma / Mass Spectrometry
*2 EPA Method 1632 - Hydride Atomic Absorption
*3 EPA Method 1631 - Oxidation / Purge and Trap / Cold Vapor Atomic Fluorescence Spectrometry
*4 EPA Method 200.9 - Graphite Furnace Atomic Absorption Spectrometry
*5 EPA Method 1613 - Isotope Dilution High Resolution Gas Spectrometry / High Resolution Mass Spectrometry
*6 EPA Method 624 - Gas Chromatography/Mass Spectrometry (GC/MS) (Purgeables)
*7 EPA Method 625 - Gas Chromatography/Mass Spectrometry (GC/MS) (Base Nuetrals and Acids)
*8 EPA Method 608 - Gas Chromatography with Electron Capture Detector
*9 EPA Method 245.1 - Cold Vapor Atomic Absorption Spectrometry
*10 EPA Method 335.2 - Titrimetric, Spectrophotometric

Table 4: EPA Region 6 Revised MQLs

Parameter	Existing MQL (ug/l)	Revised MQL (ug/l)
Aluminum	100	2.5
Arsenic	10	0.5
Beryllium	5	0.5
Copper	10	0.5
Lead	5	0.5
Mercury	0.2	0.0005/0.005[1]
Nickel	40	0.5
Selenium	5	5
Silver	2	0.5
Thallium	10	0.5
Cyanide	20	10
2,3,7,8-TCDD	0.00001	0.00001
Acrylonitrile	50	20
Carbon Tetrachloride	10	2
Pentachlorophenol	50	5
Benzidine	50	50
Benzo(a)anthracene	10	5
Benzo(a)pyrene	10	5
3,4-Benzofluoranthene	10	10
Benzo(k)fluoranthene	10	5
Chrysene	10	5
Dibenzo(a,h)anthracene	20	5
3,3'-Dichlorobenzidine	50	5
1,2-Diphenylhydrazene	20	20
Hexachlorobenzene	10	5
Indo(1,2,3-cd)pyrene	20	5
Aldrin	0.05	0.01
Chlordane	0.2	0.2
4,4'-DDT	0.1	0.02
Dieldrin	0.1	0.02
Alpha-endosulfan	0.1	0.01
Beta-endosulfan	0.1	0.02
Endrin	0.1	0.02
Heptachlor	0.05	0.01
Heptachlor epoxide	1.0	0.01
PCBs	1.0	0.2
Toxaphene	5.0	0.3
Chlorine	100	33

[1] As specified in your individual permit.

Table 4: EPA Region 6 Revised MQLs

Parameter	Existing MQL (ug/l)	Revised MQL (ug/l)
Aluminum	100	2.5
Arsenic	10	0.5
Beryllium	5	0.5
Copper	10	0.5
Lead	5	0.5
Mercury	0.2	0.0005[1]/0.005[1]
Nickel	40	0.5
Selenium	5	5
Silver	2	0.5
Thallium	10	0.5
Cyanide	20	10
2,3,7,8-TCDD	0.00001	0.00001
Acrylonitrile	50	20
Carbon Tetrachloride	10	2
Pentachlorophenol	50	5
Benzidine	50	50
Benzo(a)anthracene	10	5
Benzo(a)pyrene	10	5
3,4-Benzofluoranthene	10	10
Benzo(k)fluoranthene	10	5
Chrysene	10	5
Dibenzo(a,h)anthracene	20	5
3,3'-Dichlorobenzidine	50	5
1,2-Diphenylhydrazene	20	20
Hexachlorobenzene	10	5
Indo(1,2,3-cd)pyrene	20	5
Aldrin	0.05	0.01
Chlordane	0.2	0.2
4,4'-DDT	0.1	0.02
Dieldrin	0.1	0.02
Alpha-endosulfan	0.1	0.01
Beta-endosulfan	0.1	0.02
Endrin	0.1	0.02
Heptachlor	0.05	0.01
Heptachlor epoxide	1.0	0.01
PCBs	1.0	0.2
Toxaphene	5.0	0.3
Chlorine	100	33

[1] As specified in your individual permit.