Analytical Feasibility Support Document for the Fourth Six-Year Review of National Primary Drinking Water Regulations

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Disclaimer

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Table of Contents

Table of Exhibits

Abbreviations and Acronyms

ASTM	American Society for Testing and Materials
AVICP-AES	Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry
CCGC	Capillary Column Gas Chromatography
CBI	Confidential Business Information
CASRN	Chemical Abstract Services Registry Number
CFR	Code of Federal Regulations
CUV/FD	Coupled Ultraviolet and Fluorescence Detection
DAI	Direct Aqueous Injection
DL	Detection Limit
DBCP	1,2-Dibromo-3-chloropropane
DEHP	Di(2-ethylhexyl)phthalate
DW	Drinking Water
ECD	Electron Capture Detector
ECGC	Electron Capture Gas Chromatography
ELCD	Electrolytic Conductivity Detector
EPA	Environmental Protection Agency
EQL	Estimated Quantitation Level
ERA	Environmental Resources Associates, Inc.
FD	Fluorescence Detection
FR	Federal Register
GC	Gas Chromatography
HPLC	High Performance Liquid Chromatography
HRGC	High Resolution Gas Chromatography
HRMS	High Resolution Mass Spectrometry
ICP	Inductively Coupled Plasma
ICR	Information Collection Request
IEE	Ion Exchange Extraction
LLE	Liquid-Liquid Extraction
LLME	Liquid-Liquid Microextraction
LSE	Liquid-Solid Extraction
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDL	Method Detection Limit
ME	Microextraction
MRL	Minimum Reporting Level
MS	Mass Spectrometry
N	Nitrogen
na	not available
NELAC	National Environmental Laboratory Accreditation Conference
NPDWR	National Primary Drinking Water Regulation
OIA	OI Analytical
PCB	Polychlorinated Biphenyls
PE	Performance Evaluation
PID	Photoionization Detection

PQL	Practical Quantitation Level
PT	Proficiency Testing
SD	Standard Deviations
SDWA	Safe Drinking Water Act
SIM	Single Ion Method
SM	Standard Methods
SPE	Solid-Phase Extraction
SYR	Six-Year Review
SYR 1	First Six-Year Review
SYR 2	Second Six Year Review
SYR 3	Third Six-Year Review
SYR 4	Fourth Six-Year Review
2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TNI	The NELAC Institute
USGS	U.S. Geological Survey
UV	Ultraviolet
UVD	Ultraviolet Detector
VOC	Volatile Organic Compound

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Executive Summary

The Safe Drinking Water Act (SDWA), as amended in 1996, requires the Environmental Protection Agency (EPA) to review and revise, if appropriate, existing National Primary Drinking Water Regulations (NPDWRs). The resulting Six-Year Review (SYR)[1] involves consideration of five key elements, as appropriate: health risk, analytical and treatment feasibility, occurrence and exposure, benefit-cost analysis, and implementation-related issues. This report addresses the analytical feasibility element of the review.

Analytical feasibility is based on the ability of EPA-certified laboratories to reliably quantitate regulated contaminants. EPA promulgates an NPDWR for a chemical contaminant, it identifies a Practical Quantitation Level (PQL) defined as "[t]he lowest level [of analytical quantitation] that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions" [50 *Federal Register (FR)* 46902, November 13, 1985, p. 46906]. A PQL incorporates quantitation, precision and bias, normal operations of a laboratory, and the fundamental need to have enough laboratories available to conduct compliance monitoring analyses (50 CFR 46880, November 13, 1985; 52 *FR* 25690, July 8, 1987; 54 *FR* 22062, May 22, 1989). A PQL represents quantitation capabilities when EPA promulgates an NPDWR. As analytical technologies improve over time, however, there may be potential to reduce a PQL. This analytical feasibility report provides an assessment of whether these improvements provide an opportunity to revise PQLs.

Under the protocol developed for the SYR, EPA evaluates the potential to revise a PQL downward when the PQL limits the regulatory standard for a contaminant, the Maximum Contaminant Level (MCL). Under the SDWA, EPA first establishes a Maximum Contaminant Level Goal (MCLG) based on health risk information [SDWA Section 1412(b)(4)(A)]. Then EPA sets the MCL as close to the MCLG as feasible [SDWA Section 1412(b)(4)(B)]. Analytical feasibility, represented by a PQL, can result in an MCL being greater than an MCLG.

EPA conducted the analytical feasibility analysis for two groups of chemical contaminants:

- Carcinogens for which the MCL is greater than the MCLG because the PQL constrains the lowest feasible MCL; and
- Contaminants for which the health risk review identified a potential MCLG value less than the current PQL, which would constrain setting an MCL equal to the potential MCLG.

Under the protocol, if there is potential to reduce a PQL, the next review step is to evaluate occurrence and exposure at the potential lower PQL threshold. Because the PQL assessment may not identify a specific quantitation threshold for the occurrence and exposure analysis, EPA conducted a supplemental estimated quantitation level (EQL) assessment to identify a threshold value. An EQL is a contaminant concentration less than a PQL that available data indicate is a feasible, policy-relevant threshold for occurrence analysis. This analytical feasibility report for

1 The SDWA requires that the review process occur "not less often than every 6 years" [Section 1412(b)(9)].

the fourth SYR (SYR 4) combines the PQL assessment and the EQL assessment, which were separate analyses in prior review cycles.

The PQL assessment for SYR 4 cycle includes the two main data sources consulted for prior PQL assessments: the laboratory proficiency testing (PT) data and the adoption of improved methods or revision of existing methods since SYR 3 round. The PT data show whether there is potential for a lower PQL at a concentration where 75% of laboratories achieve results within a specific range around the spike value or acceptance criteria. It also incorporates the data used in prior reviews to develop EQL values using supplemental data sources including the method detection limit (MDL) of approved methods and MRL values reported in available monitoring data.

EPA divided the 30 regulated contaminants into two groups based on the context for inclusion in this report. There are 20 carcinogens and 2 non-carcinogens for which the PQL limited the MCL at the time of promulgation, and 8 contaminants for which a potential MCLG revision would be less than the PQL, thereby making the current PQL a limit to setting an MCL equal to the potential MCLG. For the first group of contaminants, EPA assessed the feasibility of reducing the PQL as close as possible to the MCLG. For the second group, EPA assessed the feasibility of reducing the PQL as low as the potential MCLG.

The recommendations for the PQL and EQL assessments (**Exhibit ES-1**) for the 22 contaminants in the first group are as follows:

- For ten of the contaminants, the PQL assessment supports reduction of the current PQL and the EQL assessment identified an EQL equal to the MRL mode.
- For one of the contaminants, the PQL assessment supports reduction of the current PQL and the EQL assessment identified an EQL equal to the MCLG.
- For six contaminants, the PQL assessment concluded that a PQL reduction was uncertain or not indicated, so EPA used either MRL or MDL data to identify a EQL value.
- For five contaminants, neither the PQL assessment nor the EQL assessment supports reduction of the PQL.

For the remaining nine contaminants, the PQL is greater than the potential MCLG and, therefore, limits potential MCL revisions (**Exhibit ES-2**). The recommendations for the PQL and EQL assessments for the contaminants in this group are as follows:

- The PQL assessment indicated potential to reduce PQL values for three contaminants, but EPA identified EQL values for eight of the nine contaminants.
- The EQL values for three contaminants can be based on the MRL mode.
- The EQL values for three of the contaminants can be based on MDL multipliers.
- The EQL value for one contaminant is based on the potential MCLG.
- The EQL value for one contaminant is based on a prior review cycle decision that is supported by the MRL data and MDL multiplier.

Exhibit ES-1. Analytical Feasibility Assessment Summary for Contaminants with MCL Equal to Current PQL

Contaminant	Current PQL (µg/L)	PQL Assessment Qualitative Recommendation	EQL Assessment Recommendation
Benzene	5	Potential to lower PQL	0.5 µg/L (MRL mode)
Benzo[a]pyrene	0.2	No change	No EQL
Carbon tetrachloride	5	Potential to lower PQL	0.5 µg/L (MRL mode)
Chlordane	2	Uncertain	1 µg/L (MDL multiplier)
1,2-Dibromo-3-chloropropane	0.2	Uncertain	No EQL
1,2-Dichloroethane	5	Potential to lower PQL	0.5 µg/L (MRL mode)
Dichloromethane	5	Potential to lower PQL	0.5 µg/L (MRL mode)
1,2-Dichloropropane	5	Potential to lower PQL	0.5 µg/L (MRL mode)
Di(2-ethylhexyl)phthalate	6	Uncertain	No EQL
Ethylene dibromide	0.05 µg/L	No change	No EQL
Heptachlor	0.4	Uncertain	0.1 µg/L (MDL multiplier)
Heptachlor epoxide	0.2	No change	0.1 µg/L (MDL multiplier)
Hexachlorobenzene	1	Uncertain	0.1 µg/L (MRL mode)
Pentachlorophenol	1	No change	0.9 µg/L (MDL multiplier)
Polychlorinated biphenyls	0.5	No change	No EQL
2,3,7,8-Tetra-chlorodibenzo-p-dioxin	0.00003	Uncertain	0.000005 µg/L (MRL mode)
Tetrachloroethylene	5	Potential to lower PQL	0.5 µg/L (MRL mode)
Thallium	2	Potential to lower PQL	1 µg/L (MRL mode)
Toxaphene	3	Potential to lower PQL	1 µg/L (MRL mode)
Trichloroethylene	5	Potential to lower PQL	0.5 µg/L (MRL mode)
1,1,2-Trichloroethane	5	Potential to lower PQL	3 µg/L (MCLG)
Vinyl chloride	2	Potential to lower PQL	0.5 µg/L (MRL mode)

Exhibit ES-2. Analytical Feasibility Assessment Summary for Contaminants with Potential MCLG Less than the Current PQL

Contaminant	Current PQL (µg/L)	MCLG and MCL (µg/L)	Potential MCLG (µg/L)	PQL Assessment Qualitative Recommendation	EQL Assessment Recommendation
Antimony	6	6	2	No change	No EQL
Cadmium	2	5	0.7	No change	1 µg/L (MRL mode)
Carbofuran	7	40	0.3	No change	5 µg/L (MDL multiplier)
Cyanide	100	200	4	No change	50 µg/L (MDL multiplier)
Endothall	90	100	40	Uncertain	50 µg/L (prior review)
Methoxychlor	10	40	0.1	Potential to lower PQL	1 µg/L (MDL multiplier)
Oxamyl	20	200	9	No change	9 µg/L (potential MCLG)
Styrene	5	100	zero	Potential to lower PQL	0.5 µg/L (MRL mode)
1,2,4-Trichlorobenzene	5	70	zero	Potential to lower PQL	0.5 µg/L (MRL mode)

1 Introduction

The Safe Drinking Water Act (SDWA), as amended in 1996, requires the Environmental Protection Agency (EPA) to review and revise, if appropriate, existing National Primary Drinking Water Regulations (NPDWRs) [Section 1412(b)(9)]. Since the 1996 SDWA Amendments, EPA completed the three comprehensive reviews of NPDWRs, shown in **Exhibit 1-1**. This analytical feasibility document supports decisions made during the fourth Six-Year Review (SYR 4) cycle.

Exhibit 1-1. SYR Cycle Time Periods

Review Cycle	Review Period	Documentation
1	1996-2002	68 *Federal Register* (*FR*) 42907, July 18, 2003d
2	2003-2009	75 *FR* 15499, March 29, 2010
3	2008-2015	82 *FR* 3518, January 11, 2017

Following the SYR Protocol (the 'Protocol') developed during the first cycle (SYR 1; USEPA, 2003b) and modified during the second (SYR 2) and third (SYR 3) cycles (USEPA, 2009e, 2016d), EPA reviewed the requisite data and information to make decisions regarding regulatory changes for SYR 4: health risk assessments, technology assessments (analytical feasibility and treatment technology), occurrence and exposure analyses, available economic information, and other regulatory revisions (e.g., monitoring and reporting). This document specifically addresses the analytical feasibility element.

Analytical feasibility for an NPDWR is based on the ability of certified laboratories to reliably quantitate regulated contaminants. When EPA promulgates an NPDWR for a chemical contaminant, it identifies a Practical Quantitation Level (PQL) defined as "[t]he lowest level [of analytical quantitation] that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions" (50 *FR* 46902, November 13, 1985b). A PQL represents quantitation capabilities at the time of promulgation. As analytical technologies improve over time, however, there may be potential to reduce a PQL. This analytical feasibility report provides an assessment of whether such improvements provide an opportunity to revise one or more PQLs. Section 2 provides an overview of how EPA derived the current PQLs, which informs the review process.

Under the Protocol, EPA does not review the PQL for every NPDWR. Instead, EPA reviews the potential to revise a PQL downward only when the PQL constrains the regulatory standard for a contaminant, the Maximum Contaminant Level (MCL), or constrains potential reductions to an MCL. Under the SDWA, EPA first establishes a Maximum Contaminant Level Goal (MCLG) based on health risk information [SDWA Section 1412(b)(4)(A)]. Then EPA sets the MCL as close to the MCLG as feasible [SDWA Section 1412(b)(4)(B)]. Analytical feasibility, represented by a PQL, constrains an MCL to a value greater than then MCLG when the PQL is greater than the MCLG. The PQL also has the potential to constrain reductions to an MCL when the SYR of health risk information identifies a potential MCLG value that is less than the current PQL.

There are two categories of contaminants in the analytical feasibility analysis. First are the carcinogens for which a PQL restricts the MCL to be greater than a nonzero MCLG. Second are the contaminants for which there is potential to reduce the MCLG below the current PQL (i.e., EPA's health risk review identified a potential MCLG less than the PQL). For this last category, potential PQL revisions will affect the feasibility of setting the MCL equal to the potential MCLG. **Exhibit 1-2** shows the contaminants in the first category. **Exhibit 1-3** shows the contaminants in the second category. Both exhibits show summary information provided in Section 5 including ranges of method detection limits (MDLs) for approved methods, NPDWR elements (PQL, MCL, and MCLG), and proficiency testing (PT) acceptance criteria.

Exhibit 1-2. Contaminants Included in Analytical Feasibility Analysis for which PQL Limits the MCL

Contaminant	MDL Range (µg/L)	PQL & MCL (µg/L)	MCLG (µg/L)	PT Acceptance Criteria
Benzene	0.01 – 0.04	5	zero	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)
Benzo[a]pyrene	0.016 – 0.23	0.2	zero	Mean ± 2 Standard Deviations (SD)
Carbon tetrachloride	0.008 – 0.21	5	zero	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)
Chlordane	0.0016 – 0.22	2	zero	± 45%
1,2-Dibromo-3-chloropropane (DBCP)	0.006 – 0.26	0.2	zero	± 40%
1,2-Dichloroethane	0.012 – 0.06	5	zero	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)
Dichloromethane	0.01 – 0.18	5	zero	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)
1,2-Dichloropropane	0.01 – 0.088	5	zero	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)
Di(2-ethylhexyl)phthalate (DEHP)	0.46 – 2.25	6	zero	Mean ± 2 SD
Ethylene dibromide	0.001 – 0.032	0.05	zero	± 40%
Heptachlor	0.0015 – 0.15	0.4	zero	± 45%
Heptachlor epoxide	0.0001 – 0.202	0.2	zero	± 45%
Hexachlorobenzene	0.001 – 0.13	1	zero	Mean ± 2 SD
Pentachlorophenol	0.014 – 1.6	1	zero	± 50%
Polychlorinated biphenyls (PCB, as decachlorobiphenyl)	0.08	0.5	zero	0 – 200%
2,3,7,8-Tetra-chlorodibenzo-p-dioxin (2,3,7,8-TCDD)	0.0000044	0.00003	zero	Mean ± 2 SD
Tetrachloroethylene	0.002 – 0.14	5	zero	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)
Thallium	0.02 – 1	2	0.5	± 30% (≥ 2 µg/L)
Toxaphene	0.13 – 1.7	3	zero	± 45%
1,1,2-Trichloroethane	0.01 – 0.1	5	3	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)
Trichloroethylene	0.002 – 0.19	5	zero	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)
Vinyl chloride	0.007 – 0.18	2	zero	± 40%

Exhibit 1-3. Contaminants Included in Analytical Feasibility Analysis for which Lower Potential MCLG is Less than PQL

Contaminant	MDL Range (µg/L)	MCL (µg/L)	PQL (µg/L)	Potential MCLG (µg/L)	Acceptance Criteria
Antimony	0.02 – 3	6	6	2	± 30%
Cadmium	0.03 – 1	5	2	0.7	± 20%
Carbofuran	0.043 – 1.5	40	7	0.3	± 45%
Cyanide	0.5 – 50	200	100	4	± 25%
Endothall	0.7 – 1.79	100	90	40	Mean ± 2 SD
Methoxychlor	0.0025 – 0.96	40	10	0.1	± 45%
Oxamyl	0.044 – 2	200	20	9	Mean ± 2 SD
Styrene	0.01 – 0.11	100	5	zero	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)
1,2,4-Trichlorobenzene	0.013 – 0.2	70	5	zero	± 20% (≥10 µg/L) or ± 40% (<10 µg/L)

The analytical feasibility review for SYR 4 integrates two separate analyses conducted for SYR 2 and SYR 3. It includes the two main sources of new data consulted for the analytical feasibility review, the laboratory PT data and the adoption of improved methods or revision of existing methods since SYR 3 (USEPA, 2016a). It also incorporates the method used in SYR 2 and SYR 3 to develop estimated quantitation levels (EQL) using supplemental analysis of the MDL and contaminant monitoring data (USEPA, 2016c). Section 3 contains additional descriptions of the data sources. Section 4 provides a description of the analysis methods applied to each data type.

2 Background

This section provides background information for several relevant analytical methods topics. The first is the analytical methods requirements under the SDWA. The second is EPA's approach for deriving PQL values. The third is operating details of the laboratory testing and certification program and the PT data available.

2.1 SDWA Requirements for Analytical Methods

A drinking water analytical method is a set of instructions for how to collect, prepare, and analyze a drinking water sample to identify, measure, and report one or more contaminant concentrations. Because these measurements provide evidence of compliance with water quality standards that protect public health, EPA and other agencies develop methods to be reliable and accurate. Consequently, methods also contain quality control criteria. Laboratories that use approved methods to quantitate drinking water must be approved, pass PT requirements, and pass periodic audits.

Analytical methods play multiple roles under the SDWA. First, analytical feasibility is a necessary condition for promulgating an MCL. Section 1401(1)(C)(i) of SDWA (as amended in 1996) states that an MCL is set "if, in the judgment of the Administrator, it is economically and technologically feasible to ascertain the level of such contaminant in water in public water systems."[2] Second, as discussed previously, analytical feasibility can constrain the MCL to a value greater than the MCLG. Third, analytical methods are necessary to ensure compliance with an MCL. According to the SDWA, NPDWRs include "criteria and procedures to assure a supply of drinking water which dependably complies with such maximum contaminant levels; including accepted methods of quality control and testing procedures to ensure compliance with such levels" [Section 1401(1)(D)].

In drinking water regulations, EPA refers to two measures of analytical capability, the MDL and the PQL. These two measures signify different concepts and play different roles, described below.

An MDL is a measure of method sensitivity to the presence/absence of a contaminant. The definition of an MDL is "the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results" (i.e., greater than zero) [40 CFR Part 136 Appendix B]. Thus, the regulatory significance of the MDL is that it is the minimum concentration at which a contaminant that can be reported as being present in a water sample (i.e., at a concentration greater than zero with 99% confidence). MDLs can vary by method, laboratory, and analyst. Because of the potential for day-to-day and run-to-run variability, MDLs may be difficult to reproduce between analysts within a given laboratory or between different laboratories.

[2] If quantitation is either not economically feasible or not technologically feasible, then EPA uses a treatment technique to protect health.

As defined above, a PQL incorporates variability within and between laboratories as well as acceptance criteria. EPA promulgates a PQL as the minimum concentration at which most laboratories can be expected to reliably measure a specific chemical contaminant during day-to-day analyses of drinking water samples. The PQL is a means of integrating information on the performance of the approved analytical methods into the development of a drinking water regulation (52 *FR* 25690, July 8, 1987). The PQL incorporates the following (50 *FR* 46880, November 13, 1985a; 52 *FR* 25690, July 8, 1987; 54 *FR* 22062, May 22, 1989):

- Quantitation;
- Precision and bias;
- Normal operations of a laboratory; and
- The fundamental need to have enough laboratories available to conduct compliance monitoring analyses.

Although the MDL and PQL represent different types of measurement, the following section describes past efforts to use MDL values to calculate a PQL values.

2.2 PQL Determination Methods for the SDWA Contaminants

For regulated contaminants, EPA used two main approaches to estimate PQLs. One approach used data from laboratory Performance Evaluation (PE) studies, now called Proficiency Testing (PT) studies. This is the preferred approach. In the absence of PT data, the second approach was the MDL multiplier method. The following discussion provides overviews of both approaches.

The primary use of the PT data is to operate the laboratory certification program. Laboratories must be certified directly by EPA or states with primacy for each analytical method/analyte combination that they perform to monitor regulated contaminants in drinking water. To maintain certification, laboratories must pass annual PT studies and periodic audits.

The PT studies involve sending reagent-grade water samples having known spiked concentrations to laboratories to quantitate. Laboratories must successfully quantitate or measure the concentrations within acceptance limits using approved analytical methods. The acceptance limits for inorganics range from ± 10 to ± 30% [40 CFR 141.23(k)(3)(ii)] of the spike concentration. The acceptance limits for organics range from ± 20 to ± 50% [40 CFR 141.24(f)(17)(i) and 40 CFR 141.24(h)(19)(i)] or ± 2 SD from the mean in lieu of a fixed percentage.

EPA has used certification program data to develop PQLs when the spike concentrations were in the appropriate concentration range. To derive a PQL from these data, EPA identified the concentration of an analyte at which 75% of the participating laboratories achieved quantitation results within a specified acceptance range around the spike value.

In the absence of these data, the other approach that EPA used was the MDL multiplier method. For this approach, EPA derived a PQL by multiplying an MDL by a factor of five or ten. EPA used this approach during the early years of rule development for NPDWRs when sufficient certification program data were not available. After sufficient data became available, EPA

validated most of the PQLs developed using the MDL multiplier using certification program data.

2.3 Operational Details of the PT Programs

EPA no longer performs PE studies. Beginning in December 1999, a privatized PT program began under the direction of the National Environmental Laboratory Accreditation Conference (NELAC, or now, The NELAC Institute [TNI]). Under TNI's program, the PT providers are private companies that prepare and provide PT samples (spiked at concentrations in accordance with TNI policies) to analytical laboratories as part of maintaining laboratory accreditation. PT providers also compile the results of the PT analyses for use by TNI.

- A laboratory either passes or fails for each analyte based upon the Acceptance Limits (referred to as Acceptance Criteria by TNI). The acceptance criteria adopted by TNI could be percentage based (e.g., 20% of the spiked, or true value);
- SD-based [e.g., mean ± 2 SD]; or
- Based on average and range of replicate analyses (radionuclides only).

2.4 Request for PT Data

EPA contacted Environmental Resource Associates (ERA), a Waters® Company, to find out if they were willing to provide PT data for SYR 4. ERA is the only company that has consistently provided PT data for prior SYR cycles. EPA provided a data request for the following items:

- Analyte name;
- Analytical method used (including EPA-approved methods and other methods);
- Study spiked concentration of PT sample;
- Acceptance range;
- Reported measurement; and
- Pass/fail rates for each study.

EPA only requested basic information needed to derive passing rates; it did not request the identity of any individual laboratory and would not require the disclosure of confidential business information (CBI). ERA provided the information requested for most of the regulated contaminants under review.

3 Data Sources

This section describes the data sources used in the analytical methods review. The first two subsections describe data used in prior review cycles. The third subsection describes supplemental data included in SYR 4.

3.1 MDL Data

The MDL values for approved analytical methods indicate extreme lower bounds for PQL values and in some cases PQL values are based on MDL multipliers. The MDL data are based on the approved methods available at the time of promulgation and subsequent method approvals. As new methods become available and EPA approves those methods for use to quantitate drinking water contaminants, their associated MDL values may be lower than the MDL values for prior approved methods. This kind of trend can indicate potential for a lower PQL.

EPA compiled MDL values for older and newer methods to evaluate changes over time. The MDL values and related detection values come from the approved analytical methods. EPA approved new methods for some of the regulated contaminants in this analytical feasibility study through expedited approvals of alternative test procedures for drinking water contaminants. Where applicable, the contaminant-specific sections below include newly approved methods.

Finally, EPA reviewed analytical method documents for newer methods that include supplemental information for detection and/or quantitation limits. For example, these sources include the documentation for EPA Methods 524.3 and 524.4, which provide several quantitation parameters for multiple volatile organic compounds (VOCs).

3.2 PT Data

The PT data come from recurring studies of laboratory analytical capabilities. As of October 2020, there were seven TNI-accredited companies that provide PT services (TNI, 2020). One of these PT providers, ERA, agreed to provide pass/fail rate data to EPA. **Exhibit 3-1** summarizes the availability of PT data across all four SYR cycles. The entries also report whether data is available at or below the PQL for each analyte. Data available below the PQL provide information about the potential for a lower PQL. During SYR 1 and SYR 2, EPA did not prioritize contaminants for PQL reviews and, therefore, evaluated PQL data for 68 analytes. During SYR 3, EPA obtained PQL data for 24 priority analytes and conducted PT Data Analysis for 16 analytes. During SYR 4, EPA received data for 22 analytes.

Exhibit 3-1. Availability of PE and PT Data by SYR Cycle

Analyte	CASRN	SYR 1 1996-2000	SYR 2 2000-2007	SYR 3 2008-2014	SYR 4 2015-2021
Alachlor	15972-60-8	Data ≤ PQL	No data ≤ PQL	--	--
Antimony	7440-36-0	Data < PQL[a]	No data < PQL	--	na
Arsenic	7440-38-2	Data < PQL[a]	No data < PQL	--	--
Atrazine	1912-24-9	Data ≤ PQL[a]	No data ≤ PQL	--	--
Barium	7440-39-3	Data ≤ PQL[a]	No data ≤ PQL	--	--
Benzene	71-43-2	Data ≤ PQL	Data ≤ PQL	--	Data ≤ PQL
Benzo[a]pyrene	50-32-8	No data ≤ PQL	No data ≤ PQL	Yes[c]	No data
Beryllium	7440-41-7	Data ≤ PQL	No data ≤ PQL	--	--
Bromate	15541-45-4	Data ≤ PQL	Data ≤ PQL	--	--
Cadmium	7440-43-9	No data ≤ PQL	No data ≤ PQL	--	na
Carbofuran	1563-66-2	Data ≤ PQL	No data ≤ PQL	No data ≤ PQL	No data ≤ PQL
Carbon tetrachloride	56-23-5	Data ≤ PQL	Data ≤ PQL	--	Data ≤ PQL
Chlordane	57-74-9	Data ≤ PQL	No data ≤ PQL	No data ≤ PQL	No data
Chlorite	7758-19-2	No PQL	No PQL	--	--
Chromium (total)	7440-47-3	No data ≤ PQL	No data ≤ PQL	--	--
Copper	7440-50-8	Data ≤ PQL[a]	No data ≤ PQL	--	--
Cyanide (as free cyanide)	57-12-5	No data < PQL	No data ≤ PQL	No data ≤ PQL	No data ≤ PQL
Dalapon	75-99-0	Data ≤ PQL[b]	No data ≤ PQL	--	--
DBCP	96-12-8	Data ≤ PQL	Data ≤PQL	No data ≤ PQL	No data
1,2-Dichlorobenzene	95-50-1	No data < PQL	No data ≤ PQL	--	--
1,4-Dichlorobenzene	106-46-7	Data ≤ PQL	Data ≤ PQL	--	--
1,2-Dichloroethane	107-06-2	Data ≤ PQL[a]	Data ≤ PQL	--	Data ≤ PQL
1,1-Dichloroethylene	75-35-4	No data ≤ PQL	Data ≤ PQL	--	--
cis-1,2-Dichloroethylene	156-59-2	No data ≤ PQL	Data ≤ PQL	Data ≤ PQL	--
trans-1,2-Dichloroethylene	156-60-5	No data ≤ PQL	Data ≤ PQL	Yes[c]	--
Dichloromethane	75-09-2	No data ≤ PQL	No data ≤ PQL	--	Data ≤ PQL
2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	Data ≤ PQL	No data ≤ PQL	--	--
1,2-Dichloropropane	78-87-5	No data ≤ PQL	Data ≤ PQL	--	Data ≤ PQL
Di(2-ethylhexyl)adipate	103-23-1	Data ≤ PQL[b]	No data ≤ PQL	--	--
DEHP	117-81-7	Data ≤ PQL	No data ≤ PQL	Yes[c]	Data ≤ PQL
Dinoseb	88-85-7	No data ≤ PQL	No data ≤ PQL	--	--
Diquat	85-00-7	No data ≤ PQL	No data ≤ PQL	--	--
Endothall	145-73-3	Data ≤ PQL[b]	No data ≤ PQL	Yes[c]	No data ≤ PQL
Endrin	72-20-8	No data ≤ PQL[a]	No data ≤ PQL	--	--
Ethylbenzene	100-41-4	No data ≤ PQL	Data ≤ PQL	--	--
Ethylene dibromide	106-93-4	No data ≤ PQL	No data ≤ PQL	Yes[c]	No data
Fluoride	16984-48-8	Data ≤ PQL	No data ≤ PQL	--	--
Glyphosate	1071-83-6	No data ≤ PQL	No data ≤ PQL	--	--
Heptachlor	76-44-8	Data ≤ PQL	No data ≤ PQL	Data ≤ PQL	Data ≤ PQL
Heptachlor epoxide	1024-57-3	Data ≤ PQL	No data ≤ PQL	No data ≤ PQL	No data
Hexachlorobenzene	118-74-1	Data ≤ PQL	Data ≤ PQL	Yes[c]	Data ≤ PQL
Hexachlorocyclopentadiene	77-47-4	Data ≤ PQL	No data ≤ PQL	Data ≤ PQL	--
Lead	7439-92-1	Data ≤ PQL[a]	No data ≤ PQL	--	--

Analyte	CASRN	SYR 1 1996-2000	SYR 2 2000-2007	SYR 3 2008-2014	SYR 4 2015-2021
Lindane	58-89-9	Data ≤ PQL[a]	No data ≤ PQL	--	--
Mercury (Inorganic)	7439-97-6	No data ≤ PQL	No data ≤ PQL	--	--
Methoxychlor	72-43-5	Data ≤ PQL	No data ≤ PQL	--	Data ≤ PQL
Monochlorobenzene	108-90-7	No data ≤ PQL	Data ≤ PQL	--	--
Nitrate (as Nitrogen [N])	14797-55-8	No data ≤ PQL	No data ≤ PQL	--	--
Nitrite (as N)	14797-65-0	Data ≤ PQL	No data ≤ PQL	--	--
Oxamyl	23135-22-0	Data ≤ PQL	No data ≤ PQL	Data ≤ PQL	--
Pentachlorophenol	87-86-5	Data ≤ PQL	No data ≤ PQL	No data ≤ PQL	No data ≤ PQL
Picloram	1918-02-1	No data ≤ PQL	No data ≤ PQL	--	--
PCBs (as decachlorobiphenyl)	1336-36-3	Data ≤ PQL	No data ≤ PQL	Yes[c]	na
Selenium	7782-49-2	Data ≤ PQL[a]	No data ≤ PQL	No data ≤ PQL	--
Simazine	122-34-9	Data ≤ PQL[b]	No data ≤ PQL	--	--
Styrene	100-42-5	No data ≤ PQL	Data ≤ PQL	--	Data ≤ PQL
2,3,7,8-TCDD	1746-01-6	--	No data ≤ PQL	No data ≤ PQL	Data ≤ PQL
Tetrachloroethylene	127-18-4	No data ≤ PQL	Data ≤ PQL	--	Data ≤ PQL
Thallium	7440-28-0	Data ≤ PQL	No data ≤ PQL	No data ≤ PQL	No data ≤ PQL
Toluene	108-88-3	No data ≤ PQL	Data ≤ PQL	Data ≤ PQL	--
Toxaphene	8001-35-2	Data ≤ PQL	No data ≤ PQL	Data ≤ PQL	Data ≤ PQL
2,4,5-Trichlorophenoxy-propionic Acid	93-72-1	Data ≤ PQL[a]	No data ≤ PQL	--	--
1,2,4-Trichlorobenzene	120-82-1	No data ≤ PQL	Data ≤ PQL	--	na
1,1,1-Trichloroethane	71-55-6	Data ≤ PQL	Data ≤ PQL	--	--
1,1,2-Trichloroethane	79-00-5	No data ≤ PQL	Data ≤ PQL	Yes[c]	Data ≤ PQL
Trichloroethylene	79-01-6	No data ≤ PQL	Data ≤ PQL	--	Data ≤ PQL
Vinyl chloride	75-01-4	No data ≤ PQL	Data ≤ PQL	--	No data ≤ PQL
Xylenes (total)	1330-20-7	No data ≤ PQL	Data ≤ PQL	No data ≤ PQL	--

Source for prior SYR information: USEPA (2016a)

Notes:

-- = excluded from analytical methods review.

na = not available, analyte not included in data request.

a. The passing rates for SYR 1 data were calculated, and acceptance criteria are percentage-based, not ± 2 SD.

b. Passing rates for SYR 1 data at or below the PQL could not be calculated as these analytes were not evaluated, acceptance criteria are ± 2 SD, and available regression coefficients are not valid at or below the PQL.

c. EPA performed initial data evaluation but did not finalize the PT Data Analysis because of low priority.

The PQL assessments are based primarily on the available PT data. EPA does not know whether the limited number of providers introduces bias (e.g., provide PT testing services for laboratories that are more or less likely to quantitate within acceptance ranges). Because the pass/fail rates of the available data are reported anonymously, it is not known how many labs or locations are represented or whether failure rates tend to be influenced by certain labs. **Exhibit 3-2** provides the summary statistics of the data.

Exhibit 3-2. Summary Statistics for PT Data Provided

Analyte	No. of Samples	No. of Studies	Range of No. Participating Laboratories	Average No. Participating Laboratories per Study	No. of Studies ≤ 10 Participating Laboratories
Benzene	3,215	96	3 – 118	33	14
Carbofuran	835	92	1 – 28	28	55
Carbon tetrachloride	3,080	96	3 – 119	32	15
Cyanide	260	26	1 – 42	10	20
1,2-Dichloroethane	3,015	96	3 – 118	31	15
Dichloromethane	2,967	96	3 – 118	31	19
1,2-Dichloropropane	2,868	96	2 – 118	30	21
DEHP	1,096	96	1 – 37	11	56
Endothall	480	86	1 – 23	6	74
Heptachlor	1,379	93	1 – 48	15	46
Hexachlorobenzene	1,310	94	1 – 42	14	49
Methoxychlor	1,279	92	1 – 47	14	49
Pentachlorophenol	1,003	91	1 – 38	11	48
Styrene	3,000	96	3 – 118	31	16
2,3,7,8-TCDD	368	32	5 – 18	12	14
Tetrachloroethylene	3,139	96	3 – 117	33	15
Thallium	4,826	96	3 – 140	50	7
Toxaphene	905	90	1 – 35	10	54
1,1,2-Trichloroethane	2,888	96	2 – 117	30	19
Trichloroethylene	3,100	96	3 – 118	32	15
Vinyl chloride	2,920	96	3 – 117	30	21

3.3 Compliance Monitoring Data

During SYR 2 and SYR 3, EPA performed supplemental analyses beyond the PQL assessment to identify an EQL (USEPA, 2009b, 2016c). A key data source in both cycles was the compliance monitoring data collected as part of the periodic review process. These data, voluntarily delivered by states in response to an Information Collection Request (ICR), provide quantitation measurements and threshold values reported by laboratories. Because one outcome of the PQL assessment is one or more thresholds below the current MCL to use for the SYR occurrence analysis, the monitoring data input for the EQL analysis ensures meaningful occurrence and exposure estimates.

In the past cycles, PT passing rates were generally not available for values less than the PQL, the PT data were insufficient to estimate how far below the PQL quantitation might be feasible. Therefore, EPA relied on two alternate approaches to estimate EQLs: an approach based on the minimum reporting levels (MRLs) in the ICR data, and an approach based on MDL values.

An MRL is the lowest level or analyte concentration that a laboratory reports it can reliably achieve within specified limits of precision and accuracy under routine laboratory operating conditions using a given method (USEPA, 2016a). The MRL values provide direct evidence from actual monitoring results about whether quantitation below the PQL using current analytical methods is feasible.

The ICR database for SYR 4 contains compliance monitoring data for 2012 through 2019. USEPA (2024a) provides a description of the data collection, data management, and quality assurance methods the Agency used to establish a high quality, national contaminant occurrence database consisting of data from 46 states plus Washington, D.C., American Samoa, and many other primacy entities such as Tribes. This database contains results for several million drinking water compliance monitoring samples.

This ICR database also contains a substantial number of MRL values. When compliance monitoring data are recorded, laboratories should report "<MRL" (i.e., less than the MRL) along with a numeric MRL value when a contaminant concentration is not measured at a level greater than the MRL. Because of inconsistencies in data entry or reporting across laboratories or states, EPA performed a variety of data quality checks and data transformations on the MRL data in consultation with state data management staff. USEPA (2024a) describes the data management process, including measures taken to address data quality concerns that affect the occurrence and exposure analysis.

The MRL values provide EPA with valuable insight into actual analytical capabilities across laboratories and States. MRLs can vary across laboratories because of differences in the analytical method used as well as differences in instrumentation, implementation, and reporting. By examining the distribution of MRL values for a contaminant, EPA can identify whether laboratory performance is relatively uniform (e.g., most MRLs are the same) or highly variable (e.g., MRLs that vary by one or more orders of magnitude). Distribution information such as the mode or most frequently occurring value is a potential candidate for EQL when a substantial share of the MRL values for a contaminant equal the modal MRL.

4 Fourth SYR Cycle Assessment Methodology

The following sections describe the analysis methods for the PQL assessment and the EQL assessment.

4.1 PQL Data Assessment

EPA used two different approaches to assess improvements in laboratory analytical performance over time: 1) comparing information of the analytical methods available for compliance monitoring at the time of promulgation to those available currently, and 2) evaluating data from the laboratory accreditation studies performed as part of the drinking water laboratory certification program (the PT data). For analytes with no new methods, analytical performance was measured solely by PT data. A passing rate of 75% is the threshold for evaluation of the results of the PQL assessment. For analytes with new methods, analytical performance was measured by PT data, but may be supported by lower DLs for new methods. The existence of new methods with lower DLs may not directly translate to improved analytical performance, however. It is possible that only a small number of laboratories will use a new method, or it may take time for the method to be utilized to its full effectiveness.

For each analyte, EPA compared MDLs from EPA-approved methods to determine if MDLs have declined over time. Note that MDLs from approved proprietary methods (i.e., analytical methods not developed by EPA) are included in the MDL comparison even though use may be infrequent. Because the PT data provider also provided method information, EPA estimated the frequency of approved method use.

The PT data analysis is a chart showing passing rates for each spiked concentration, the PQL, and a 75% passing rate. Based on the chart data, EPA provides a qualitative recommendation drawn by presenting a recommendation of whether a PQL might be reduced.

4.2 EQL Data Assessment

An EQL is a contaminant concentration less than a PQL that available data indicate is a feasible, policy-relevant threshold for occurrence analysis. EPA derived the EQL values using the types of data used to derive PQLs such as laboratory performance and MDL values. EPA used two sources of information:

- MRL values in the SYR 4 ICR occurrence database; and
- MDL values for EPA-approved analytical methods.

First, EPA evaluated the MRL data using the analysis method developed for SYR 2 (USEPA, 2009b). The Agency identified the mode and estimated the percentage of MRL values less than or equal to the mode. When 80% or more of the MRL values were less than or equal to the mode, it was a candidate EQL value provided it was less than the PQL.

If the modal MRL was not an EQL candidate, then EPA reviewed the MDL data to determine the feasibility of deriving an EQL equal to 10 × MDL. When MDL ranges are available for a method, EPA used the higher value. In some instances, there were multiple MDL values. EPA

based the EQL on the highest MDL value that was less than the PQL. If the available data did not support an EQL less than the PQL, then EPA did not develop an EQL. If the data supported an EQL value that was less than a potential MCLG, then EPA noted this and used the potential MCLG as the threshold for the occurrence analysis.

5 Results of PQL and EQL Assessments

The results for the regulated analytes are in two sections, one for each of the two contaminant groups shown in Section 1. Each contaminant summary includes both parts of the PQL assessment (methods comparison and PT data analysis) and both parts of the EQL assessment (MRL data and MDL multiplier) along with assessment summaries. The analytical method acronyms listed in each methods comparison section include the following:

- Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry (AVICP-AES)
- Capillary Column Gas Chromatography/Mass Spectrometry (CCGC/MS)
- Direct Aqueous Injection High Performance Liquid Chromatography with Post Column Derivatization (DAI/HPLC)
- Drinking Water (DW)
- Gas Chromatography with Electrolytic Conductivity Detectors (GC/ECD)
- Gas Chromatography/Mass Spectrometry (GC/MS)
- High Performance Liquid Chromatography with a Photodiode Array Ultraviolet Detector (HPLC/UVD)
- High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS)
- Inductively Coupled Plasma with Mass Spectrometry (ICP/MS)
- Ion Exchange Extraction, Acidic Methanol Methylation and Gas Chromatography/Mass Spectrometry (IEE and GC/MS)
- Liquid-Liquid Extraction, Derivatization, and Gas Chromatography with an Electrolytic Conductivity Detector (LLE and GC/ECD)
- Liquid-Liquid Extraction and High Performance Liquid Chromatography with Coupled Ultraviolet and Fluorescence Detection (LLE and HPLC/CUV/FD)
- Liquid-Liquid Extraction or Liquid-Solid Extraction and Gas Chromatography with Photoionization Detection (LLE or LSE and GC/PID)
- Liquid-Liquid Microextraction, Derivatization, and fast Gas Chromatography with Electrolytic Conductivity Detection (LLME and GC/ECD)
- Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (LSE and CCGC/MS)
- Liquid-Solid Extraction and Gas Chromatography with an Electrolytic Conductivity Detector (LSE and GC/ECD)
- Liquid-Solid Extraction and Electron Capture Gas Chromatography (LSE and ECGC)
- Liquid-Solid Extraction and High Performance Liquid Chromatography with Coupled Ultraviolet and Fluorescence Detection (LSE and HPLC/CUV/FD)
- Microextraction and Gas Chromatography (ME and GC)
- Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (SPE and CCGC/MS)
- OI Analytical (OIA)
- Standard Methods (SM)

5.1 Contaminants for which PQL Limits the MCL

5.1.1 Benzene

5.1.1.1 Results of the Method Comparison

Exhibit 5-1 summarizes the MDLs for benzene as documented in EPA-approved analytical methods. EPA approved two new analytical methods for benzene since NPDWR promulgation: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The full scan mode sub-method MDLs for EPA Method 524.3 and EPA Method 524.4 and the single ion monitoring (SIM) mode MDL for EPA 524.4 fall within the range of other approved methods for benzene. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-1. Analytical Methods for Benzene

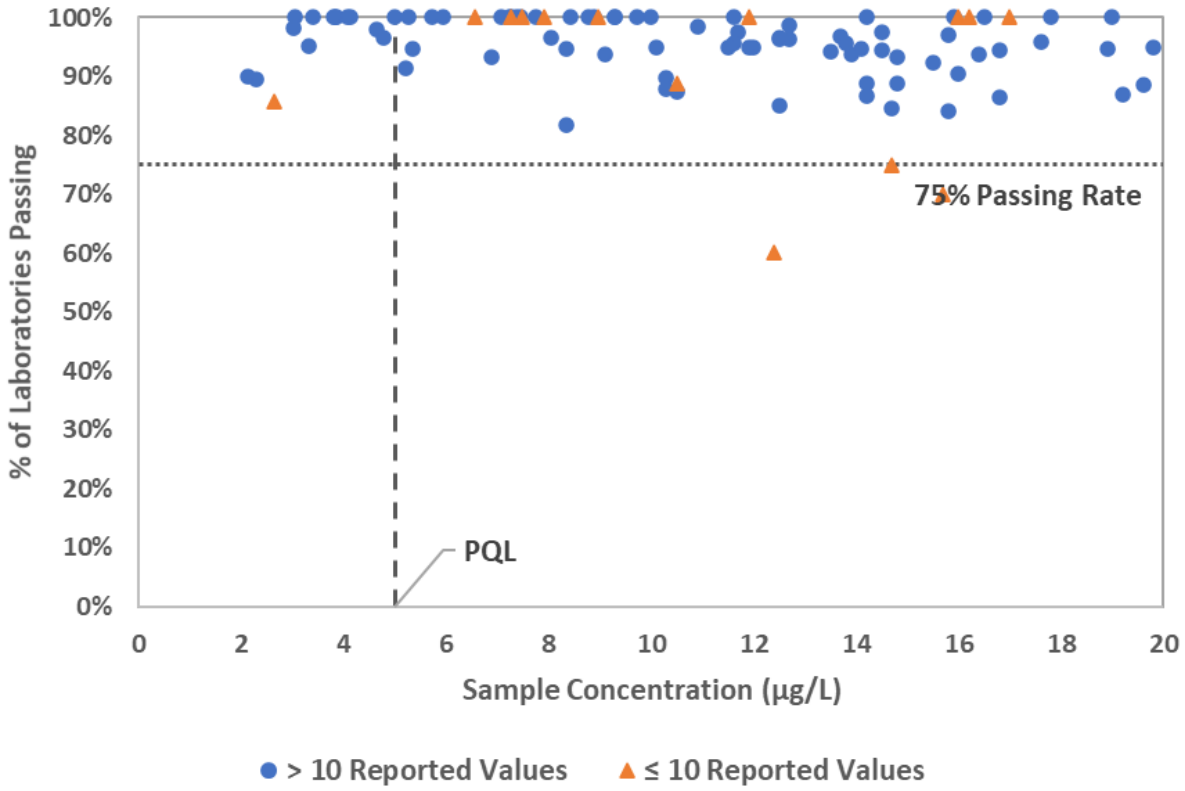
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.01	1.9%
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.03 – 0.04	80.6%
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.017 SIM mode: not given	7.0%
EPA 524.4* (USEPA, 2013)	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.028 SIM mode: 0.012	0.5%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 5 µg/L (0.005 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (52 *FR* 25690, July 8, 1987)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.1.1.2 Results of the PT Data Analysis

The chart in **Exhibit 5-2** shows the PT study passing rates at various concentrations along with the current PQL of 5 µg/L. The data reflect the methods listed above as well as other methods. There were 15 studies conducted for concentrations below the current PQL, all of which resulted in passing rates greater than 75%. The two studies with passing rates less than 75% for concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-2. Evaluation of PT Data for Benzene



Acceptance Criteria = ±20% (≥10 µg/L) or ±40% (<10 µg/L) [40 CFR 141.24(f)(17)(i)]

5.1.1.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is two orders of magnitude less than PQL. This usage pattern suggests widespread capability to quantitate below the PQL. The PT data further demonstrate laboratory capability to quantitate below the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.1.1.4 Results of the MRL Analysis

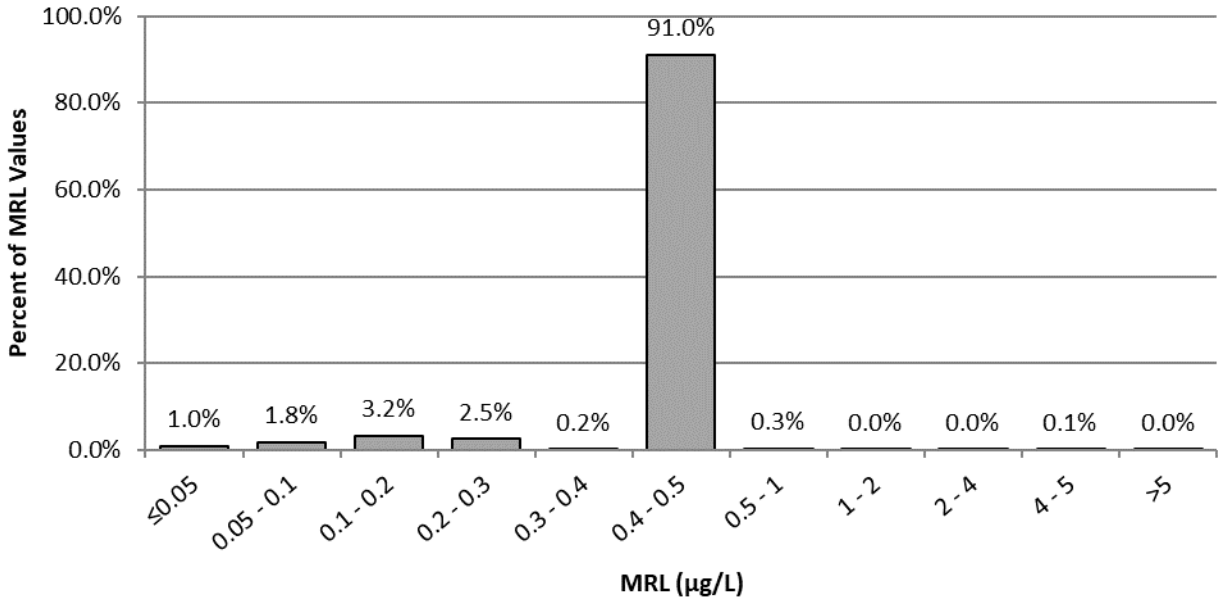
As shown in **Exhibit 5-3**, the modal MRL for benzene is 0.5 µg/L. Summary data show that 90.8% of the MRLs are equal to this value and 99.6% are equal to or less than it. **Exhibit 5-4** shows that the range including the mode dominates the probability distribution. Almost all the MRL values are below the PQL of 5 µg/L. Like the PT data, the MRL data indicate potential to lower the PQL. The percentage of the MRL values that are less than or equal to the mode exceeds the 80% threshold to use the mode as an EQL. Therefore, EPA based the EQL on the modal MRL.

Exhibit 5-3. Summary of MRL Data for Benzene

MRL Value Category	Number of Records	Percentage of Records
All	424,678	100%
Less than mode	37,428	8.8%
Equal to mode (0.5 µg/L)	385,685	90.8%
Greater than mode	1,565	0.4%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-4. MRL Distribution for Benzene



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.1.5 Results of MDL Multiplier Analysis

Exhibit 5-5 shows EPA's approved methods for the detection of benzene, and corresponding MDLs or upper bound values of MDL ranges. Multiplying the MDLs by 10 results in a possible EQL range from 0.1 to 0.4 µg/L. This range of values is more than an order of magnitude below the PQL. Thus, the MDL data support an EQL below the PQL.

Exhibit 5-5. MDL Multiplier Values for Benzene

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.01	0.1
EPA 524.2	0.04	0.4
EPA 524.3	0.017	0.17
EPA 524.4	Full scan mode: 0.028 SIM mode: 0.012	Full scan mode: 0.28 SIM mode: 0.12

5.1.1.6 EQL Assessment Recommendation

The MRL data support an EQL value equal to the mode of 0.5 µg/L. The MDL multiplier analysis further supports EPA selecting an EQL an order of magnitude less than the current PQL.

5.1.2 Benzo[a]pyrene

5.1.2.1 Results of the Method Comparison

Exhibit 5-6 summarizes the MDLs for benzo[a]pyrene as documented in EPA-developed analytical methods. EPA approved two updated analytical methods for the analysis of benzo[a]pyrene in drinking water since promulgation. The MDL ranges are comparable to the original methods, indicating no clear potential for PQL reduction.

Exhibit 5-6. Analytical Methods for Benzo[a]pyrene

Approved Method	Technique	MDL (µg/L)
EPA 550 (USEPA, 1990a)	LLE and HPLC/CUV/FD	0.029
EPA 550.1 (USEPA, 1990b)	LSE and HPLC/CUV/FD	0.016
EPA 525.2* (USEPA, 1995j)	LSE and CCGC/MS	0.032 – 0.23
EPA 525.3* (USEPA, 2012)	SPE and CCGC/MS	Full scan mode: 0.035 – 0.043 SIM mode: 0.0069 – 0.023

Notes:
* New approved analytical method since promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 0.2 µg/L (0.0002 mg/L in 40 CFR 141.61)
Current PQL = 0.2 µg/L (57 *FR* 31776, July 17, 1992)
DL = 0.02 µg/L [40 CFR 141.24(h)(18)]

5.1.2.2 Results of the PT Data Analysis

EPA did not receive PT data for benzo[a]pyrene during the current review cycle. PT data provided for prior review cycles did not include studies conducted at concentrations less than the PQL (USEPA, 2003a, 2009a). Thus, PT data are not sufficient to indicate potential for a lower PQL.

5.1.2.3 PQL Assessment Recommendations

The MDL ranges for newer methods do not indicate potential to reduce the PQL. There are no recent PT data demonstrating potential to reduce the PQL and data available during prior review cycles were insufficient. Therefore, the PQL assessment does not indicate potential to reduce the PQL.

5.1.2.4 Results of the MRL Analysis

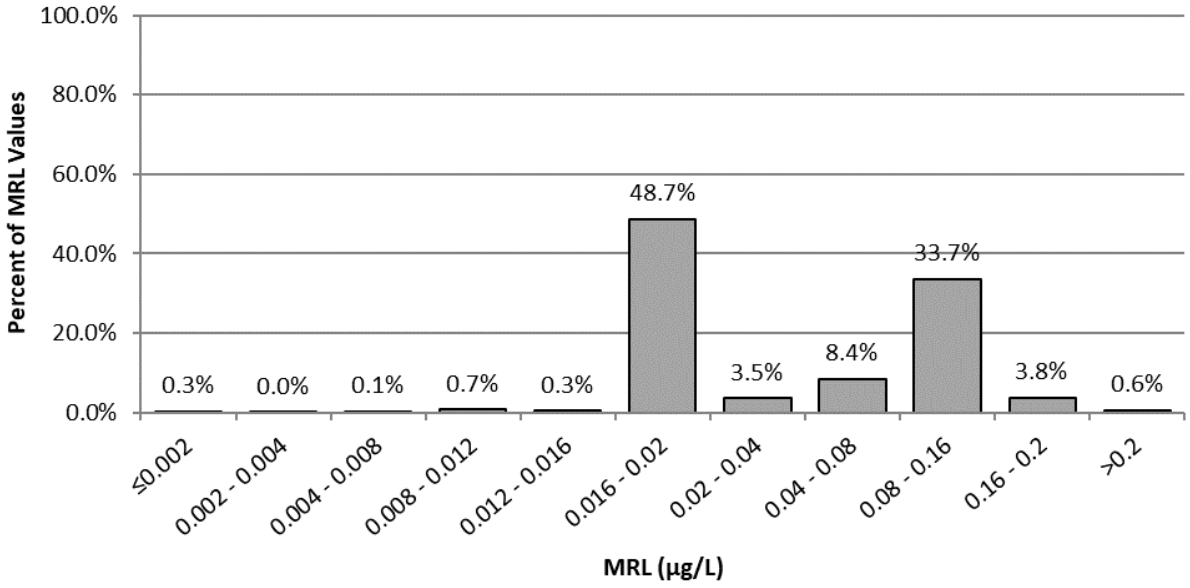
As shown in **Exhibit 5-7**, the modal MRL for benzo[a]pyrene is 0.02 µg/L. Summary data show that 47.1% of the MRLs are equal to this value and 50.2% are equal to or less than it. **Exhibit 5-8** shows that almost half of the MRL values are between the mode and the PQL of 0.2 µg/L. The MRL data indicate that there may be potential to lower the PQL because over 99% of the MRL values are less than the PQL. The percentage of the MRL values that are less than or equal to the mode does not meet the 80% threshold, however. Therefore, EPA did not base the EQL on the modal MRL. Consequently, EPA reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-7. Summary of MRL Data for Benzo[a]pyrene

MRL Value Category	Number of Records	Percentage of Records
All	149,713	100%
Less than mode	4,580	3.1%
Equal to mode (0.02 µg/L)	70,452	47.1%
Greater than mode	74,681	49.9%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-8. MRL Distribution for Benzo[a]pyrene



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.2.5 Results of MDL Multiplier Analysis

Exhibit 5-9 shows EPA's approved methods for the detection of benzo[a]pyrene, and corresponding MDLs or upper bound values of MDL ranges. Multiplying the MDLs by 10 results in a possible EQL range from 0.16 to 2.3 µg/L. The lower bound of this range rounds to 0.2 µg/L, which is the PQL. Thus, the MDL data do not support an EQL below the PQL.

Exhibit 5-9. MDL Multiplier Values for Benzo[a]pyrene

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 550	0.029	0.29
EPA 550.1	0.016	0.16
EPA 525.2	0.23	2.3
EPA 525.3	Full scan mode: 0.043 SIM mode: 0.023	Full scan mode: 0.43 SIM mode: 0.23

5.1.2.6 EQL Assessment Recommendation

EPA concluded that although MRL values are generally below the PQL, the lack of PT and the MDL values do not support revision of the PQL for benzo[a]pyrene. Therefore, EPA did not develop an EQL.

5.1.3 Carbon Tetrachloride

5.1.3.1 Results of the Method Comparison

Exhibit 5-10 summarizes the MDLs for carbon tetrachloride as documented in EPA-approved analytical methods. EPA approved three analytical methods for carbon tetrachloride since NPDWR promulgation. Two are more recent: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The full scan mode sub-method MDLs for EPA Method 524.3 and EPA Method 524.4 are like other approved methods. The MDL for the SIM mode sub-method MDL of EPA Method 524.4 for carbon tetrachloride is lower. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-10. Analytical Methods for Carbon Tetrachloride

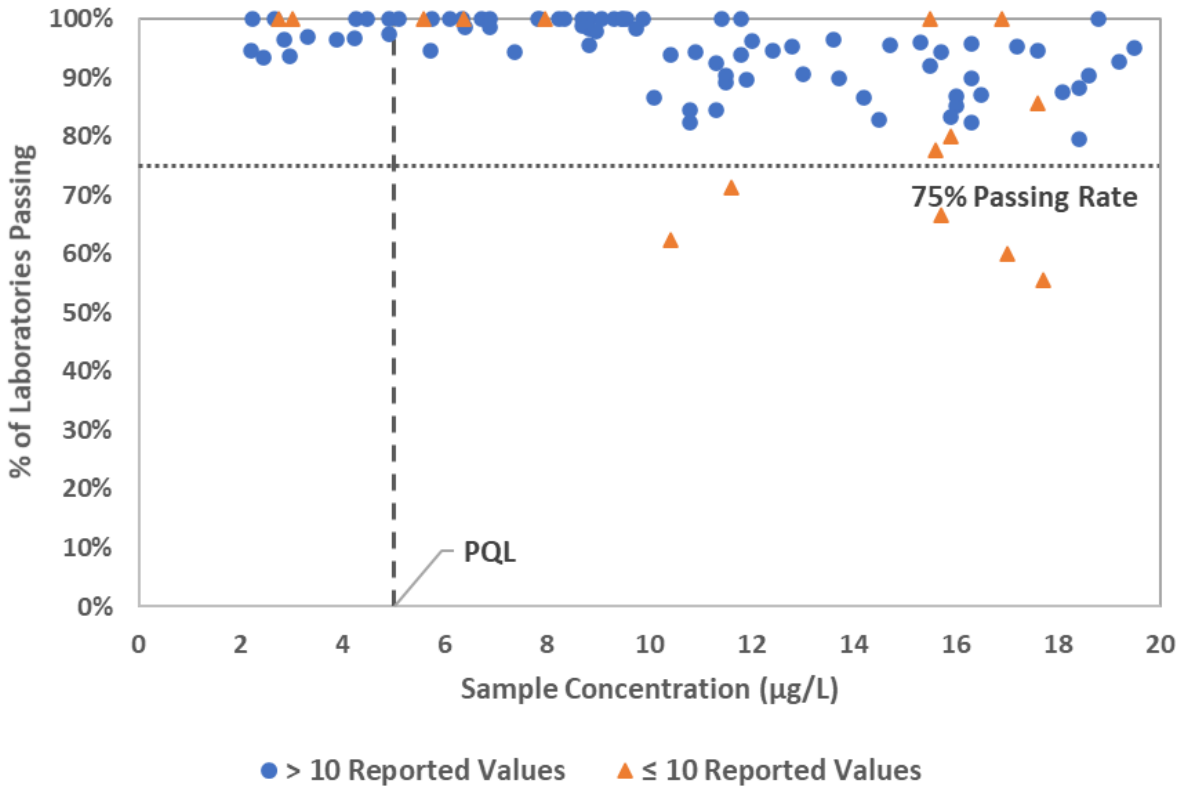
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.01 – 0.02	1.8%
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.08 – 0.21	81.1%
EPA 551.1* (USEPA, 1995l)	LLE and GC/ECD	0.002 – 0.05	0%
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.044 SIM mode: not given	7.0%
EPA 524.4* (USEPA, 2013)	GCMS using Nitrogen Purge Gas	Full scan mode: 0.073 SIM mode: 0.008	0.5%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 5 µg/L (0.005 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (52 *FR* 25690, July 8, 1987)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.1.3.2 Results of the PT Data Analysis

The chart in **Exhibit 5-11** shows the PT study passing rates at various spike concentrations along with the current PQL of 5 µg/L data. The data reflect the EPA Methods listed above as well as others. There were 15 studies for concentrations below the current PQL. The passing rates for these studies exceeded 75%. The five studies with passing rates less than 75% are studies that included ten or fewer laboratories.

Exhibit 5-11. Evaluation of PT Data for Carbon Tetrachloride



Acceptance Criteria = ±20% (≥10 µg/L) or ±40% (<10 µg/L) [40 CFR 141.24(f)(17)(i)]

5.1.3.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is two orders of magnitude less than PQL. This usage pattern suggests widespread capability to quantitate below the PQL. The PT data further demonstrate laboratory capability to quantitate below the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.1.3.4 Results of the MRL Analysis

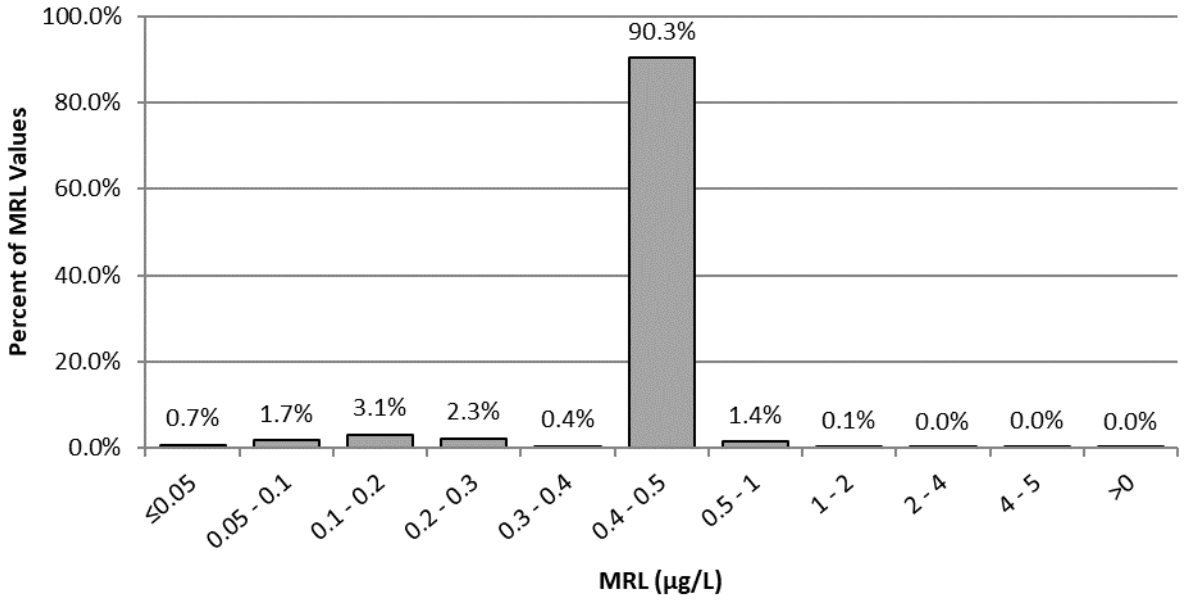
As shown in **Exhibit 5-12**, the modal MRL for carbon tetrachloride is 0.5 µg/L. Summary data show that 90.2% of the MRLs are equal to this value and 98.5% are equal to or less than it. **Exhibit 5-13** shows that the range including the mode dominates the probability distribution. Like the PT data, the MRL data indicate potential to lower the PQL. Almost all the MRL values are below the PQL of 5 µg/L. The percentage of the MRL values that are less than or equal to the mode exceeds the 80% threshold to use the mode as an EQL. Therefore, EPA based the EQL on the modal MRL.

Exhibit 5-12. Summary of MRL Data for Carbon Tetrachloride

MRL Value Category	Number of Records	Percentage of Records
All	447,499	100%
Less than mode	37,186	8.3%
Equal to mode (0.5 µg/L)	403,452	90.2%
Greater than mode	6,861	1.5%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-13. MRL Distribution for Carbon Tetrachloride



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.3.5 Results of MDL Multiplier Analysis

Exhibit 5-14 shows EPA's approved methods for the detection of carbon tetrachloride, and corresponding MDLs or upper bound values of MDL ranges. Multiplying the MDLs by 10 results in a possible EQL range from 0.08 to 2.1 µg/L. Although the range of values is less than the PQL, the upper bound is greater than the MRL mode. The MDL multiplier range upper bound for method EPA 524.2 is 2.1 µg/L, which was the most reported method in the PT data. Nevertheless, the MDL data support an EQL below the PQL.

Exhibit 5-14. MDL Multiplier Values for Carbon Tetrachloride

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.02	0.2
EPA 524.2	0.21	2.1
EPA 551.1	0.05	0.05
EPA 524.3	Full scan mode: 0.044	0.44
EPA 524.4	Full scan mode: 0.073 SIM mode: 0.008	0.73 0.08

5.1.3.6 EQL Assessment Recommendation

The MRL data support an EQL value equal to the mode of 0.5 µg/L. The MDL multiplier analysis supports an EQL less than the PQL, but the upper bound of the range is greater than the MRL mode. Nevertheless, EPA selected the MRL mode as an EQL given the overwhelming evidence in the monitoring results that laboratories can quantitate the contaminant above 0.5 µg/L.

5.1.4 Chlordane

5.1.4.1 Results of the Method Comparison

Exhibit 5-15 summarizes the MDLs for chlordane as documented in EPA-approved analytical methods. EPA has approved three methods since NPDWR promulgation but has not approved updated or new analytical methods for the analysis of chlordane in drinking water samples since SYR 3. The MDL ranges for the methods approved since promulgation are comparable to the original methods, indicating no clear potential for PQL reduction.

Exhibit 5-15. Analytical Methods for Chlordane

Method	Technique	MDL (µg/L)
EPA 505 (USEPA, 1995c)	ME and GC	0.14
EPA 508 (USEPA, 1995e)	GC/ECD	0.0016 – 0.0041a
EPA 508.1* (USEPA, 1995f)	LSE and ECGC	0.001 – 0.004a
EPA 525.2* (USEPA, 1995j)	LSE and CCGC/MS	0.05 – 0.22b
EPA 525.3* (USEPA, 2012)	SPE and CCGC/MS	Full scan mode: 0.0094 – 0.1a SIM mode: 0.0016 – 0.0028a

Notes:
* New approved analytical method since promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
a. MDL range for chlordane includes α-chlordane and γ-chlordane.
b. MDL range for chlordane includes α-chlordane, γ-chlordane and trans-nonachlor.
MCL = 2 µg/L (0.002 mg/L in 40 CFR 141.61)
Current PQL = 2 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.2 µg/L [40 CFR 141.24(h)(18)]

5.1.4.2 Results of the PT Data Analysis

EPA did not receive PT data for chlordane during the current review cycle. PT data provided for SYR 3 did not include studies conducted at concentrations less than the PQL (USEPA, 2016a); data provided for prior cycles included studies with passing rates greater than 75% at concentrations less than the PQL (USEPA, 2003a, 2009a). Thus, older PT data indicate some potential for a lower PQL.

5.1.4.3 PQL Assessment Recommendation

The MDL ranges for methods approved since promulgation do not indicate potential to reduce the PQL. There are no recent PT data demonstrating potential to reduce the PQL, although prior review cycles included data with high passing rates at concentrations less than the PQL. Therefore, the PQL assessment indicates uncertain potential to reduce the PQL.

5.1.4.4 Results of the MRL Analysis

As shown in **Exhibit 5-16**, the modal MRL for chlordane is 0.2 µg/L. Approximately 77.8% of the MRL values are equal to or less than the modal value. Thus, the percentage of the MRL values that are less than or equal to the mode does not meet the 80% threshold. Therefore, EPA did not base the EQL on the modal MRL.

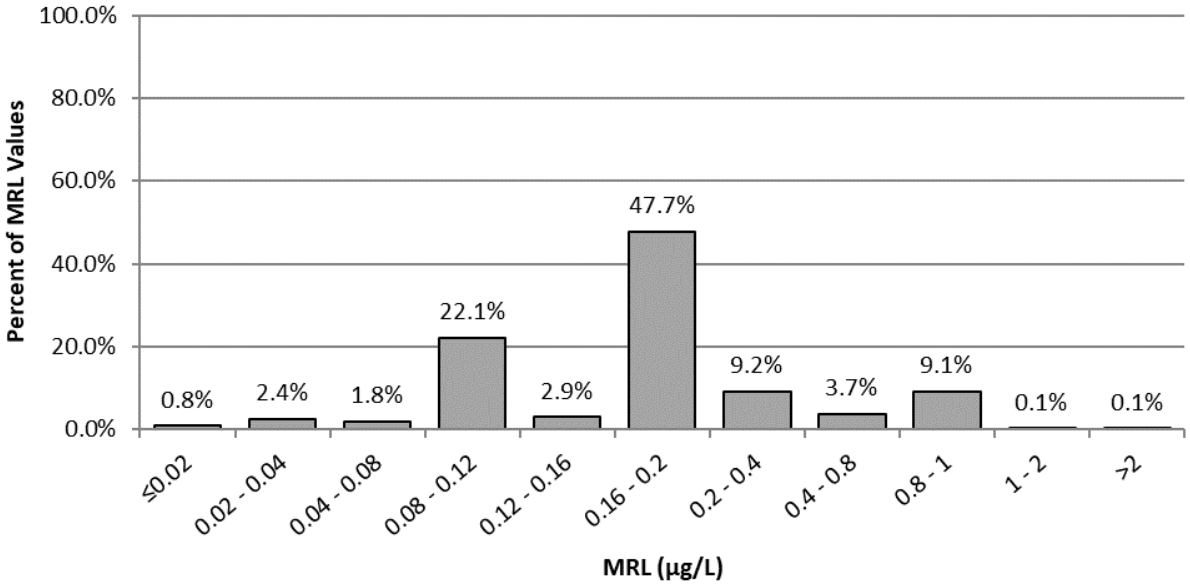
Exhibit 5-17 shows that more than 99% of the MRL values are less than the PQL of 2 µg/L. Consequently, EPA reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-16. Summary of MRL Data for Chlordane

MRL Value Category	Number of Records	Percentage of Records
All	150,289	100%
Less than mode	50,456	33.6%
Equal to mode (0.2 µg/L)	66,472	44.2%
Greater than mode	33,361	22.2%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-17. MRL Distribution for Chlordane



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.4.5 Results of MDL Multiplier Analysis

Exhibit 5-18 shows EPA's approved methods for the detection of chlordane and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 would give a possible EQL range from 0.028 to 2.2 µg/L. One of these values is greater than the PQL. EPA used the highest value below the PQL (1.4 µg/L) and rounded to 1 µg/L to obtain an EQL. More than 99% of the MRLs for chlordane in the SYR 4 ICR database are less than or equal to 1 µg/L.

Exhibit 5-18. MDL Multiplier Values for Chlordane

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 505	0.14	1.4
EPA 508	0.0041	0.041
EPA 508.1	0.004	0.04
EPA 525.2	0.22	2.2
EPA 525.3	Full scan mode: 0.1 SIM mode: 0.0028	Full scan mode: 1.0 SIM mode: 0.028

5.1.4.6 EQL Assessment Recommendation

EPA did not identify an EQL based on the MRL mode because too many MRL values were greater than the mode. EPA identified an EQL of 1 µg/L based on the MDL multiplier value range. The MRL distribution indicates that most values are less than the EQL.

5.1.5 1,2-Dibromo-3-Chloropropane (DBCP)

5.1.5.1 Results of the Method Comparison

Exhibit 5-19 summarizes the MDLs for DBCP as documented in EPA-approved analytical methods. All the methods shown have been approved since NDPWR promulgation. EPA has not approved updated or new analytical methods samples since the last review. The MDL ranges for EPA 524.3 and EPA 551.1 are somewhat lower.

Exhibit 5-19. Analytical Methods for DBCP

Approved Method	Technique	MDL (µg/L)
EPA 504.1* (USEPA, 1995b)	ME and GC	0.01
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode 0.063 SIM mode 0.0016
EPA 551.1* (USEPA, 1995l)	LLE and GC/ECD	0.006 – 0.009

Notes:
* New approved analytical method since promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 0.2 µg/L (0.0002 mg/L in 40 CFR 141.61)
Current PQL = 0.2 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.02 µg/L [40 CFR 141.24(h)(18)]

5.1.5.2 Results of the PT Data Analysis

EPA did not receive PT data for DBCP during the current review cycle. PT data provided for SYR 3 did not include studies conducted at concentrations less than the PQL (USEPA, 2016a); data provided for prior cycles included studies with passing rates greater than 75% at concentrations slightly less than the PQL (USEPA, 2003a, 2009a). Thus, older PT data indicate some potential for a lower PQL.

5.1.5.3 PQL Assessment Recommendation

There are no recently approved analytical methods with MDLs that indicate potential to reduce the PQL. There are no recent PT data demonstrating potential to reduce the PQL, although prior review cycles included limited data with high passing rates at concentrations slightly less than the PQL. Therefore, the PQL assessment indicates uncertain potential to reduce the PQL.

5.1.5.4 Results of the MRL Analysis

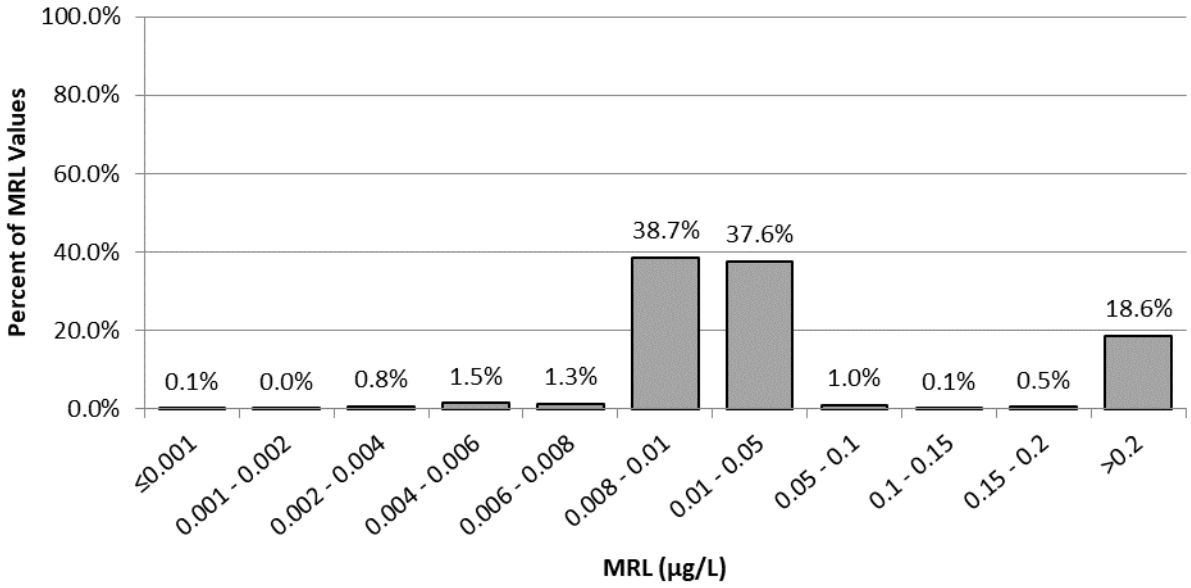
As shown in **Exhibit 5-20**, the modal MRL for DBCP is 0.01 µg/L, which is less than the PQL of 0.2 µg/L. Summary data show that 38.4% of the MRLs are equal to this value and 42.3% are equal to or less than it. The percentage of the MRL values that are less than or equal to the mode does not meet the 80% threshold. Therefore, EPA did not base the EQL on the modal MRL. **Exhibit 5-21** shows that 18.6% of the MRL values are greater than the PQL. Consequently, EPA reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-20. Summary of MRL Data for DBCP

MRL Value Category	Number of Records	Percentage of Records
All	200,803	100%
Less than mode	7,831	3.9%
Equal to mode (0.01 µg/L)	77,189	38.4%
Greater than mode	115,783	57.7%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-21. MRL Distribution for DBCP



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.5.5 Results of MDL Multiplier Analysis

Exhibit 5-22 shows EPA's approved methods for the detection of DBCP and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 would give a possible EQL range from 0.016 to 0.63 µg/L. The upper bound value is greater than the PQL. The highest value that is less than the PQL is 0.1 µg/L. Almost 20% of the MRL values exceed 0.1 µg/L, which indicates an EQL of 0.1 µg/L is not feasible.

Exhibit 5-22. MDL Multiplier Values for DBCP

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 504.1	0.01	0.1
EPA 524.3	Full scan mode: 0.063 SIM mode: 0.0016	Full scan mode: 0.63 SIM mode: 0.016
EPA 551.1	0.009	0.09

5.1.5.6 EQL Assessment Recommendation

The MRL do not support establishing an EQL value that is less than the PQL of 0.2 µg/L. Although the MDL data indicate potential for an EQL of 0.1 µg/L, almost 19% of the MRL values are greater than this value. Therefore, EPA did not develop an EQL.

5.1.6 1,2-Dichloroethane

5.1.6.1 Results of the Method Comparison

Exhibit 5-23 summarizes the MDLs for 1,2-dichloroethane as documented in EPA-approved analytical methods. EPA approved two new analytical methods for 1,2-dichloroethane since NPDWR promulgation: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The full scan mode sub-method MDLs for EPA Method 524.3 and EPA Method 524.4 are like other approved methods, as is the SIM mode sub-method MDL of EPA Method 524.4. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-23. Analytical Methods for 1,2-Dichloroethane

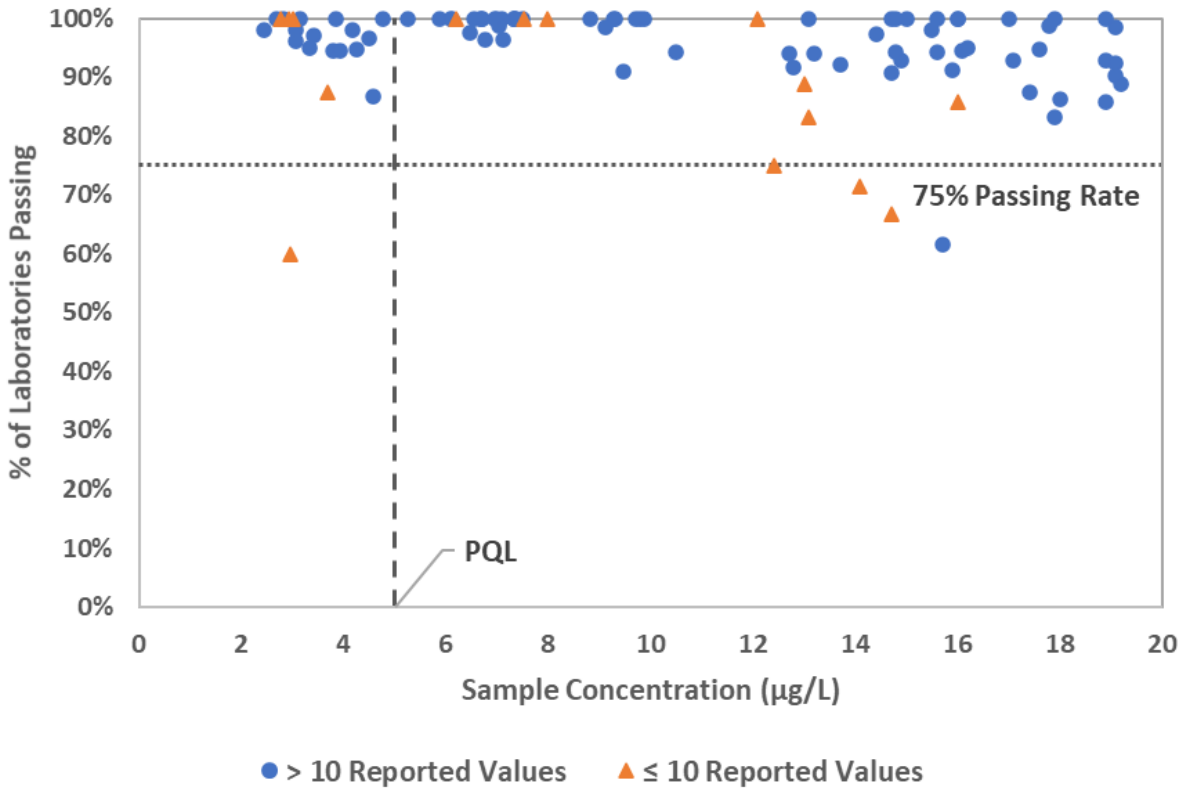
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.03	1.8%
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.02 – 0.06	82.2%
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.025 SIM mode: not given	7.4%
EPA 524.4* (USEPA, 2013)	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.027 SIM mode: 0.012	0.6%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 5 µg/L (0.005 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (52 *FR* 25690, July 8, 1987)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.1.6.2 Results of the PT Data Analysis

The chart in **Exhibit 5-24** shows the PT study passing rates at various concentrations along with the current PQL of 5 µg/L. The data reflect the methods listed above as well as other methods. There were 21 studies conducted for concentrations below the current PQL, all but one of which had passing rates greater than 75%. The study with the passing rate below 75% included fewer than ten laboratories. Similarly, two of the three studies with passing rates less than 75% at concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-24. Evaluation of PT Data for 1,2-Dichloroethane



Acceptance Criteria = ±20% (≥10 µg/L) or ±40% (<10 µg/L) [40 CFR 141.24(f)(17)(i)]

5.1.6.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is two orders of magnitude less than PQL. This usage pattern suggests widespread capability to quantitate below the PQL. The PT data further demonstrate laboratory capability to quantitate below the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.1.6.4 Results of the MRL Analysis

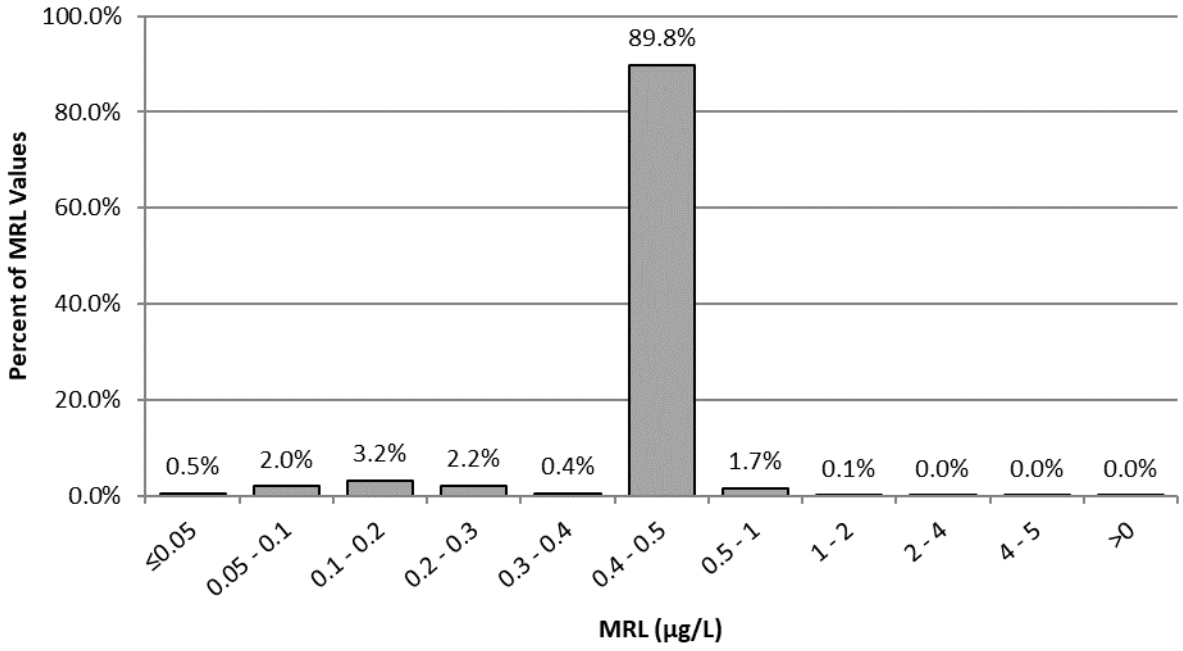
As shown in **Exhibit 5-25**, the modal MRL for 1,2-dichloroethane is 0.5 µg/L. Summary data show that 89.6% of the MRLs are equal to this value and 98.1% are equal to or less than it. **Exhibit 5-26** shows that the range including the mode dominates the probability distribution. Almost all the MRL values are below the PQL of 5 µg/L. Like the PT data, the MRL data indicate potential to lower the PQL. The percentage of the MRL values that are less than or equal to the mode exceeds the 80% threshold to use the mode as an EQL. Therefore, EPA based the EQL on the modal MRL.

Exhibit 5-25. Summary of MRL Data for 1,2-Dichloroethane

MRL Value Category	Number of Records	Percentage of Records
All	437,232	100%
Less than mode	37,335	8.5%
Equal to mode (0.5 µg/L)	391,661	89.6%
Greater than mode	8,236	1.9%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-26. MRL Distribution for 1,2-Dichloroethane



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.6.5 Results of MDL Multiplier Analysis

Exhibit 5-27 shows EPA's approved methods for the detection of 1,2-dichloroethane, and corresponding MDLs or upper bound values of MDL ranges. Multiplying the MDLs by 10 results in a possible EQL range from 0.12 to 0.6 µg/L. Much of this range of values is an order of magnitude below the PQL. The MDL multiplier value for method EPA 524.2 is 0.6 µg/L, which was the most reported method in the PT data. Nevertheless, the MDL data support an EQL below the PQL.

Exhibit 5-27. MDL Multiplier Values for 1,2-Dichloroethane

Approved Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.03	0.3
EPA 524.2	0.06	0.6
EPA 524.3	Full scan mode: 0.025	0.25
EPA 524.4	Full scan mode: 0.027 SIM mode: 0.012	Full scan mode: 0.27 SIM mode: 0.12

5.1.6.6 EQL Assessment Recommendation

The MRL data support an EQL value equal to the mode of 0.5 µg/L. The MDL multiplier analysis supports an EQL less than the PQL, but the upper bound of the range is greater than the MRL mode. Nevertheless, EPA selected the MRL mode as an EQL given the overwhelming evidence in the monitoring results that laboratories can quantitate the contaminant above 0.5 µg/L.

5.1.7 Dichloromethane

5.1.7.1 Results of the Method Comparison

Exhibit 5-28 summarizes the MDLs for dichloromethane as documented in EPA-approved analytical methods. EPA approved two new analytical methods for dichloromethane since NPDWR promulgation: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The full scan mode sub-method MDLs for EPA Method 524.3 and EPA Method 524.4 are higher than other approved methods for dichloromethane. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-28. Analytical Methods for Dichloromethane

Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.01 – 0.02	1.7%
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.03 – 0.09	84.4%
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.14 SIM mode: not given	7.1%
EPA 524.4* (USEPA, 2013)	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.18 SIM mode: not given	0.5%

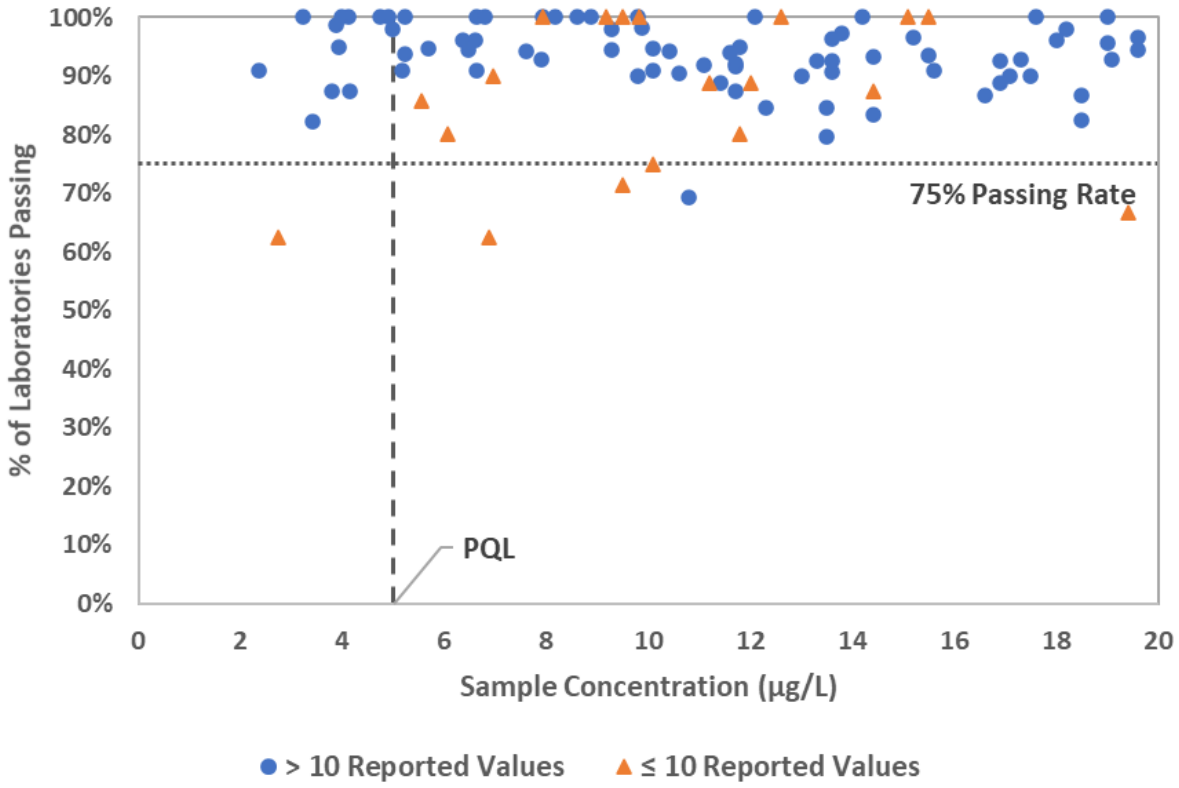
Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018.
MCL = 5 µg/L (0.005 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (57 *FR* 31776, July 17, 1992)
DL = 0.5 µg/L [40 CFR 141.24(f)(17)(i)]

5.1.7.2 Results of the PT Data Analysis

The chart in **Exhibit 5-29** shows the PT study passing rates at various concentrations along with the current PQL of 5 µg/L. The data reflect the methods listed above as well as other methods. There were 13 studies conducted for concentrations below the current PQL, all but one of which had passing rates greater than 75%. The study with a passing rate less than 75% included fewer

than ten laboratories. Similarly, three of the four studies with passing rates less than 75% for concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-29. Evaluation of PT Data for Dichloromethane



Acceptance Criteria = ±20% (≥10 µg/L) or ±40% (<10 µg/L) [40 CFR 141.24(f)(17)(i)]

5.1.7.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is two orders of magnitude less than the PQL. This usage pattern suggests widespread capability to quantitate below the PQL. The PT data further demonstrate laboratory capability to quantitate below the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.1.7.4 Results of the MRL Analysis

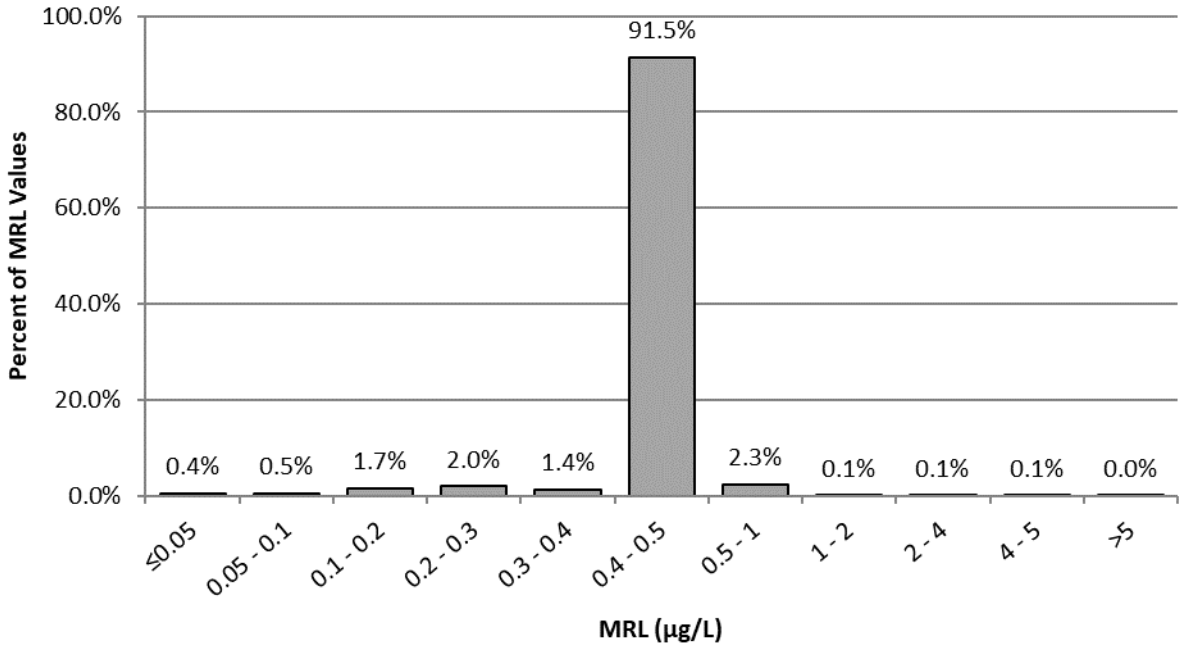
As shown in **Exhibit 5-30**, the modal MRL for dichloromethane is 0.5 µg/L. Summary data show that 90.8% of the MRLs are equal to this value and 97.4% are equal to or less than it. **Exhibit 5-31** shows that the range including the mode dominates the probability distribution. Like the PT data, the MRL data indicate potential to lower the PQL. Almost all the MRL values are below the PQL of 5 µg/L. The percentage of the MRL values that are less than or equal to the mode exceeds the 80% threshold to use the mode as an EQL. Therefore, EPA based the EQL on the modal MRL.

Exhibit 5-30. Summary of MRL Data for Dichloromethane

MRL Value Category	Number of Records	Percentage of Records
All	423,751	100%
Less than mode	28,159	6.6%
Equal to mode (0.5 µg/L)	384,663	90.8%
Greater than mode	10,929	2.6%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-31. MRL Distribution for Dichloromethane



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.7.5 Results of MDL Multiplier Analysis

Exhibit 5-32 shows EPA's approved methods for the detection of dichloromethane, and corresponding MDLs or upper bound values of MDL ranges. Multiplying the MDLs by 10 results in a possible EQL range from 0.2 to 1.8 µg/L. Although the range of values is less than the PQL, the upper bound is greater than the MRL mode. The MDL multiplier for method EPA 524.2 is 0.9 µg/L, which was the most reported method in the PT data. Nevertheless, the MDL data support an EQL below the PQL.

Exhibit 5-32. MDL Multiplier Values for Dichloromethane

Approved Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.02	0.2
EPA 524.2	0.09	0.9
EPA 524.3	Full scan mode: 0.14	1.4
EPA 524.4	Full scan mode: 0.18	1.8

5.1.7.6 EQL Assessment Recommendation

The MRL data support an EQL value equal to the mode of 0.5 µg/L. The MDL multiplier analysis supports an EQL less than the PQL, but the upper bound of the range is greater than the MRL mode. Nevertheless, EPA selected the MRL mode as an EQL given the overwhelming evidence in the monitoring results that laboratories can quantitate the contaminant above 0.5 µg/L.

5.1.8 1,2-Dichloropropane

5.1.8.1 Results of the Method Comparison

Exhibit 5-33 summarizes the MDLs for 1,2-dichloropropane as documented in EPA-approved analytical methods. EPA approved two new analytical methods for 1,2-dichloropropane since NPDWR promulgation: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The full scan mode sub-method MDLs for EPA Method 524.3 and EPA Method 524.4 and the SIM mode MDL for EPA 524.4 fall within the range of other approved methods of 1,2-dichloropropane. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-33. Analytical Methods for 1,2-Dichloropropane

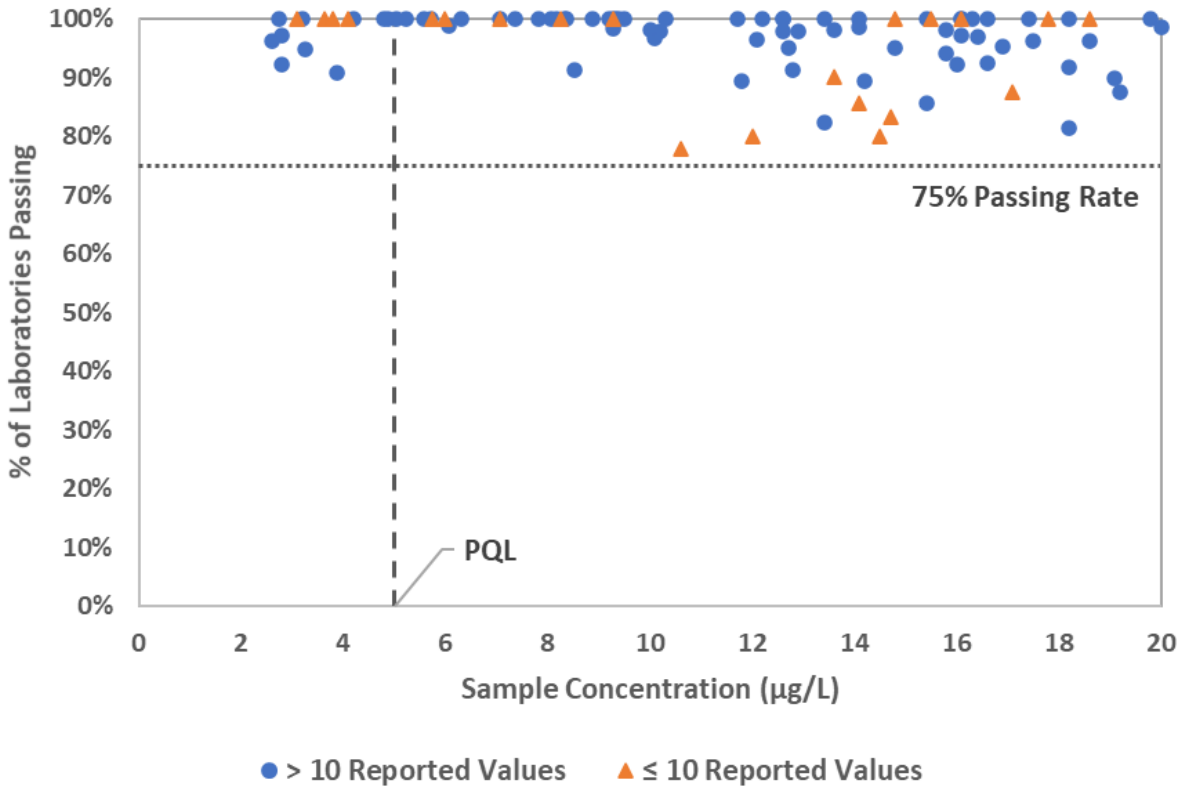
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.01 – 0.03	1.7%
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.02 – 0.04	84.8%
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.018 SIM mode: not given	7.3%
EPA 524.4* (USEPA, 2013)	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.088 SIM mode: 0.011	0.6%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 5 µg/L (0.005 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.1.8.2 Results of the PT Data Analysis

The chart in **Exhibit 5-34** shows the PT study passing rates at various concentrations along with the current PQL of 5 µg/L. The data reflect the methods listed above as well as other methods. There were 14 studies conducted for concentrations below the current PQL, all of which had passing rates greater than 75%. There were no studies with passing rates less than 75% even though several studies included fewer than ten laboratories.

Exhibit 5-34. Evaluation of PT Data for 1,2-Dichloropropane



Acceptance Criteria = ±20% (≥10 µg/L) or ±40% (<10 µg/L) [40 CFR 141.24(f)(17)(i)]

5.1.8.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is two orders of magnitude less than the PQL. This usage pattern suggests widespread capability to quantitate below the PQL. The PT data further demonstrate laboratory capability to quantitate below the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.1.8.4 Results of the MRL Analysis

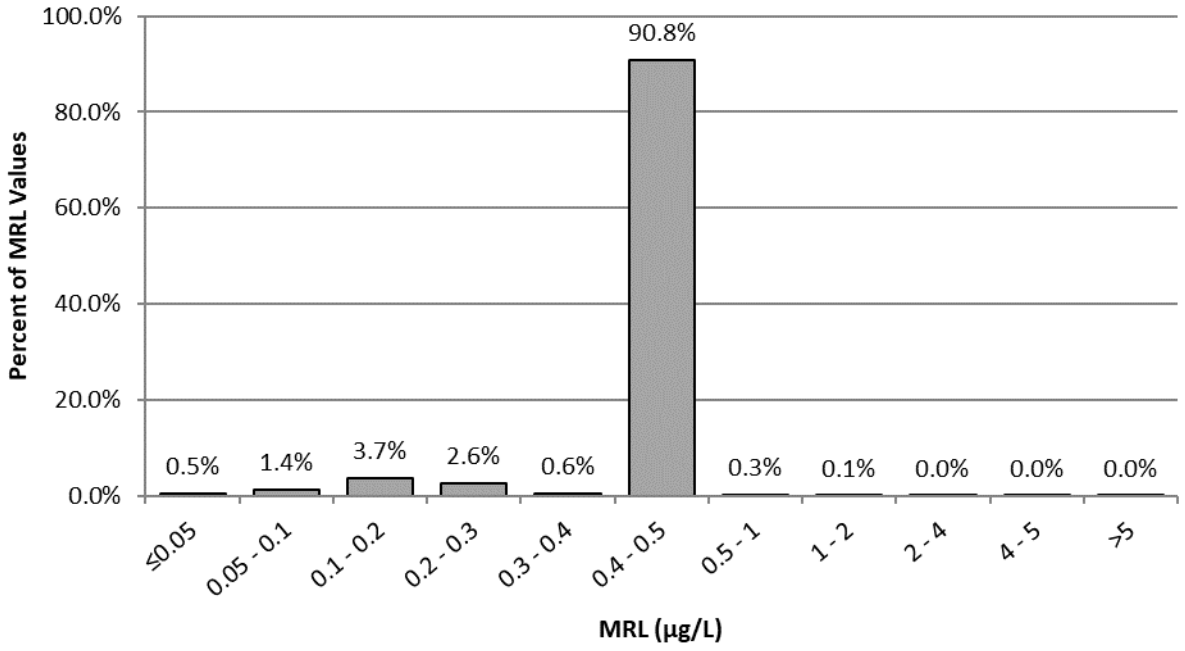
As shown in **Exhibit 5-35**, the modal MRL for 1,2-dichloropropane is 0.5 µg/L. Summary data show that 90.7% of the MRLs are equal to this value and 99.6% are equal to or less than it. **Exhibit 5-36** shows that the range including the mode dominates the probability distribution. Almost all the MRL values are below the PQL of 5 µg/L. Like the PT data, the MRL data indicate potential to lower the PQL. The percentage of the MRL values that are less than or equal to the mode exceeds the 80% threshold to use the mode as an EQL. Therefore, EPA based the EQL on the modal MRL.

Exhibit 5-35. Summary of MRL Data for 1,2-Dichloropropane

MRL Value Category	Number of Records	Percentage of Records
All	418,124	100%
Less than mode	37,187	8.9%
Equal to mode (0.5 µg/L)	379,230	90.7%
Greater than mode	1,707	0.4%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-36. MRL Distribution for 1,2-Dichloropropane



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.8.5 Results of MDL Multiplier Analysis

Exhibit 5-37 shows EPA's approved methods for the detection of 1,2-dichloropropane, and corresponding MDLs or upper bound values of MDL ranges. Multiplying the MDLs by 10 results in a possible EQL range from 0.11 to 0.88 µg/L. This range of values is less than PQL. Thus, the MDL data support an EQL below the PQL.

Exhibit 5-37. MDL Multiplier Values for 1,2-Dichloropropane

Approved Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.03	0.3
EPA 524.2	0.04	0.4
EPA 524.3	Full scan mode: 0.018	0.18
EPA 524.4	Full scan mode: 0.088 SIM mode: 0.011	Full scan mode: 0.88 SIM mode: 0.11

5.1.8.6 EQL Assessment Recommendation

The MRL data support an EQL value equal to the mode of 0.5 µg/L. The MDL multiplier analysis further supports EPA selecting an EQL an order of magnitude less than the current PQL.

5.1.9 Di(2-ethylhexyl)phthalate (DEHP)

5.1.9.1 Results of the Method Comparison

Exhibit 5-38 summarizes the MDLs for DEHP as documented in EPA-developed analytical methods. EPA has approved two updated or new analytical methods for the analysis of DEHP since NDPWR promulgation. The most recent method, EPA 525.3, has a lower MDL range than the older methods, which indicates potential for PQL reduction. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 525.2, followed by EPA 525.3.

Exhibit 5-38. Analytical Methods for DEHP

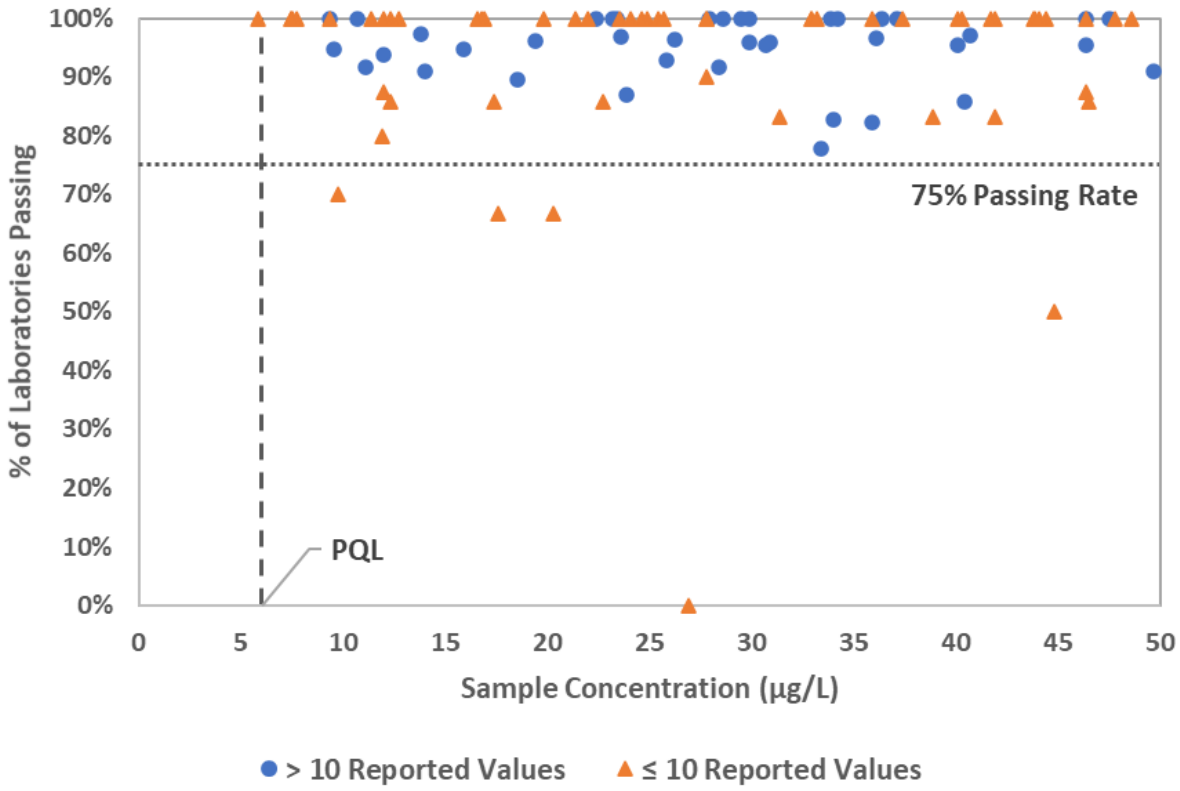
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 506 (USEPA, 1995d)	LLE or LSE and GC/PID	2.25	1.1%
EPA 525.2* (USEPA, 1995j)	LSE and CCGC/MS	0.46 – 1.3	84.9%
EPA 525.3* (USEPA, 2012)	SPE and CCGC/MS	0.025 – 0.05	3.0%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 6 µg/L (0.006 mg/L in 40 CFR 141.61)
Current PQL = 6 µg/L (57 *FR* 31776, July 17, 1992)
DL = 0.6 µg/L [40 CFR 141.24(h)(18)]

5.1.9.2 Results of the PT Data Analysis

The chart in **Exhibit 5-39** shows the PT study passing rates at various concentrations along with the current PQL of 6 µg/L. The data reflect the methods listed above as well as other methods. There was one study conducted for a concentration slightly below the current PQL, which had a passing rate greater than 75%. The five studies with passing rates less than 75% are studies that included ten or fewer laboratories.

Exhibit 5-39. Evaluation of PT Data for DEHP



Acceptance Criteria = mean ± 2 SD [40 CFR 141.24(h)(19)(i)(B)]

5.1.9.3 PQL Assessment Recommendations

There are no recently approved analytical methods with MDLs that indicate potential to reduce the PQL. There are limited PT data demonstrating potential to reduce the PQL. Therefore, the PQL assessment indicate uncertain potential to reduce the PQL.

5.1.9.4 Results of the MRL Analysis

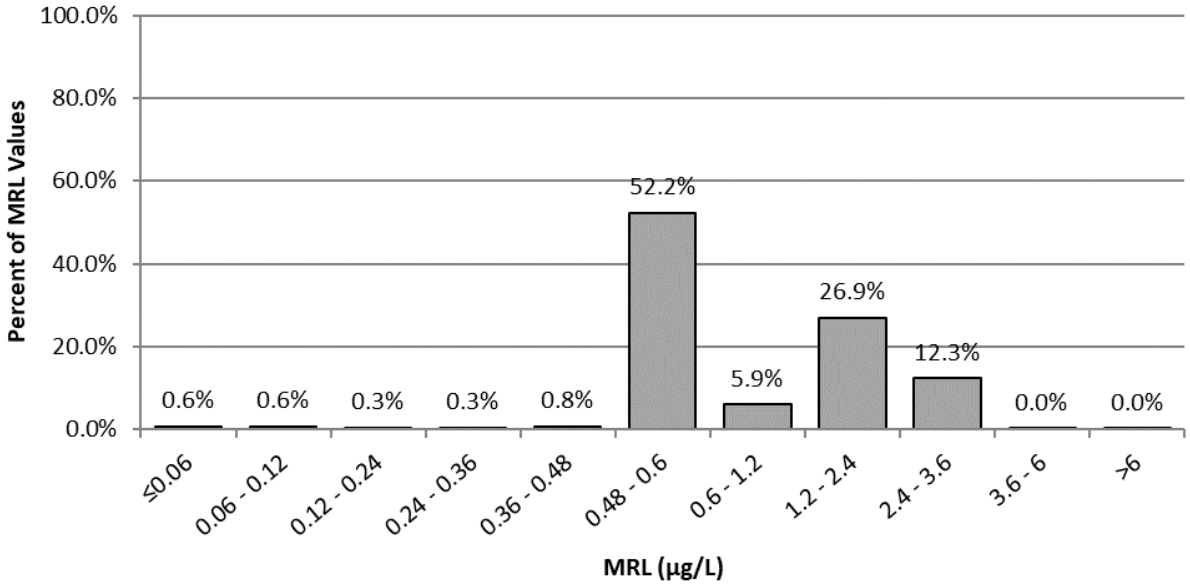
As shown in **Exhibit 5-40** and, the modal MRL for DEHP is 0.6 µg/L. Summary data show that 42.8% of the MRLs are equal to this value, and 54.8% of the MRL values are equal to or less than it. **Exhibit 5-41** shows a large proportion of MRLs between the mode and the PQL of 6 µg/L. The MRL data appear to indicate that there is potential to lower the PQL because almost all the MRL values are less than the PQL. The percentage of the MRL values that are less than or equal to the mode does not meet the 80% threshold. Therefore, EPA did not base the EQL on the modal MRL. Consequently, EPA reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-40. Summary of MRL Data for DEHP

MRL Value Category	Number of Records	Percentage of Records
All	156,347	100%
Less than mode	18,821	12.0%
Equal to mode (0.6 µg/L)	66,963	42.8%
Greater than mode	70,563	45.1%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-41. MRL Distribution for DEHP



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.9.5 Results of MDL Multiplier Analysis

Exhibit 5-42 shows EPA's approved methods for the detection of DEHP, and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 gives a possible EQL range from 0.5 to 22.5 µg/L. This range extends well above the PQL; two of the three MDL multiplier values are much higher than the PQL. The only value less than the PQL, 0.5 µg/L, is also less than the MRL mode. The MDL data do not support an EQL below the PQL.

Exhibit 5-42. MDL Multiplier Values for DEHP

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 506	2.25	22.5
EPA 525.2	1.3	13
EPA 525.3	0.05	0.5

5.1.9.6 EQL Assessment Recommendation

EPA concluded that although MRL values are generally below the PQL, neither the MRL mode nor MDL multiplier values support an EQL value less than the PQL for DEHP. Therefore, EPA did not develop an EQL.

5.1.10 Ethylene Dibromide

5.1.10.1 Results of the Method Comparison

Exhibit 5-43 summarizes the MDLs for ethylene dibromide as documented in EPA-approved analytical methods. All three methods have been approved since NPDWR promulgation (83 *FR* 51644, October 12, 2018). The MDL values are primarily the same order of magnitude as the PQL.

Exhibit 5-43. Analytical Methods for Ethylene Dibromide

Approved Method	Technique	MDL (µg/L)
EPA 504.1* (USEPA, 1995b)	ME and GC	0.01
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode 0.018 SIM mode 0.001
EPA 551.1* (USEPA, 1995l)	LLE and GC/ECD	0.007 – 0.032

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 0.05 µg/L (0.00005 mg/L in 40 CFR 141.61)
Current PQL = 0.05 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.01 µg/L [40 CFR 141.24(h)(18)]

5.1.10.2 Results of the PT Data Analysis

EPA did not receive PT data for ethylene dibromide during the current review cycle. PT data provided for prior review cycles did not include studies conducted at concentrations less than the PQL (USEPA, 2003a, 2009a). Thus, PT data are not sufficient to indicate potential for a lower PQL.

5.1.10.3 PQL Assessment Recommendations

The approved analytical methods do not indicate potential to reduce the PQL. There are no recent PT data demonstrating potential to reduce the PQL and data available during prior review cycles were insufficient. Therefore, the PQL assessment does not indicate potential to reduce the PQL.

5.1.10.4 Results of the MRL Analysis

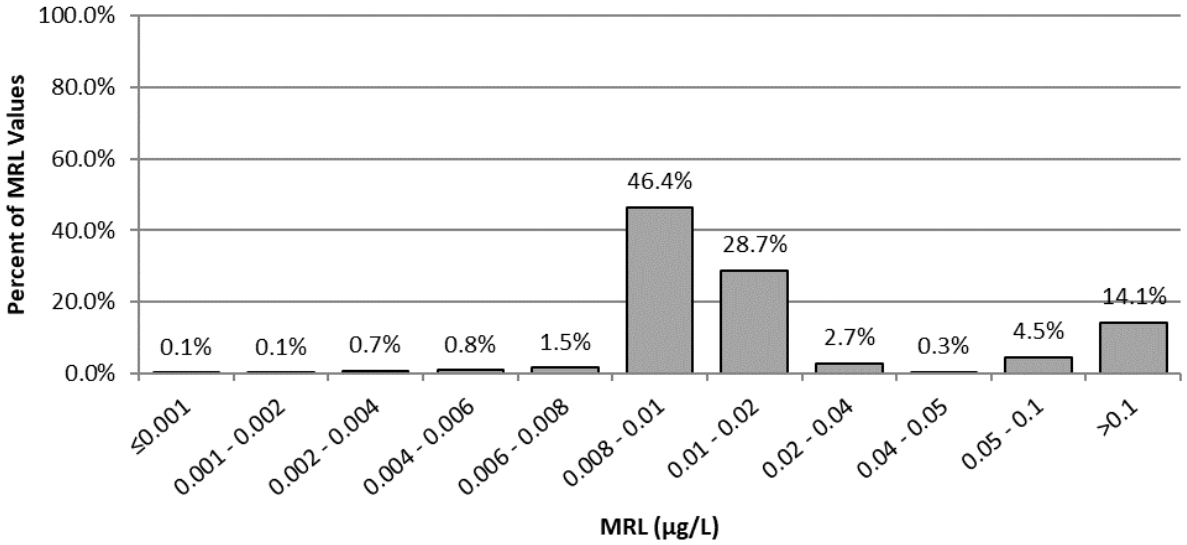
As shown in **Exhibit 5-44**, the modal MRL for ethylene dibromide is 0.01 µg/L which is less than the PQL of 0.05 µg/L. More than 50% of the MRL values are greater than the mode. Therefore, EPA did not base the EQL on the modal MRL. **Exhibit 5-45** shows that about 18.6% of the MRL values are greater than the PQL. Consequently, EPA reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-44. Summary of MRL Data for Ethylene Dibromide

MRL Value Category	Number of Records	Percentage of Records
All	198,152	100%
Less than mode	11,522	5.8%
Equal to mode (0.01 µg/L)	86,934	43.9%
Greater than mode	99,696	50.3%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-45. MRL Distribution for Ethylene Dibromide



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.10.5 Results of MDL Multiplier Analysis

Exhibit 5-46 shows EPA's approved methods for the detection of ethylene dibromide, and the MDLs. Applying a multiplier of 10 would give a possible EQL range from 0.01 to 0.32 µg/L. Three of the values are greater than the PQL, but 0.01 µg/L is less than the PQL. Almost 50% of the MRL values are greater than 0.01 µg/L, indicating it cannot be an EQL.

Exhibit 5-46. MDL Multiplier Values for Ethylene Dibromide

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 504.1	0.01	0.1
EPA 524.3	Full scan mode: 0.018 SIM mode: 0.001	Full scan mode: 0.18 SIM mode: 0.01
EPA 551.1	0.032	0.32

5.1.10.6 EQL Assessment Recommendation

EPA concluded that all three information sources—PT, MRL, and MDL data—do not support a reduction of the PQL for ethylene dibromide. Therefore, EPA did not develop an EQL.

5.1.11 Heptachlor

5.1.11.1 Results of the Method Comparison

Exhibit 5-47 summarizes the MDLs for heptachlor as documented in EPA-approved analytical methods. EPA has not approved updated or new analytical methods for the analysis of heptachlor in drinking water samples since promulgation. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 525.2, followed by EPA 505.

Exhibit 5-47. Analytical Methods for Heptachlor

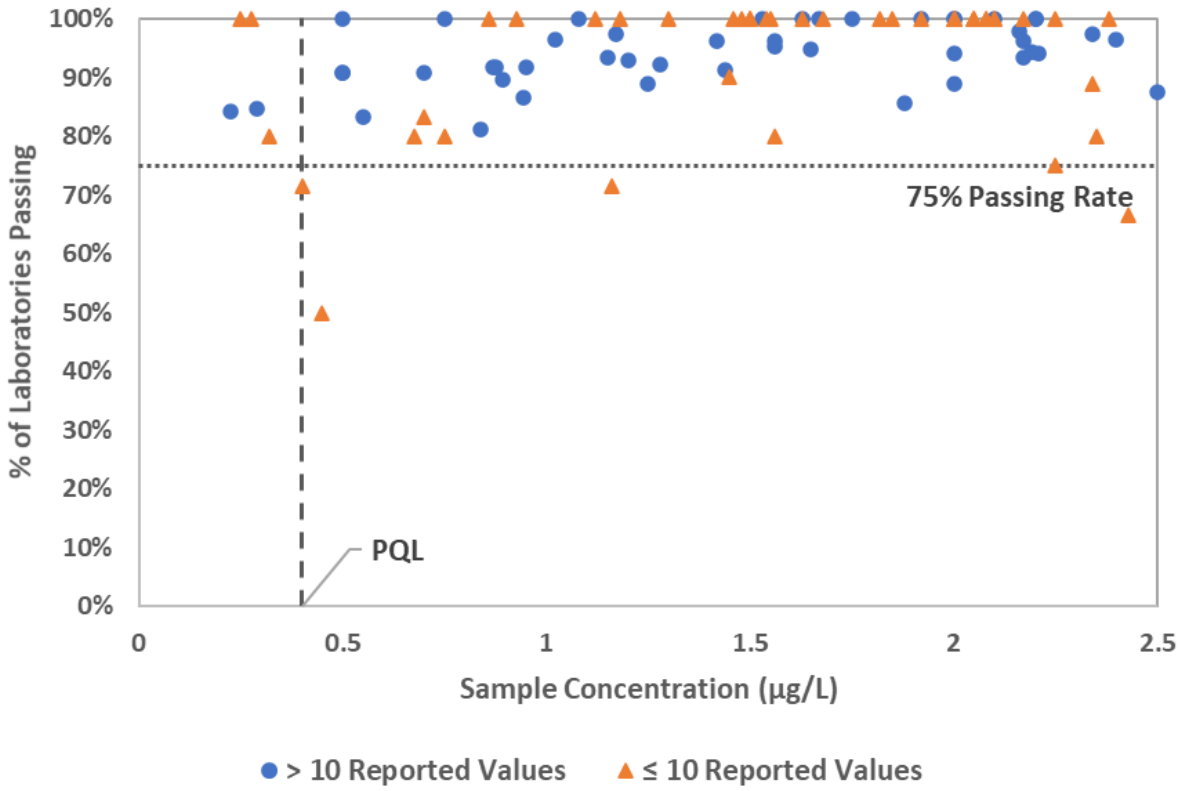
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 505 (USEPA, 1995c)	ME and GC	0.003	20.0%
EPA 508 (USEPA, 1995e)	GC/ECD	0.0015	11.8%
EPA 508.1* (USEPA, 1995f)	LSE and ECGC	0.005	13.0%
EPA 525.2* (USEPA, 1995j)	LSE and CCGC/MS	0.059 – 0.15	46.2%
EPA 525.3* (USEPA, 2012)	SPE and CCGC/MS	Full scan mode: 0.0032 – 0.034 SIM mode: 0.0034	1.8%
EPA 551.1* (USEPA, 1995l)	LLE and GC/ECD	0.002 – 0.081	0.0%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 0.4 µg/L (0.0004 mg/L in 40 CFR 141.61)
Current PQL = 0.4 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.04 µg/L [40 CFR 141.24(h)(18)]

5.1.11.2 Results of the PT Data Analysis

The chart in **Exhibit 5-48** shows the PT study passing rates at various concentrations along with the current PQL of 0.4 µg/L. The data reflect the methods listed above as well as other methods. There were five studies conducted for concentrations below the current PQL, all of which had passing rates greater than 75%. The four studies with passing rates less than 75% are studies that included ten or fewer laboratories.

Exhibit 5-48. Evaluation of PT Data for Heptachlor



Acceptance Criteria = ±45% [40 CFR 141.24(h)(19)(i)(B)]

5.1.11.3 PQL Assessment Recommendation

The limited data below the current PQL of 0.4 µg/L indicate uncertain potential to reduce the PQL. Although one new analytical method has been approved since 2007 (EPA 525.3), the PT data indicate infrequent use of this method. Frequent use of EPA 525.2 indicates limited potential to reduce the PQL.

5.1.11.4 Results of the MRL Analysis

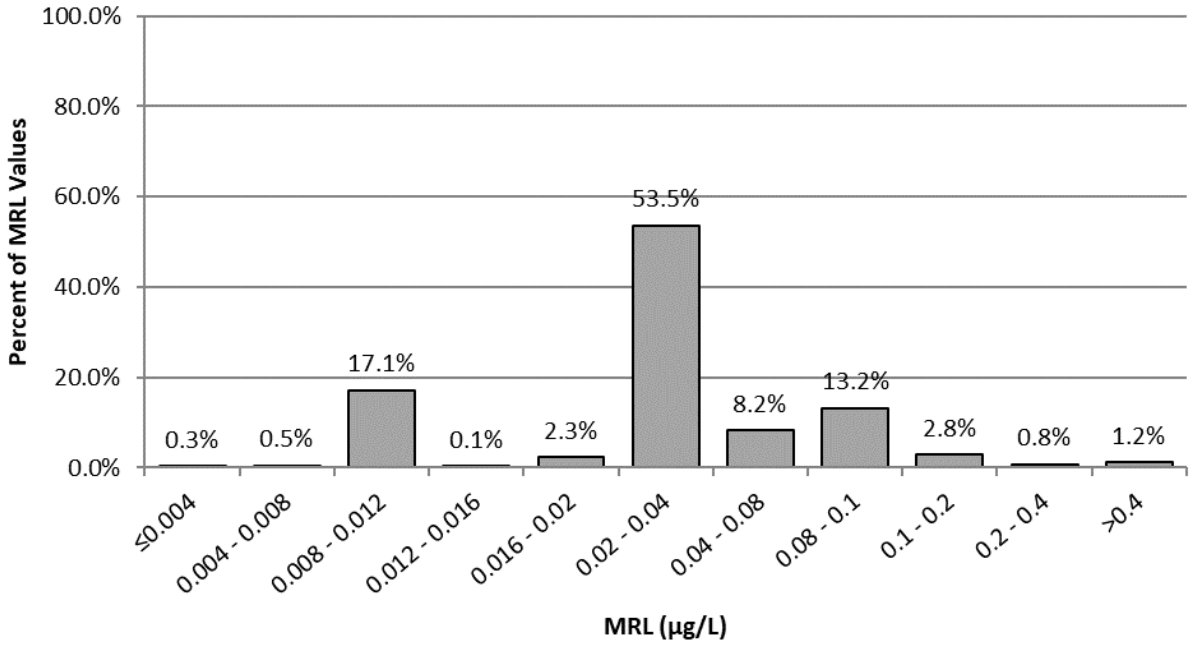
As shown in **Exhibit 5-49,** the modal MRL for heptachlor is 0.04 µg/L. Summary data show that 44.6% of the MRLs are equal to this value, and 73.9% of the MRL values are equal to or less than it. The percentage of the MRL values that are less than or equal to the mode does not meet the 80% threshold. Therefore, EPA did not base the EQL on the modal MRL. **Exhibit 5-50** shows that more than 98% of the MRL values are less than the PQL of 0.4 µg/L. Consequently, EPA reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-49. Summary of MRL Data for Heptachlor

MRL Value Category	Number of Records	Percentage of Records
All	154,431	100%
Less than mode	45,192	29.3%
Equal to mode (0.04 µg/L)	68,826	44.6%
Greater than mode	40,413	26.2%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-50. MRL Distribution for Heptachlor



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.11.5 Results of MDL Multiplier Analysis

Exhibit 5-51 shows EPA's approved methods for the detection of heptachlor, and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 to the MDL values results in a possible EQL range from 0.015 to 1.5 µg/L. Two of these values are greater than the PQL. Excluding these values, the next highest value is 0.05 µg/L, which rounds to 0.1 µg/L, which is less than the PQL. Almost 95% of the MRL values are less than 0.1 µg/L.

Exhibit 5-51. MDL Multiplier Values for Heptachlor

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 505	0.003	0.03
EPA 508	0.0015	0.015
EPA 508.1	0.005	0.05
EPA 525.2	0.15	1.5
EPA 525.3	Full scan mode: 0.034 SIM mode: 0.0034	Full scan mode: 0.34 SIM mode: 0.034
EPA 551.1	0.081	0.81

5.1.11.6 EQL Assessment Recommendation

EPA used the highest MDL multiplier value less than the PQL (0.05 µg/L) and rounded up to 0.1 µg/L to establish an EQL. The MRL distribution supports this value as an EQL because almost 95% of the MRL values are less than or equal to this value.

5.1.12 Heptachlor Epoxide

5.1.12.1 Results of the Method Comparison

Exhibit 5-52 summarizes the MDLs for heptachlor epoxide as documented in EPA-approved analytical methods. EPA has approved updated or new analytical methods since promulgation.

Exhibit 5-52. Analytical Methods for Heptachlor Epoxide

Approved Method	Technique	MDL (µg/L)
EPA 505 (USEPA, 1995c)	ME and GC	0.004
EPA 508 (USEPA, 1995e)	GC/ECD	0.0059
EPA 508.1* (USEPA, 1995f)	LSE and ECGC	0.0001
EPA 525.2* (USEPA, 1995j)	LSE and CCGC/MS	0.048 – 0.13
EPA 525.3* (USEPA, 2012)	SPE and CCGC/MS	Full scan mode: 0.0053 – 0.039 SIM mode: 0.0026
EPA 551.1* (USEPA, 1995l)	LLE and GC/ECD	0.002 – 0.202

Notes:
* New approved analytical method since NPDWR promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 0.2 µg/L (0.0002 mg/L in 40 CFR 141.61)
Current PQL = 0.2 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.02 µg/L [40 CFR 141.24(h)(18)]

5.1.12.2 Results of the PT Data Analysis

EPA did not receive PT data for heptachlor epoxide during the current review cycle. PT data provided for SYR 3 did not include studies conducted at concentrations less than the PQL (USEPA, 2016a); data provided for prior cycles included a few studies with passing rates greater than 75% at concentrations less than the PQL (USEPA, 2003a; 2009a). Thus, older PT data indicate some potential for a lower PQL.

5.1.12.3 PQL Assessment Recommendation

The MDL ranges for methods approved since promulgation indicate some potential to reduce the PQL. There are no recent PT data demonstrating potential to reduce the PQL, although prior

review cycles included data with high passing rates at concentrations less than the PQL. Therefore, the PQL assessment indicates uncertain potential to reduce the PQL.

5.1.12.4 Results of MRL Analysis

There are no PT studies with spiked values below the PQL. The PT data above the PQL show passing rates close to 100% for most of the studies although one study has a passing rate less than 75% (USEPA, 2016a). Given the lack of data below the PQL, EPA determined that the PT data do not support a reduction of the PQL.

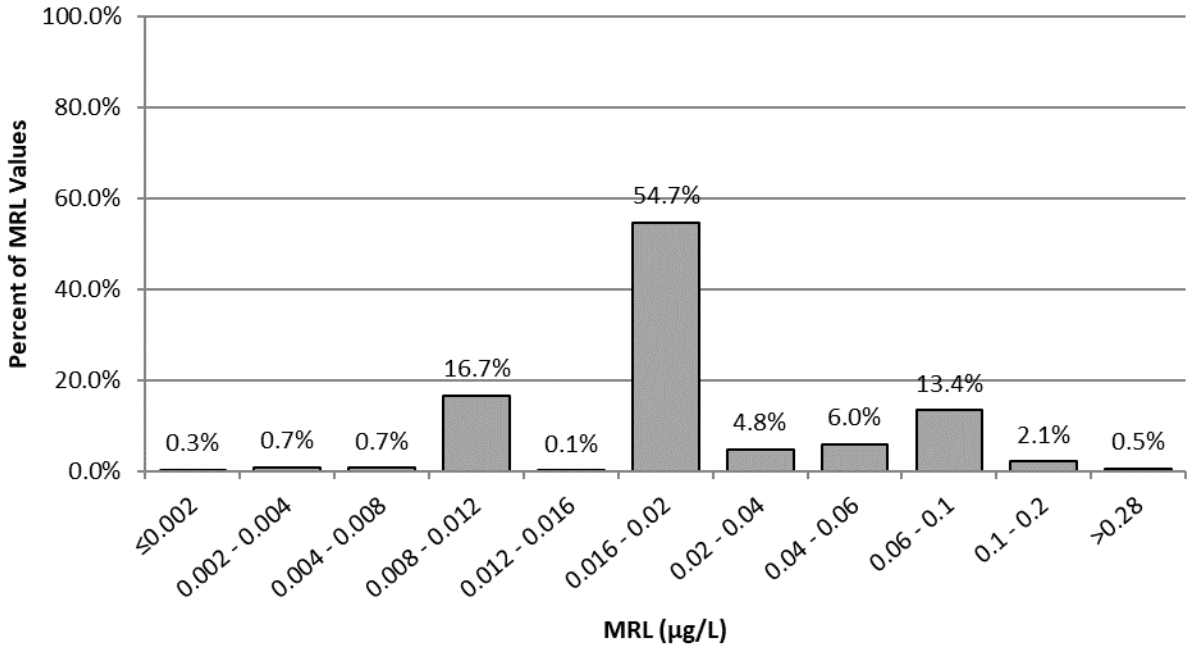
As shown in **Exhibit 5-53**, the modal MRL for heptachlor epoxide is 0.02 µg/L. Summary data show that 52% of the MRLs are equal to this value, and 73.2% of the MRL values are equal to or less than it. The percentage of the MRL values that are less than or equal to the mode does not meet the 80% threshold. Therefore, EPA did not base the EQL on the modal MRL. **Exhibit 5-54** shows that more than 99% of the MRL values are less than the PQL. Consequently, EPA reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-53. Summary of MRL Data for Heptachlor Epoxide

MRL Value Category	Number of Records	Percentage of Records
All	153,649	100%
Less than mode	32,556	21.2%
Equal to mode (0.02 µg/L)	79,848	52.0%
Greater than mode	41,245	26.8%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-54. MRL Distribution for Heptachlor Epoxide



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.12.5 Results of MDL Multiplier Analysis

Exhibit 5-55 shows EPA's approved methods for the detection of heptachlor epoxide, and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 to the MDL values results in a possible EQL range from 0.001 to 2.02 µg/L. Two of these values are greater than the PQL. The next highest value is 0.059 µg/L. The MRL data show that approximately 15% of the MRL values are greater than 0.06 µg/L (0.059 µg/L rounded up). Further rounding up 0.1 µg/L results in more than 97% of the MRL values are less than or equal to 0.1 µg/L. Thus, an EQL slightly greater than the MDL multiplier result is also feasible.

Exhibit 5-55. MDL Multiplier Values for Heptachlor Epoxide

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 505	0.004	0.04
EPA 508	0.0059	0.059
EPA 508.1	0.0001	0.001
EPA 525.2	0.13	1.3
EPA 525.3	Full scan mode: 0.039 SIM mode: 0.0026	Full scan mode: 0.39 SIM mode: 0.026
EPA 551.1	0.202	2.02

5.1.12.6 EQL Assessment Recommendation

EPA used the highest MDL multiplier value below the PQL (0.06 µg/L, rounded) to establish an EQL. The MRL data support rounding the value up to 0.1 µg/L.

5.1.13 Hexachlorobenzene

5.1.13.1 Results of the Method Comparison

Exhibit 5-56 summarizes the MDLs for hexachlorobenzene as documented in EPA-approved analytical methods. EPA re-approved one analytical method in 2018, EPA Method 525.3 (83 *FR* 51644, October 12, 2018) and multiple methods have been approved since promulgation. The MDL range of EPA Method 525.3 falls into the range of other approved methods for hexachlorobenzene listed in the table. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 525.2, which has the highest MDL range.

Exhibit 5-56. Analytical Methods for Hexachlorobenzene

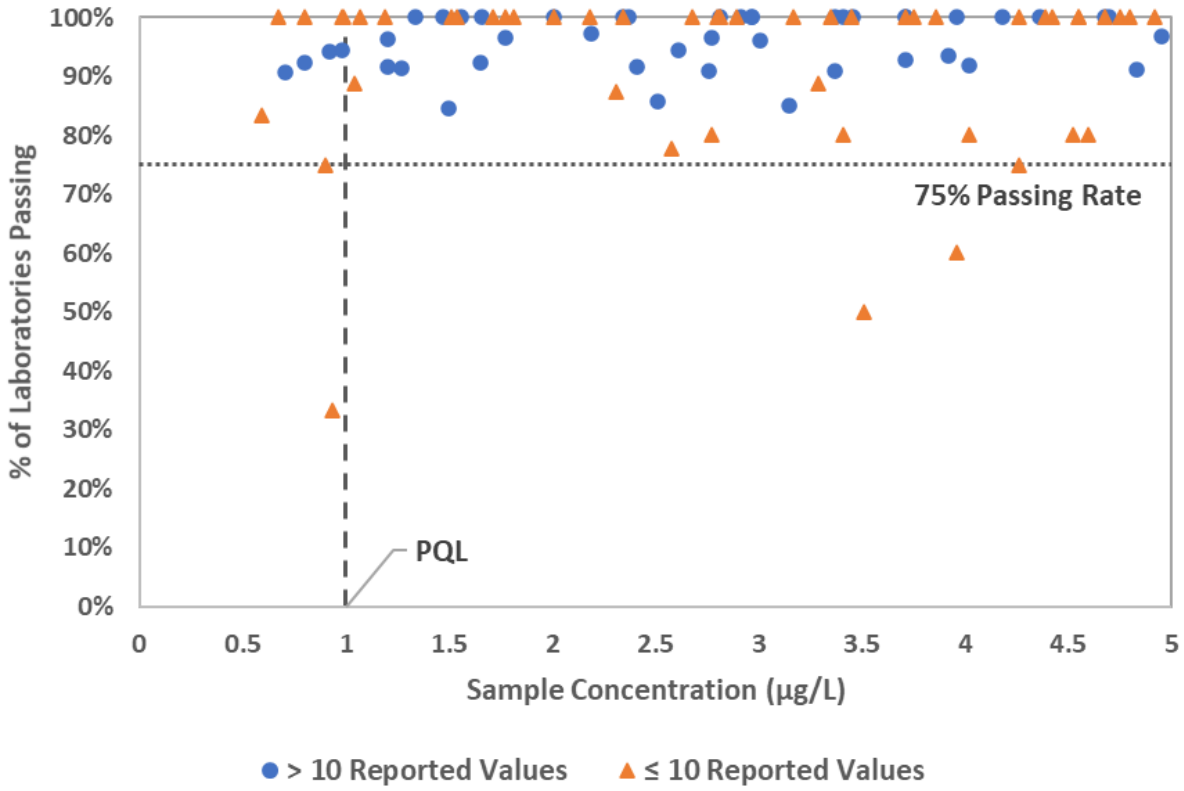
Approved Methods	Technique	MDL (µg/L)	PT Data Frequency
EPA 505 (USEPA, 1995c)	ME and GC	0.002	19%
EPA 508 (USEPA, 1995e)	GC/ECD	0.0077	9.2%
EPA 508.1* (USEPA, 1995f)	LSE and ECGC	0.001	10.7%
EPA 525.2* (USEPA, 1995j)	LSE and CCGC/MS	0.049 – 0.13	52.5%
EPA 551.1* (USEPA, 1995l)	LLE and GC/ECD	0.001 – 0.003	0%
EPA 525.3* (USEPA, 2012)	SPE and CCGC/MS	Full scan mode: 0.0094 – 0.016 SIM mode: 0.0092	1.8%

Notes:
* New re-approved analytical method since NPDWR promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 1 µg/L (0.001 mg/L in 40 CFR 141.61)
Current PQL = 1 µg/L (57 *FR* 31776, July 17, 1992)
DL = 0.1 µg/L [40 CFR 141.24(h)(18)]

5.1.13.2 Results of the PT Data Analysis

The chart in **Exhibit 5-57** shows the PT study passing rates at various concentrations along with the current PQL of 1 µg/L. The data reflect the methods listed above as well as other methods. There were 11 studies conducted for concentrations below the current PQL, all but one of which had passing rates greater than 75%. The one with a passing rate less than 75% is a study that included fewer than ten laboratories. Similarly, the two studies with passing rates less than 75% at concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-57. Evaluation of PT Data for Hexachlorobenzene



Acceptance Criteria = mean ± 2 SD [40 CFR 141.24(h)(19)(i)(B)]

5.1.13.3 PQL Assessment Recommendations

The data below the current PQL of 1 µg/L indicate potential to reduce the PQL. Although one new analytical method has been approved since 2007 (EPA 525.3), the PT data indicate infrequent use of this method. Frequent use of EPA 525.2 may limit the extent to which PT data indicate potential to lower the PQL because of the high MDL range. Therefore, the PQL assessment outcome is inconclusive.

5.1.13.4 Results of the MRL Analysis

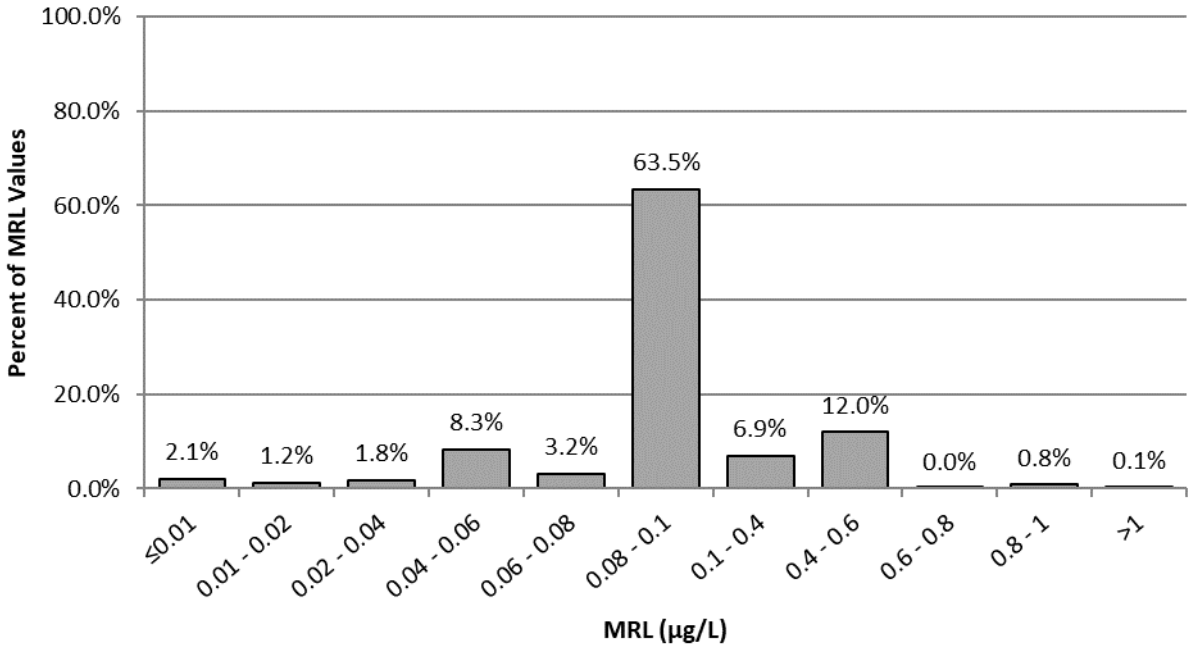
As shown in **Exhibit 5-58**, the modal MRL for hexachlorobenzene is 0.1 µg/L. Approximately 80.2% of the MRL values are equal to or less than the modal value. The percentage of the MRL values that are less than or equal to the mode meets the 80% threshold. Therefore, EPA based the EQL on the modal MRL. **Exhibit 5-59** shows that more than 99% of the MRL values are less than the PQL.

Exhibit 5-58. Summary of MRL Data for Hexachlorobenzene

MRL Value Category	Number of Records	Percentage of Records
All	155,928	100%
Less than mode	34,872	22.4%
Equal to mode (0.1 µg/L)	90,187	57.8%
Greater than mode	30,869	19.8%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-59. MRL Distribution for Hexachlorobenzene



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.13.5 Results of MDL Multiplier Analysis

Exhibit 5-60 shows EPA's approved methods for the detection of hexachlorobenzene, and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 would give a possible EQL range from 0.01 to 1.3 µg/L. The range includes the MRL mode and most of the values are less than the mode.

Exhibit 5-60. MDL Multiplier Values for Hexachlorobenzene

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 505	0.002	0.02
EPA 508	0.0077	0.077
EPA 508.1	0.001	0.01
EPA 525.2	0.13	1.3
EPA 551.1	0.003	0.03
EPA 525.3	Full scan mode: 0.016 SIM mode: 0.0092	Full scan mode: 0.16 SIM mode: 0.092

5.1.13.6 EQL Assessment Recommendation

EPA based the EQL on the MRL mode of 0.1 µg/L. The range of MDL multiplier values also supports this EQL value.

5.1.14 Pentachlorophenol

5.1.14.1 Results of the Method Comparison

Exhibit 5-61 summarizes the MDLs for pentachlorophenol as documented in EPA-approved analytical methods. EPA approved one new analytical method, SM 6640 B, for the analysis of pentachlorophenol in drinking water samples in 2018 (83 *FR* 51644, October 12, 2018). The MDL for the new SM 6640 B is 0.01 – 0.08 µg/L. EPA has approved several methods since NPDWR promulgation, but the MDL values are often greater than the MDL for EPA 515.1. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-61. Analytical Methods for Pentachlorophenol

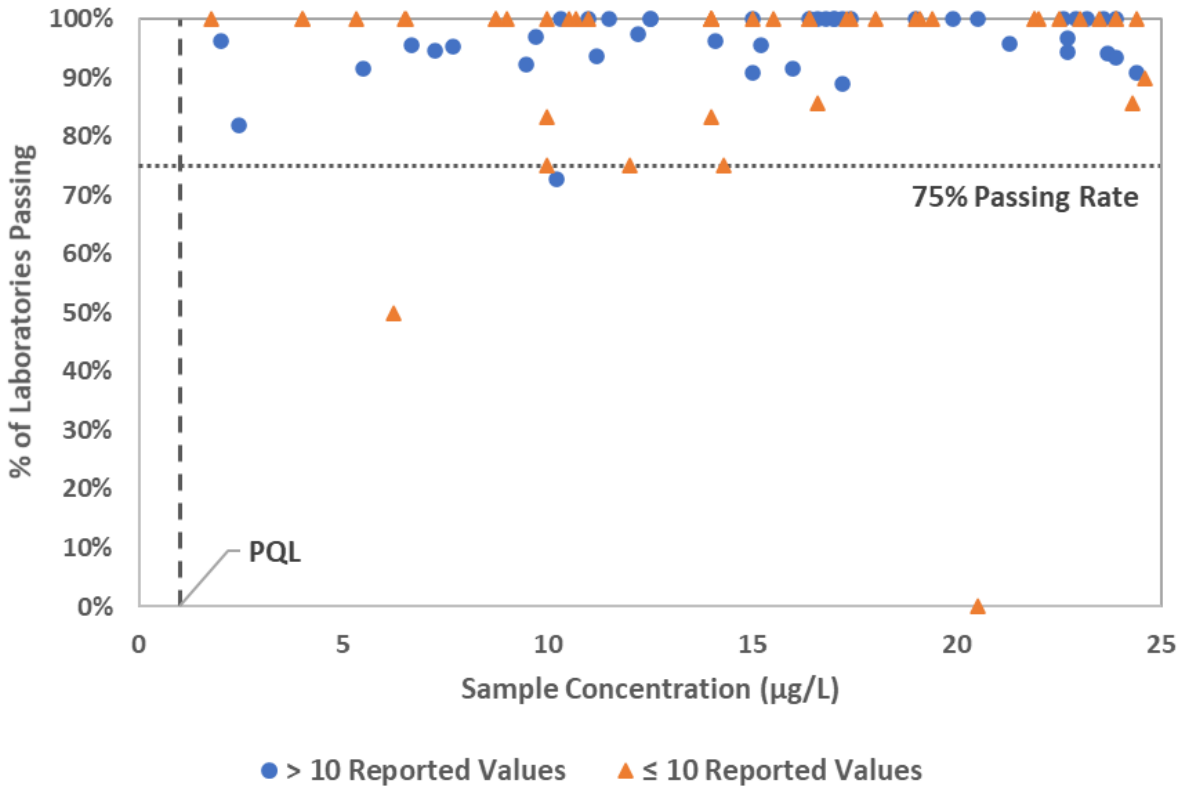
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 515.1 (USEPA, 1995g)	GC/ECD	0.032	13.6%
EPA 515.2* (USEPA, 1995h)	LSE and GC/ECD	0.16	2.5%
EPA 515.3* (USEPA, 1996)	LLE and GC/ECD	0.021 – 0.085	36.0%
EPA 515.4* (USEPA, 2000)	LLME and GC/ECD	0.014 – 0.084	30.7%
EPA 525.2* (USEPA, 1995j)	LSE and CCGC/MS	0.72 – 1.0	7.1%
EPA 525.3* (USEPA, 2012)	SPE and CCGC/MS	Full scan mode: 0.06 – 0.069 SIM mode: 0.047	0.9%
EPA 555* (USEPA, 1992b)	HPLC/UVD	0.15 – 1.6	3.0%
American Society for Testing and Materials (ASTM) D5317* (ASTM, 2000)	GC/ECD	0.076[a]	0.0%
SM 6640 B* (Rodger et al., 2017)	LLME and GC/ECD	0.01 – 0.08	0.1%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
a. Rather than MDL, ASTM D5317 lists an EDL.
MCL = 1 µg/L (0.001 mg/L in 40 CFR 141.61)
Current PQL = 1 µg/L (56 *FR* 30266, July 1, 1991)
DL = 0.04 µg/L [40 CFR 141.24(h)(18)]

5.1.14.2 Results of the PT Data Analysis

The chart in **Exhibit 5-62** shows the PT study passing rates at various concentrations along with the current PQL of 1 µg/L. The data reflect the methods listed above as well as other methods. There were no studies conducted for concentrations below the current PQL. The three studies with passing rates less than 75% include two studies with fewer than ten laboratories.

Exhibit 5-62. Evaluation of PT Data for Pentachlorophenol



Acceptance Criteria = ±50% [40 CFR 141.24(h)(19)(i)(B)]

5.1.14.3 PQL Assessment Recommendation

There are no PT data below the current PQL. Although one new analytical method has been approved since 2007 (EPA 525.3), the PT data indicate infrequent use of this method. Frequent use of either EPA 515.3 or EPA 515.4 indicates limited potential to reduce the PQL.

5.1.14.4 Results of the MRL Analysis

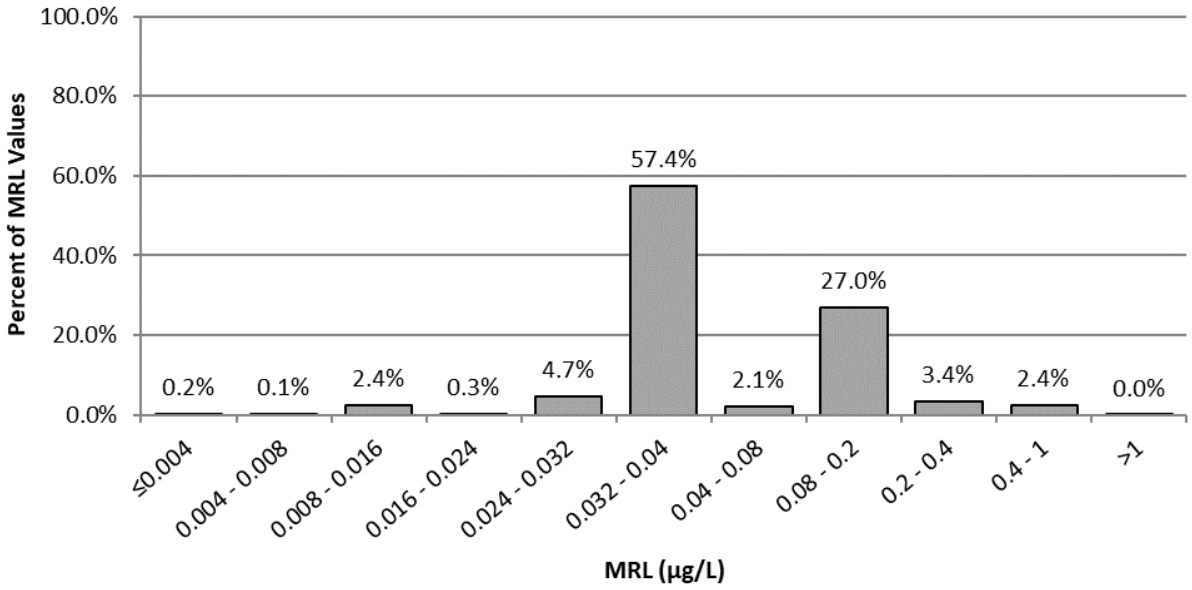
As shown in **Exhibit 5-63** the modal MRL for pentachlorophenol is 0.04 µg/L. Summary data show that 57.2% of the MRLs are equal to this value, and 65.1% of the MRL values are equal to or less than it. The percentage of the MRL values that are less than or equal to the mode does not meet the 80% threshold. Therefore, EPA did not base the EQL on the modal MRL. **Exhibit 5-64** shows that almost all the MRL values are less than the PQL. Consequently, EPA reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-63. Summary of MRL Data for Pentachlorophenol

MRL Value Category	Number of Records	Percentage of Records
All	162,735	100%
Less than mode	12,877	7.9%
Equal to mode (0.04 µg/L)	93,054	57.2%
Greater than mode	56,804	34.9%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-64. MRL Distribution for Pentachlorophenol



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.14.5 Results of MDL Multiplier Analysis

Exhibit 5-65 shows EPA's approved methods for the detection of pentachlorophenol, and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 would give a range from 0.32 to 16 µg/L. Four of these values are greater than the PQL and five of the values are less than the PQL of 1 µg/L. The highest of the values lower than the PQL rounds to 0.9 µg/L, which is slightly less than the PQL. Almost all the MRL values are less than 0.9 µg/L.

Exhibit 5-65. MDL Multiplier Values for Pentachlorophenol

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 515.1	0.032	0.32
EPA 515.2	0.16	1.6
EPA 515.3	0.085	0.85
EPA 515.4	0.084	0.84
EPA 525.2	1.0	10
EPA 525.3	Full scan mode: 0.069 SIM mode: 0.047	Full scan mode: 0.69 SIM mode: 0.47
EPA 555	1.6	16
ASTM D5317	0.076	0.76
SM 6640 B	0.08	0.8

5.1.14.6 EQL Assessment Recommendation

The MRL do not support establishing an EQL value equal to the mode, but support an EQL less than the PQL of 1 µg/L. The MDL data indicate some potential for a lower PQL. Therefore, EPA set an EQL equal to 0.9 µg/L, which is the highest MDL multiplier result less than the PQL.

5.1.15 Polychlorinated Biphenyls (PCBs)

5.1.15.1 Results of the Methods Comparison

Exhibit 5-66 summarizes the MDLs for PCBs as documented in EPA-approved analytical methods. EPA has approved new methods for drinking water quantitation since rule promulgation. These methods are for quantitating arochlors—mixtures of PCB congeners—for screening purposes. Compliance monitoring continues to require EPA 508A to quantitate decachlorobiphenyl. Thus, the newer methods do not indicate potential for a PQL reduction.

Exhibit 5-66. Analytical Methods for PCBs

Approved Method	Technique	MDL (µg/L)
EPA 508A a (USEPA, 1989)	GC/ECD	0.08
EPA 505 b (USEPA, 1995c)	ME and GC	0.08 – 15.0
EPA 508 b (USEPA, 1995e)	GC/ECD	No MDLs
EPA 508.1* b (USEPA, 1995f)	LSE and ECGC	0.012 – 0.044
EPA 525.2* b (USEPA, 1995j)	LSE and CCGC/MS	0.018 – 0.56
EPA 525.3* b (USEPA, 2012)	SPE and CCGC/MS	0.003 – 0.058

Notes:
* New approved analytical method since promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
a. As decachlorobiphenyl.
b. As arochlors; used for screening purposes.
MCL = 0.5 µg/L (0.0005 mg/L in 40 CFR 141.61)
Current PQL = 0.5 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.1 µg/L (as decachlorobiphenyl) [40 CFR 141.24(h)(18)], or 0.08 – 20 µg/L (as arochlors) [40 CFR 141.24(h)(13)]

5.1.15.2 Results of the PT Data Analysis

EPA did not receive PT data for PCBs during the current review cycle. PT data provided for prior cycles included only one study at a concentration less than the PQL, which had a passing

rate less than 75% (USEPA, 2003a; 2009a). Thus, PT data do not indicate potential for a lower PQL.

5.1.15.3 PQL Assessment Recommendation for PCBs

The newer methods do not indicate potential to reduce the PQL because they screen for arochlors; compliance relies on the method approved at promulgation. There are no PT data demonstrating potential to reduce the PQL. Therefore, the PQL assessment does not indicate potential to reduce the PQL.

5.1.15.4 Results of the MRL Analysis

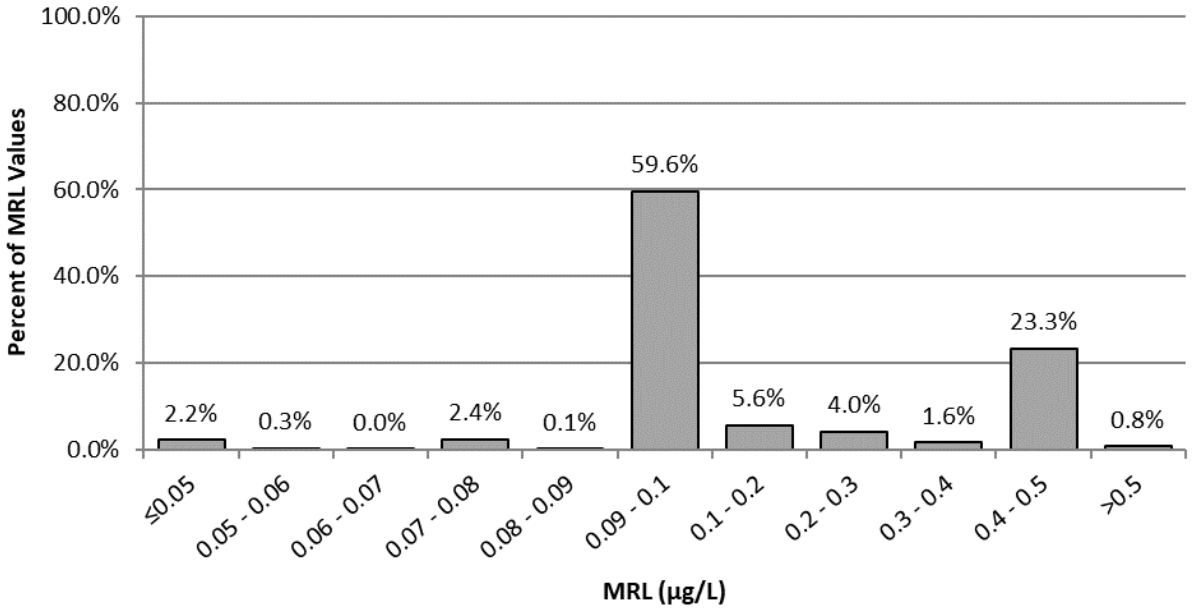
As shown in **Exhibit 5-67**, the modal MRL for PCBs is 0.1 µg/L, which equals the PQL. Summary data show that 54.3% of the MRLs are equal to this value, and 64.7% of the MRL values are equal to or less than it. As shown in **Exhibit 5-68,** the MRL data appear to indicate some potential to lower the PQL because a majority of the MRL values are below the PQL of 0.5 µg/L. Consequently, EPA reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-67. Summary of MRL Data for PCBs

MRL Value Category	Number of Records	Percentage of Records
All	82,610	100%
Less than mode	8,631	10.4%
Equal to mode (0.1 µg/L)	44,831	54.3%
Greater than mode	29,148	35.3%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-68. MRL Distribution for PCBs



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.15.5 Results of MDL Multiplier Analysis

Exhibit 5-69 shows EPA's approved method for the detection of PCBs (as decachlorobiphenyl) for compliance determination and the MDL. Applying a multiplier of 10 would give a possible EQL of 0.8 µg/L, which is greater than the PQL. The MDL data do not support an EQL below the PQL.

Exhibit 5-69. Analytical Methods for PCBs (as decachlorobiphenyl)

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 508A	0.08	0.8

5.1.15.6 EQL Assessment Recommendation

EPA concluded that although a majority of MRL values are generally below the PQL, the MRL mode is not a feasible EQL, and the MDL multiplier value does not support revision of the PQL for PCBs. Therefore, EPA did not develop an EQL.

5.1.16 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8-TCDD)

5.1.16.1 Results of the Method Comparison

Exhibit 5-70 summarizes the MDL for 2,3,7,8-TCDD as documented in EPA-approved analytical methods. No updated or new analytical methods have been approved for the analysis of 2,3,7,8-TCDD in drinking water samples since SYR 2. The last column of the exhibit shows how frequently method EPA 1613 occurs in the PT database. It is the most common method in the PT data.

Exhibit 5-70. Analytical Methods for 2,3,7,8-TCDD

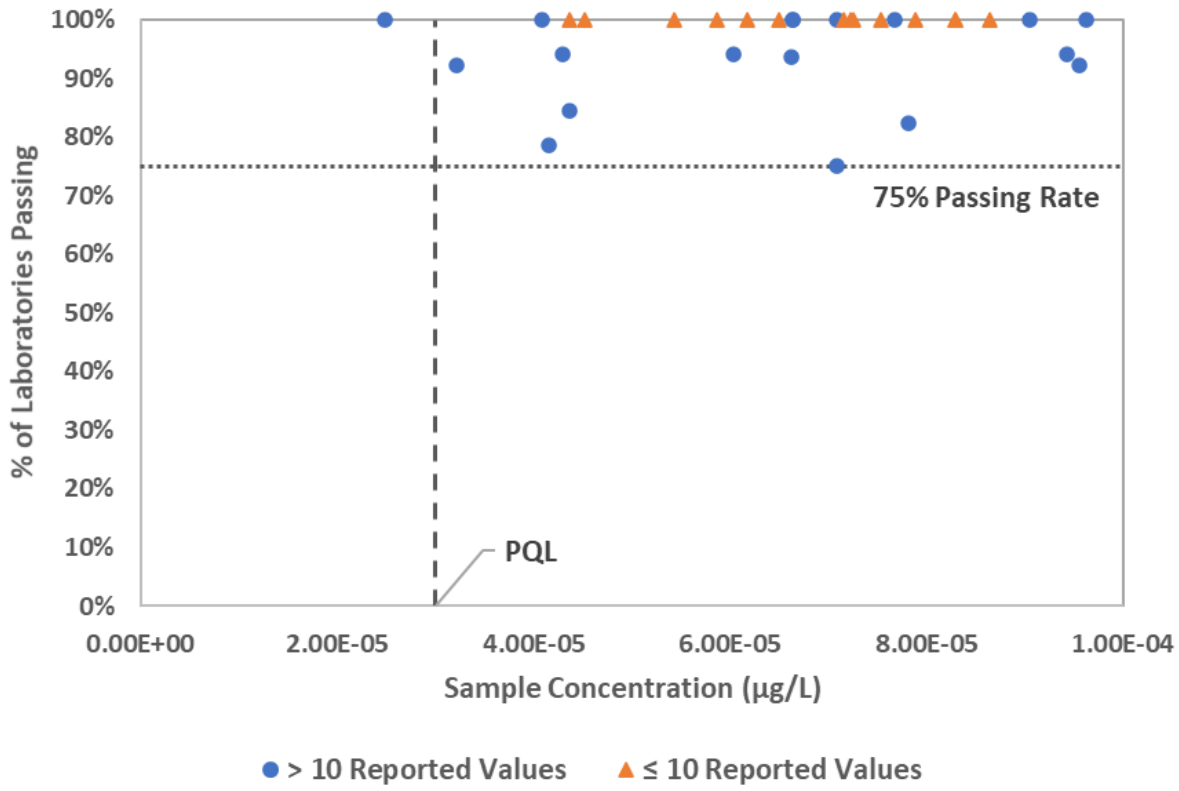
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 1613 (USEPA, 1994a)	HRGC/HRMS	0.0000044 (4.4E-06)	83.4%

Notes:
Regulatory DLs for organic compounds are listed at 40 CFR 141.24(h)(18).
MCL = 0.00003 µg/L ($3x10^{-8}$ mg/L in 40 CFR 141.61)
Current PQL = 0.00003 µg/L (57 *FR* 31776, July 17, 1992)
DL = 0.000005 µg/L [40 CFR 141.24(h)(18)]

5.1.16.2 Results of the PT Data Analysis

The chart in **Exhibit 5-71** shows the PT study passing rates at various concentrations along with the current PQL of 0.00003 µg/L (3.00E-05 µg/L). The data reflect the method listed above as well as other methods. There was one study for a concentration less than the current PQL. The passing rate for that study exceeded 75%. There were no studies with passing rates less than 75% for concentrations greater than the PQL.

Exhibit 5-71. Evaluation of PT Data for 2,3,7,8-TCDD



Acceptance Criteria = mean ± 2 SD [40 CFR 141.24(h)(19)(i)(B)]

5.1.16.3 PQL Assessment Recommendation

The limited data below the current PQL indicates some potential to reduce the PQL. The lack of newer methods with lower detection limits suggests uncertain potential to reduce the PQL.

5.1.16.4 Results of the MRL Analysis

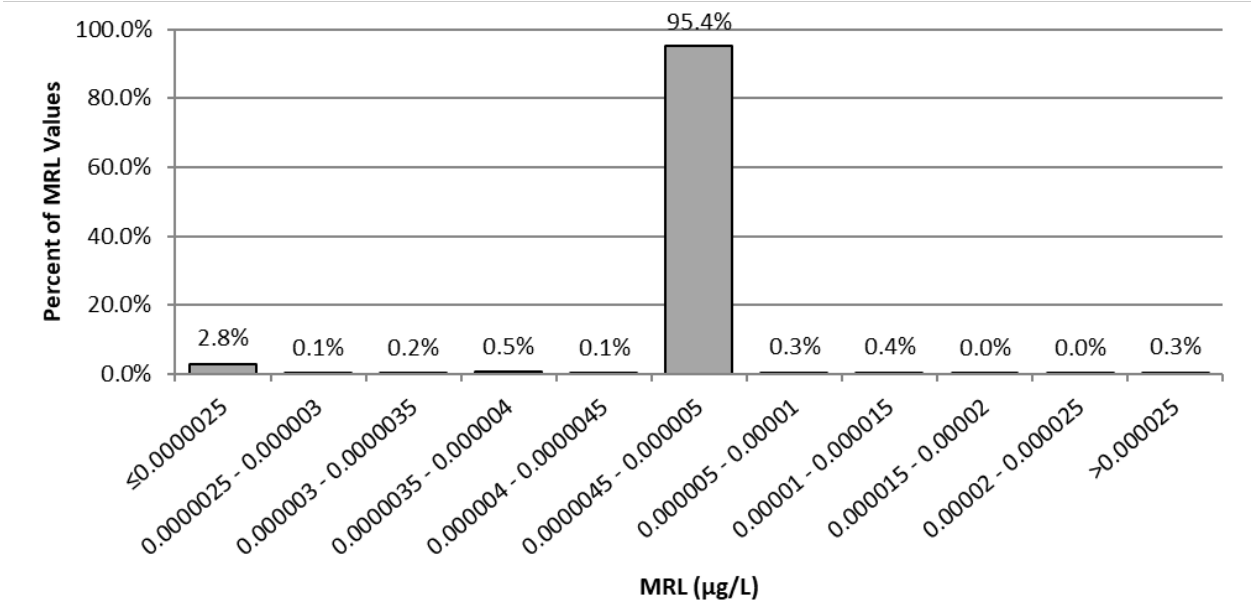
As shown in **Exhibit 5-72** the modal MRL for 2,3,7,8-TCDD is 0.000005 µg/L (5.00E-6 µg/L). Summary data show that 95.1% of the MRLs are equal to this value, and 99% of the MRL values are equal to or less than it. Because more than 80% of the MRL values are less than or equal to 5.00E-6 µg/L, EPA identified the mode as the EQL. In **Exhibit 5-73**, the MRL data indicate that there is potential to lower the PQL because most of the MRL values are less than the PQL. EPA also reviewed MDL values to determine whether they support an EQL below the PQL.

Exhibit 5-72. Summary of MRL Data for 2,3,7,8-TCDD

MRL Value Category	Number of Records	Percentage of Records
All	20,294	100%
Less than mode	783	3.9%
Equal to mode (5.00E-6 µg/L)	19,298	95.1%
Greater than mode	213	1.0%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-73. MRL Distribution for 2,3,7,8-TCDD



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.16.5 Results of MDL Multiplier Analysis

Exhibit 5-74 shows EPA's approved method for the detection of 2,3,7,8-TCDD, and the MDL. Applying a multiplier of five would give a possible EQL of 0.000022 (2.20E-5) µg/L, which is less than the PQL, but not as low as the modal MRL. EPA instead used the modal MRL to establish the EQL.

Exhibit 5-74. MDL Multiplier Values for 2,3,7,8-TCDD

Method	MDL (µg/L)	MDL x 5 (µg/L)
EPA 1613	4.40E-6	2.20E-5

5.1.16.6 EQL Assessment Recommendation

The MRL data support setting an EQL equal to the MRL mode of 5.00E-6 µg/L. Although this value is less than the MDL multiplier result, 99% of MRL values were less than or equal to the MRL value.

5.1.17 Tetrachloroethylene

5.1.17.1 Results of the Method Comparison

Exhibit 5-75 summarizes the MDLs for tetrachloroethylene as documented in EPA-approved analytical methods. EPA approved three new analytical methods for tetrachloroethylene since NPDWR promulgation, including two recent methods: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The full scan mode sub-method MDLs for EPA Method 524.3 and EPA Method 524.4 and the SIM mode MDL for EPA 524.4 fall within the range of other approved methods for tetrachloroethylene. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2.

Exhibit 5-75. Analytical Methods for Tetrachloroethylene

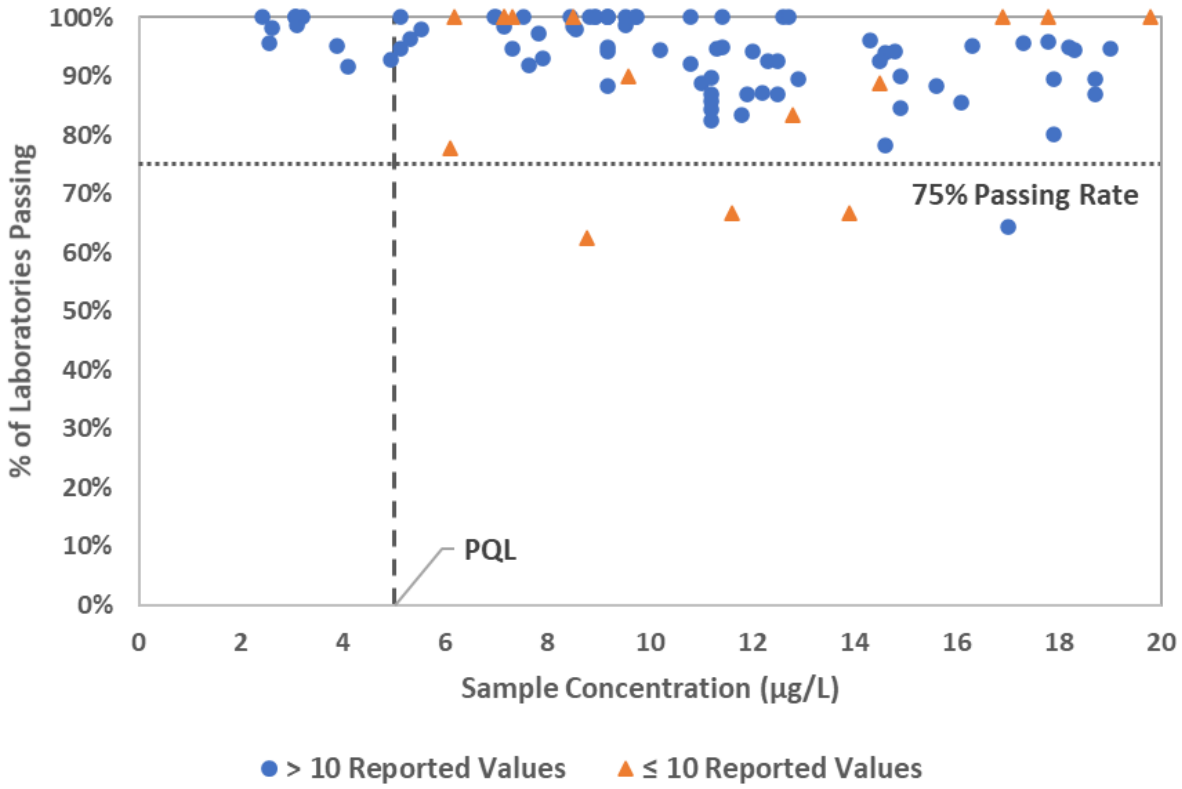
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.02 – 0.05	1.7%
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.05 – 0.14	80.6%
EPA 551.1 (USEPA, 1995l)	LLE and GC/ECD	0.002 – 0.008	<0.1%
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.036 SIM mode: not given	7.0%
EPA 524.4* (USEPA, 2013)	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.059 SIM mode: 0.011	0.5%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 5 µg/L (0.005 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.1.17.2 Results of the PT Data Analysis

The chart in **Exhibit 5-76** shows the PT study passing rates at various concentrations along with the current PQL of 5 µg/L. The data reflect the methods listed above as well as other methods. There were 11 studies conducted for concentrations below the current PQL, all of which had passing rates greater than 75%. Three of the four studies with passing rates less than 75% for concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-76. Evaluation of PT Data for Tetrachloroethylene



Acceptance Criteria = ±20% (≥10 µg/L) or ±40% (<10 µg/L) [40 CFR 141.24(f)(17)(i)]

5.1.17.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is up to two orders of magnitude less than PQL. This usage pattern suggests widespread capability to quantitate below the PQL. The PT data further demonstrate laboratory capability to quantitate below the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.1.17.4 Results of the MRL Analysis

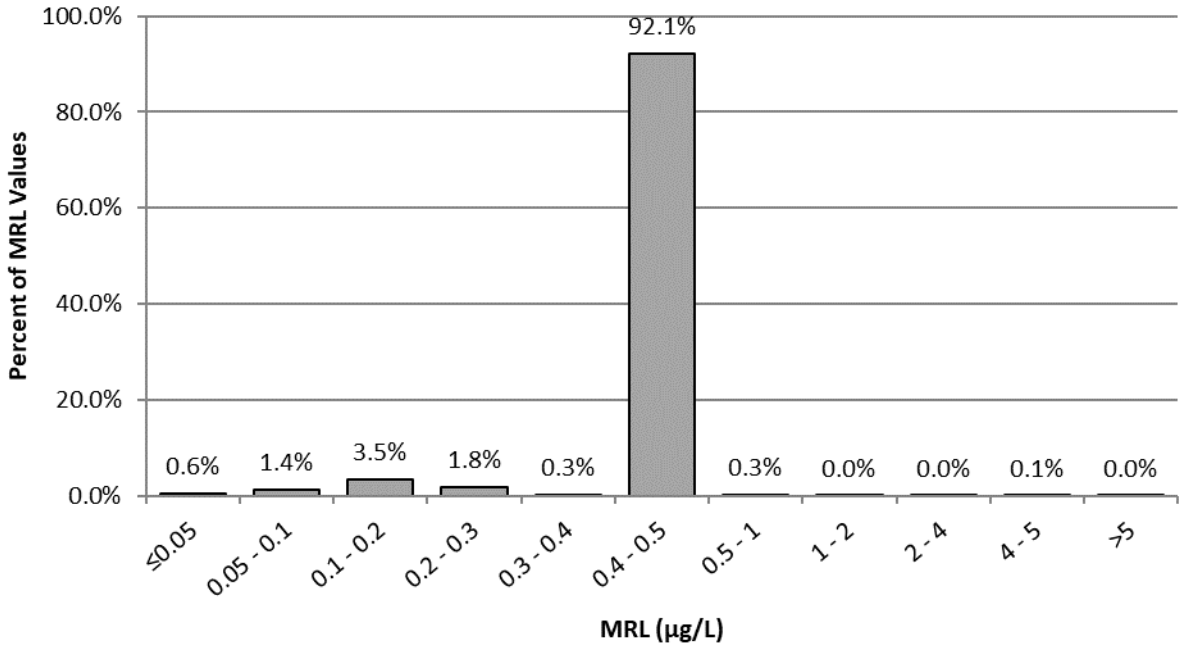
As shown in **Exhibit 5-77**, the modal MRL for tetrachloroethylene is 0.5 µg/L. Summary data show that 91.8% of the MRLs are equal to this value and 99.6% are equal to or less than it. **Exhibit 5-78** shows that the range including the mode dominates the probability distribution. Like the PT data, the MRL data indicate potential to lower the PQL. Almost all the MRL values are below the PQL of 5 µg/L. The percentage of the MRL values that are less than or equal to the mode exceeds the 80% threshold to use the mode as an EQL. Therefore, EPA based the EQL on the modal MRL.

Exhibit 5-77. Summary of MRL Data for Tetrachloroethylene

MRL Value Category	Number of Records	Percentage of Records
All	474,380	100%
Less than mode	37,237	7.8%
Equal to mode (0.5 µg/L)	435,345	91.8%
Greater than mode	1,798	0.4%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-78. MRL Distribution for Tetrachloroethylene



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.17.5 Results of MDL Multiplier Analysis

Exhibit 5-79 shows EPA's approved methods for the detection of tetrachloroethylene, and corresponding MDLs or upper bound values of MDL ranges. Multiplying the MDLs by 10 results in a possible EQL range from 0.08 to 1.4 µg/L. Although the range of values is less than the PQL, the upper bound is greater than the MRL mode. The MDL multiplier result for method EPA 524.2 is 1.4 µg/L, which was the most reported method in the PT data. Nevertheless, the MDL data support an EQL below the PQL.

Exhibit 5-79. MDL Multiplier Values for Tetrachloroethylene

Approved Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.05	0.5
EPA 524.2	0.14	1.4
EPA 551.1	0.008	0.08
EPA 524.3	Full scan mode: 0.036	0.36
EPA 524.4	Full scan mode: 0.059 SIM mode: 0.011	Full scan mode: 0.59 SIM mode: 0.11

5.1.17.6 EQL Assessment Recommendation

The MRL data support an EQL value equal to the mode of 0.5 µg/L. The MDL multiplier analysis supports an EQL less than the PQL, but the upper bound of the range is greater than the MRL mode. Nevertheless, EPA selected the MRL mode as an EQL given the overwhelming evidence in the monitoring results that laboratories can quantitate the contaminant above 0.5 µg/L.

5.1.18 Thallium

5.1.18.1 Results of the Method Comparison

Exhibit 5-80 summarizes the MDLs for thallium as documented in EPA-approved analytical methods. EPA has approved two updated or new analytical methods for the analysis of thallium since NPDWR promulgation. The MDL values do not indicate potential to lower the PQL, however. The last column of the exhibit shows how frequently each method occurs in the PT database, which contains 4,806 results for thallium. The most common method is EPA 200.8, followed by EPA 200.9.

Exhibit 5-80. Analytical Methods for Thallium

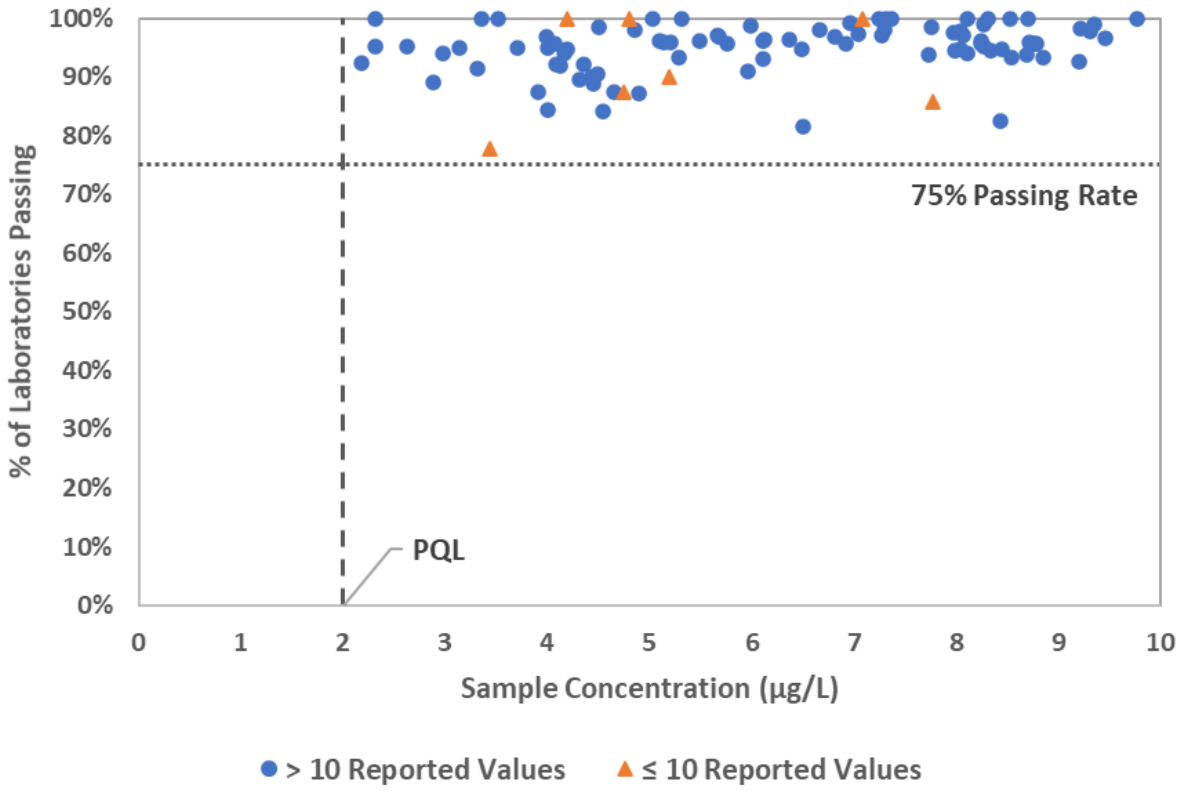
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 200.7 (USEPA, 2001a)*	Inductively Coupled Plasma - Atomic Emission Spectrometry	1	10.5%
EPA 200.8 (USEPA, 1994b)	ICP with MS	Scan mode: 0.3 SIM model: 0.02	63.8%
EPA 200.9 (USEPA, 1994c)	Graphite Furnace Atomic Absorption	0.7	12.7%
SM 3125* (Lipps et al., 2020)	ICP with MS	0.03	0.5%

Notes:
* New approved analytical method since NPDWR promulgation (83 *FR* 51644, October 12, 2018).
MCL = 2 µg/L (0.002 mg/L in 40 CFR 141.61)
Current PQL = 2 µg/L (57 *FR* 31776, July 17, 1992)
DL = 0.3-1.0 µg/L [40 CFR 141.23(a)(4)(i)]

5.1.18.2 Results of the PT Data Analysis

The chart in **Exhibit 5-81** shows the PT study passing rates at various concentrations along with the current PQL of 2 µg/L. The data reflect the methods listed above as well as other methods. There were no studies conducted for concentrations below the current PQL. All the studies had passing rates greater than 75%.

Exhibit 5-81. Evaluation of PT Data for Thallium



Acceptance Criteria = ±30% (≥ 2 µg/L) [40 CFR 141.23(k)(3)(ii)]

5.1.18.3 PQL Assessment Recommendation

Given the lack of PT data below the current PQL, the PT do not indicate potential to reduce the PQL. The frequent use of EPA 200.8 also indicates limited potential to revise the PQL.

5.1.18.4 Results of the MRL Analysis

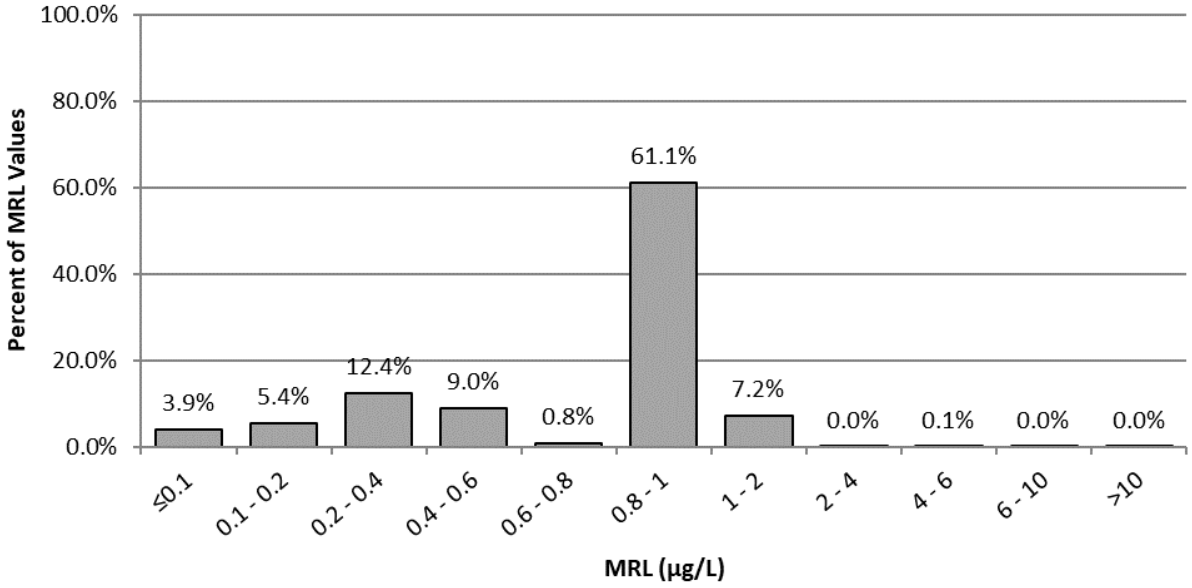
As shown in **Exhibit 5-82,** the modal MRL for thallium is 1 µg/L, which is greater than the current MCLG of 0.5 µg/L. Summary data show that 61.1% of the MRLs are equal to the MRL, and 92.6% of the MRL values are equal to or less than it. The percentage of the MRL values that are less than or equal to the mode meets the 80% threshold. Therefore, EPA based the EQL on the modal MRL. **Exhibit 5-83** shows that more than 99% of the MRL values are less than or equal to the PQL.

Exhibit 5-82. Summary of MRL Data for Thallium

MRL Value Category	Number of Records	Percentage of Records
All	184,507	100%
Less than mode	58,106	31.5%
Equal to mode (1 µg/L)	112,767	61.1%
Greater than mode	13,634	7.4%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-83. MRL Distribution for Thallium



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.18.5 Results of MDL Multiplier Analysis

Exhibit 5-84 shows EPA's approved methods for the detection of thallium, and the MDLs. Applying a multiplier of 10 would give a possible EQL range of 3.0 to 10 µg/L. The PQL is less than this range. The MDL data do not support an EQL below the PQL.

Exhibit 5-84. MDL Multiplier Values for Thallium

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 200.7	1	10
EPA 200.8	0.3	3
EPA 200.9	0.7	7
SM 3125	0.03	0.3

5.1.18.6 EQL Assessment Recommendation

The MRL data support an EQL value equal to the mode of 1 µg/L. The MDL multiplier analysis does not support an EQL less than the PQL. Nevertheless, EPA selected the MRL mode as an EQL given the overwhelming evidence in the monitoring results that laboratories can quantitate the contaminant above 1 µg/L. This value is greater than the current MCLG.

5.1.19 Toxaphene

5.1.19.1 Results of the Method Comparison

Exhibit 5-85 summarizes the MDLs for toxaphene as documented in EPA-approved analytical methods. EPA has approved three analytical methods for toxaphene since NDPWR promulgation. The MDL values for two of these methods are less than the MDL for Method EPA

505. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 505, followed by EPA 508.

Exhibit 5-85. Analytical Methods for Toxaphene

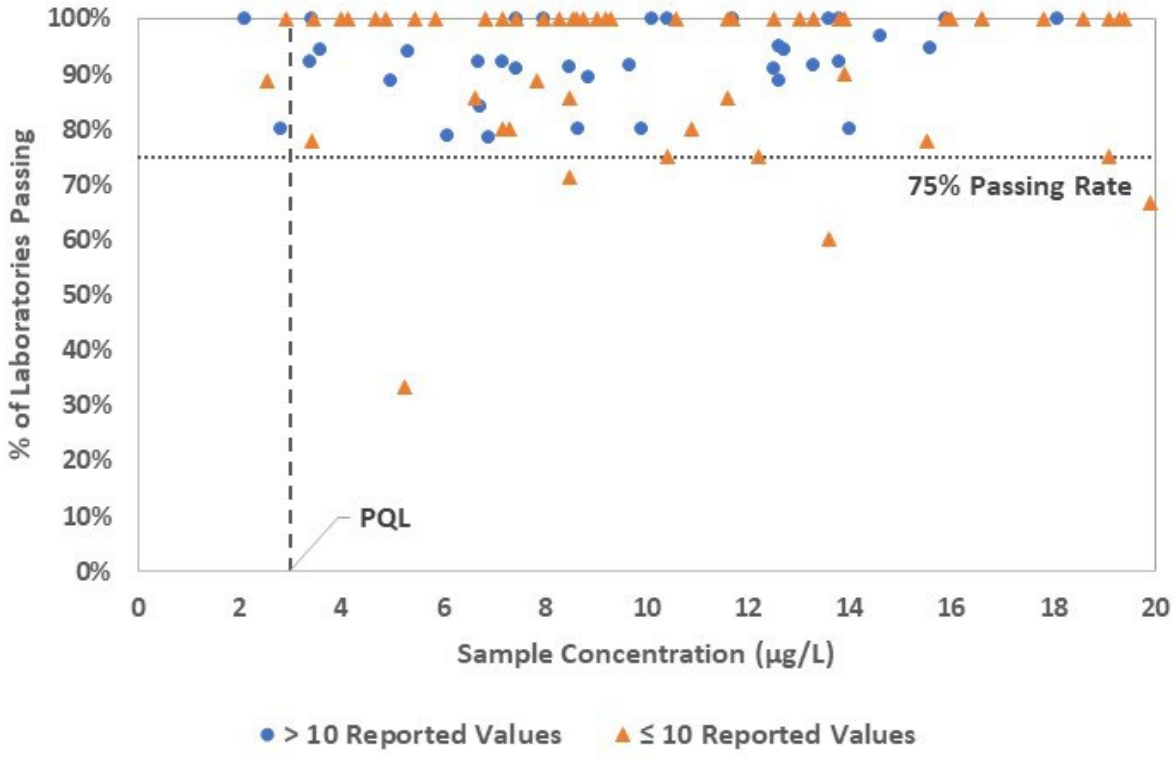
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 505 (USEPA, 1995c)	ME and GC	1.0	38.2%
EPA 508 (USEPA, 1995e)	GC/ECD	Not given	23.4%
EPA 508.1* (USEPA, 1995f)	LSE and ECGC	0.13	20.8%
EPA 525.2* (USEPA, 1995j)	LSE and CCGC/MS	1.0 – 1.7	15.8%
EPA 525.3* (USEPA, 2012)	SPE and CCGC/MS	0.32	0.6%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 3 µg/L (0.003 mg/L in 40 CFR 141.61)
Current PQL = 3 µg/L (56 *FR* 3526, January 30, 1991)
DL = 1.0 µg/L [40 CFR 141.24(h)(18)]

5.1.19.2 Results of the PT Data Analysis

The chart in **Exhibit 5-86** shows the PT study passing rates at various concentrations along with the current PQL of 3 µg/L. The data reflect the methods listed above as well as other methods. There were four studies conducted for concentrations below the current PQL, all of which had passing rates greater than 75%. The four studies with passing rates less than 75% for concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-86. Evaluation of PT Data for Toxaphene



Acceptance Criteria = ±45% [40 CFR 141.24(h)(19)(i)(B)]

5.1.19.3 PQL Assessment Recommendation

The limited data below the current PQL indicate uncertain potential to reduce the PQL. Methods developed after promulgation have lower MDL values indicating limited potential to reduce the PQL.

5.1.19.4 Results of the MRL Analysis

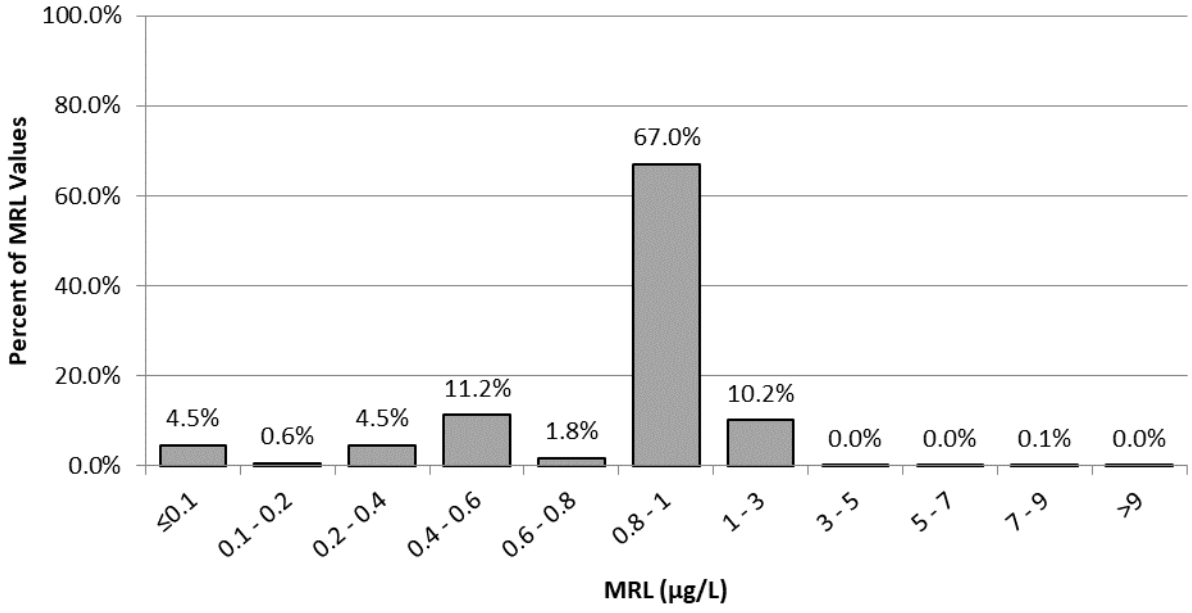
As shown in **Exhibit 5-87**, the modal MRL is 1 µg/L. Approximately 89.7% of the MRL values are equal to or less than the modal value. This percentage meets the 80% threshold. Therefore, EPA based the EQL on the modal MRL. **Exhibit 5-88** shows that more than 99% of the MRL values are less than the PQL. EPA reviewed MDL values to determine whether they also support an EQL below the PQL.

Exhibit 5-87. Summary of MRL Data for Toxaphene

MRL Value Category	Number of Records	Percentage of Records
All	145,265	100%
Less than mode	38,369	26.4%
Equal to mode (1 µg/L)	92,002	63.3%
Greater than mode	14,894	10.3%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-88. MRL Distribution for Toxaphene



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.19.5 Results of MDL Multiplier Analysis

Exhibit 5-89 shows EPA's approved methods for the detection of toxaphene, and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 would give a possible EQL range from 1.3 to 17 µg/L. Three of the values are greater than the PQL; only the lower bound is less than the PQL.

Exhibit 5-89. MDL Multiplier Values for Toxaphene

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 505	1.0	10
EPA 508	no MDL	no MDL
EPA 508.1	0.13	1.3
EPA 525.2	1.7	17
EPA 525.3	0.32	3.2

5.1.19.6 EQL Assessment Recommendation

The MRL data support setting an EQL equal to the MRL mode of 1 µg/L. Although this value is less than the MDL multiplier range, almost 90% of MRL values were less than or equal to the MRL value.

5.1.20 Trichloroethylene

5.1.20.1 Results of the Method Comparison

Exhibit 5-90 summarizes the MDLs for trichloroethylene as documented in EPA-approved analytical methods. EPA approved three new analytical methods for trichloroethylene since NPDWR promulgation, including two recent methods: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The full scan mode sub-method MDLs for EPA Method 524.3 and EPA Method 524.4 and the SIM mode MDL for EPA 524.4 fall within the range of other approved methods for trichloroethylene. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-90. Analytical Methods for Trichloroethylene

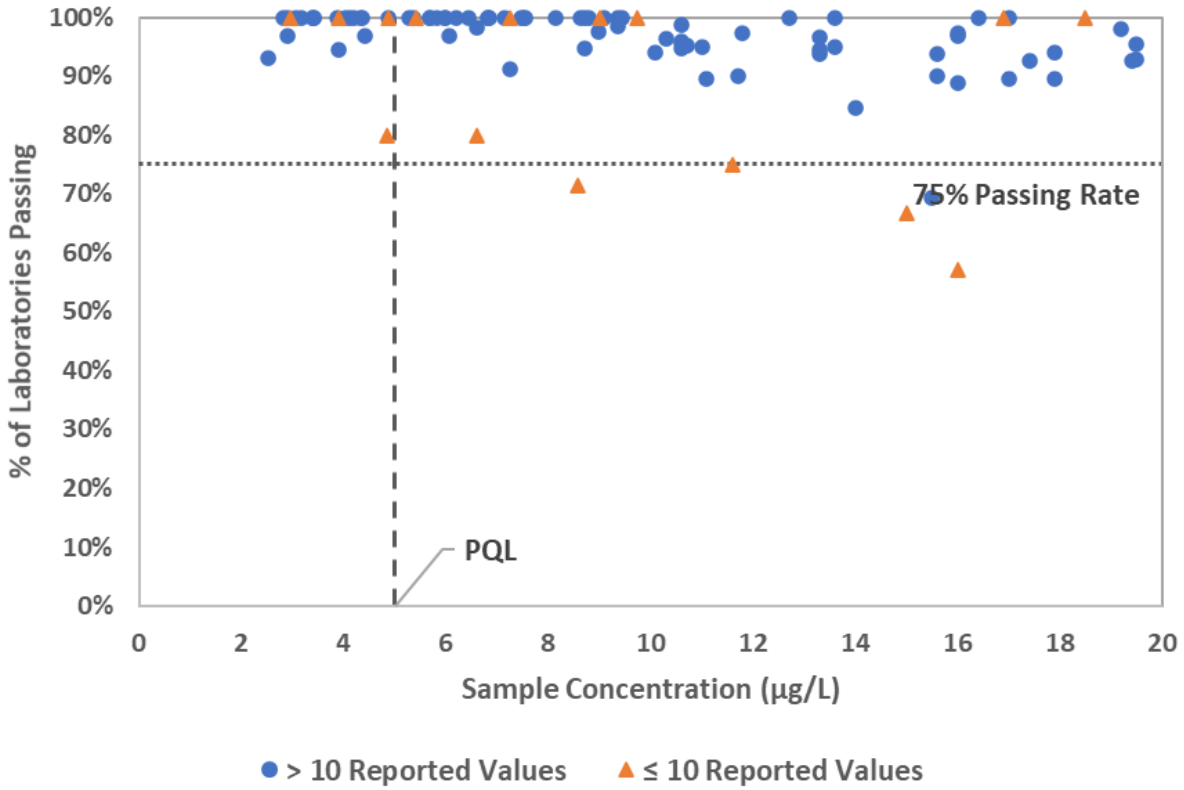
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.01 – 0.06	1.8%
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.02 – 0.19	80.2%
EPA 551.1 (USEPA, 1995l)	LLE and GC/ECD	0.002 – 0.042	0%
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.035 SIM mode: not given	7.2%
EPA 524.4* (USEPA, 2013)	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.078 SIM mode: 0.012	0.5%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 5 µg/L (0.005 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (52 *FR* 25690, July 8, 1987)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.1.20.2 Results of the PT Data Analysis

The chart in **Exhibit 5-91** shows the PT study passing rates at various concentrations along with the current PQL of 5 µg/L. The data reflect the methods listed above as well as other methods. There were 22 studies conducted for concentrations below the current PQL, all of which had passing rates greater than 75%. Three of the four studies with passing rates less than 75% for concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-91. Evaluation of PT Data for Trichloroethylene



Acceptance Criteria = ±20% (≥10 µg/L) or ±40% (<10 µg/L) [40 CFR 141.24(f)(17)(i)]

5.1.20.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is two orders of magnitude less than PQL. This usage pattern suggests widespread capability to quantitate below the PQL. The PT data further demonstrate laboratory capability to quantitate below the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.1.20.4 Results of the MRL Analysis

As shown in **Exhibit 5-92**, the modal MRL for trichloroethylene is 0.5 µg/L. Summary data show that 91.8% of the MRLs are equal to this value and 99.6% are equal to or less than it. **Exhibit 5-93** shows that the range including the mode dominates the probability distribution. Like the PT data, the MRL data indicate potential to lower the PQL. Almost all the MRL values are below the PQL of 5 µg/L. The percentage of the MRL values that are less than or equal to the

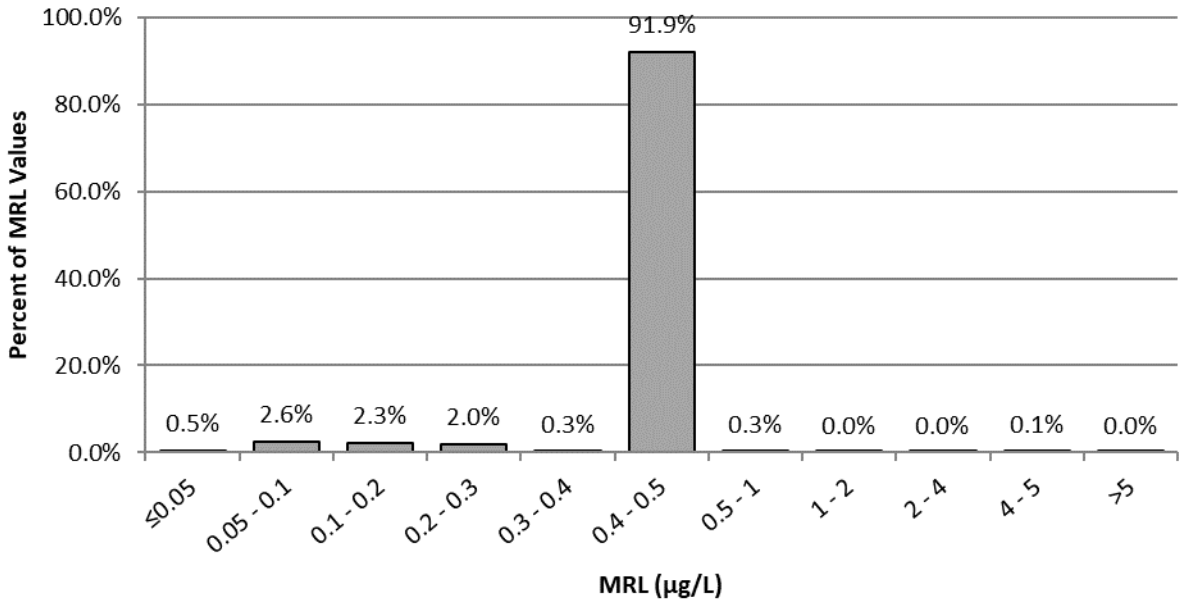
mode exceeds the 80% threshold to use the mode as an EQL. Therefore, EPA based the EQL on the modal MRL.

Exhibit 5-92. Summary of MRL Data for Trichloroethylene

MRL Value Category	Number of Records	Percentage of Records
All	475,446	100%
Less than mode	37,301	7.8%
Equal to mode (0.5 µg/L)	436,365	91.8%
Greater than mode	1,780	0.4%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-93. MRL Distribution for Trichloroethylene



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.20.5 Results of MDL Multiplier Analysis

Exhibit 5-94 shows EPA's approved methods for the detection of trichloroethylene, and corresponding MDLs or upper bound values of MDL ranges. Multiplying the MDLs by 10 results in a possible EQL range from 0.12 to 1.9 µg/L. Although the range of values is less than the PQL, the upper bound is greater than the MRL mode. The MDL multiplier result for method EPA 524.2 is 1.9 µg/L, which was the most reported method in the PT data. Nevertheless, the MDL data support an EQL below the PQL.

Exhibit 5-94. MDL Multiplier Values for Trichloroethylene

Approved Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.06	0.6
EPA 524.2	0.19	1.9
EPA 551.1	0.042	0.42
EPA 524.3	Full scan mode: 0.035	0.35
EPA 524.4	Full scan mode: 0.078 SIM mode: 0.012	Full scan mode: 0.78 SIM mode: 0.12

5.1.20.6 EQL Assessment Recommendation

The MRL data support an EQL value equal to the mode of 0.5 µg/L. The MDL multiplier analysis supports an EQL less than the PQL, but the upper bound of the range is greater than the MRL mode. Nevertheless, EPA selected the MRL mode as an EQL given the overwhelming evidence in the monitoring results that laboratories can quantitate the contaminant above 0.5 µg/L.

5.1.21 1,1,2-Trichloroethane

5.1.21.1 Results of the Method Comparison

Exhibit 5-95 summarizes the MDLs for 1,1,2-trichloroethane as documented in EPA-approved analytical methods. EPA approved three analytical methods for 1,1,2-trichloroethane since NPDWR promulgation, including two recent methods: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The SIM mode MDL of EPA Method 524.4 has a lower MDL than the other approved methods. The last column of the exhibit shows how frequently each method occurs in the PT database, which contains 2,884 results for 1,1,2-trichloroethane. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-95. Analytical Methods for 1,1,2-Trichloroethane

Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2	GC/ECD	0.04	1.7%
EPA 524.2	CCGC/MS	0.03 – 0.1	84.5%
EPA 551.1*	LLE and GC/ECD	0.012 – 0.017	<0.1%
EPA 524.3*	CCGC/MS	Full scan mode: 0.048 SIM mode: not given	7.3%
EPA 524.4*	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.048 SIM mode: 0.01	0.5%

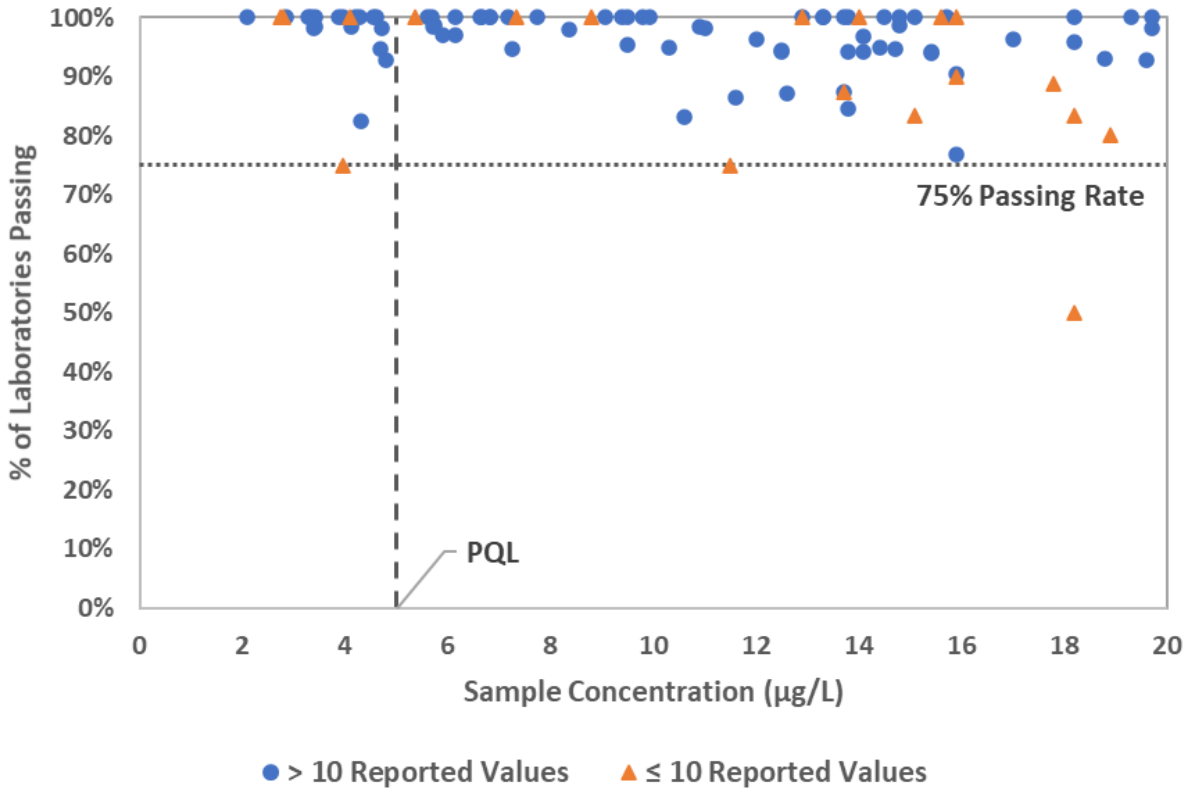
Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 5 µg/L (0.005 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (57 *FR* 31776, July 17, 1992)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.1.21.2 Results of the PT Data Analysis

The chart in **Exhibit 5-96** shows the PT study passing rates at various concentrations along with the current PQL of 5 µg/L. The data reflect the methods listed above as well as other methods. There were 22 studies conducted for concentrations below the current PQL, all of which had

passing rates equal to or greater than 75%. The one study with a passing rate less than 75% at a concentration greater than the PQL included fewer than ten laboratories.

Exhibit 5-96. Evaluation of PT Data for 1,1,2-Trichloroethane



Acceptance Criteria = ±20% (≥10 µg/L) or ±40% (<10 µg/L) [40 CFR 141.24(f)(17)(i)]

5.1.21.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is two orders of magnitude less than PQL. This usage pattern suggests widespread capability to quantitate lower than the PQL. The PT data similarly demonstrate laboratory capability to quantitate lower than the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.1.21.4 Results of the MRL Analysis

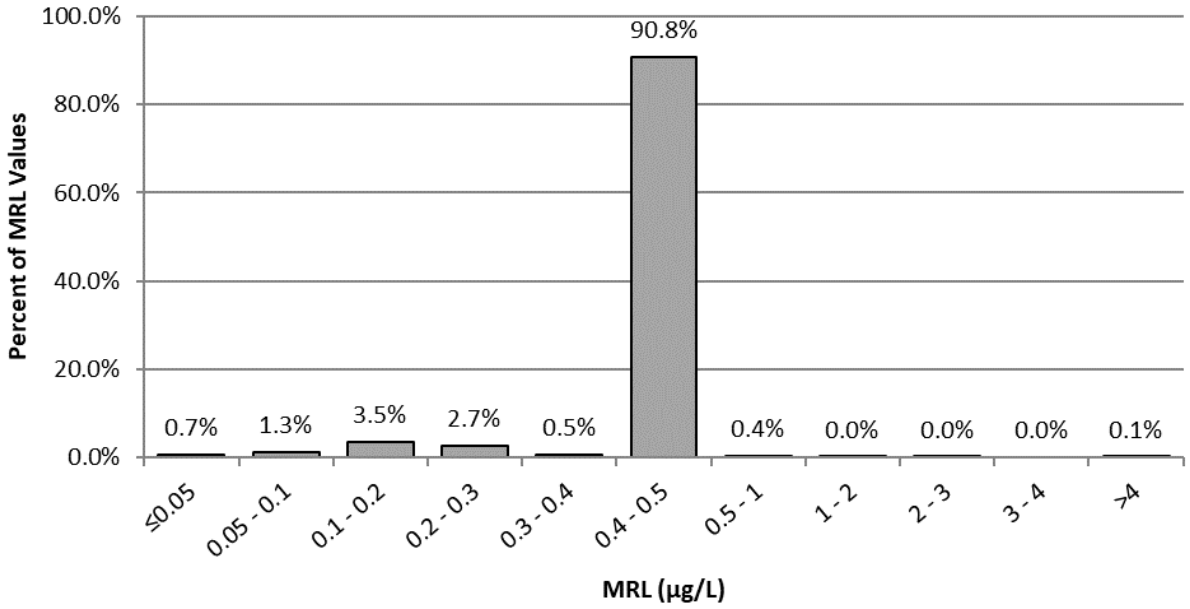
As shown in **Exhibit 5-97**, the modal MRL is 0.5 µg/L, which is less than the MCLG of 3 µg/L. More than 99% of MRL values are less than the mode. **Exhibit 5-98** shows that more than 99.9% of MRL values are less than or equal to the MCLG. Although the MRL mode meets criteria to be an EQL, the mode is less than the MCLG. Consequently, the MCLG is the appropriate threshold for the occurrence analysis.

Exhibit 5-97. Summary of MRL Data for 1,1,2-Trichloroethane

MRL Value Category	Number of Records	Percentage of Records
All	137,544	100%
Less than mode	18,378	13.4%
Equal to mode (0.5 µg/L)	117,947	85.8%
Greater than mode	1,219	0.9%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: Fourth SYR cycle ICR database (USEPA, 2024a)

Exhibit 5-98. MRL Distribution for 1,1,2-Trichloroethane



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.21.5 Results of MDL Multiplier Analysis

Exhibit 5-99 shows EPA's approved methods for the detection of 1,1,2-trichloroethane, and the MDLs. Applying a multiplier of 10 would give a possible EQL range from 0.17 to 1 µg/L. This range is below the current MCLG, which further supports use of the MCLG as the threshold in the occurrence analysis.

Exhibit 5-99. MDL Multiplier Values for 1,1,2 for Trichloroethane

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.04	0.4
EPA 524.2	0.1	1
EPA 551.1	0.017	0.17
EPA 524.3	Full scan mode: 0.048	0.48
EPA 524.4	SIM mode: 0.01	0.1

5.1.21.6 EQL Assessment Recommendation

The MRL data and the MDL multiplier results support using the current MCLG of 3 µg/L as an EQL.

5.1.22 Vinyl Chloride

5.1.22.1 Results of the Method Comparison

Exhibit 5-100 summarizes the MDLs for vinyl chloride as documented in EPA-approved analytical methods. EPA approved two new analytical methods for vinyl chloride since NPDWR promulgation: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The full scan mode sub-method MDLs for EPA Method 524.3 and EPA Method 524.4 fall within the range of other approved methods for vinyl chloride. The SIM mode MDL for EPA 524.4 is an order of magnitude smaller than other approved methods for vinyl chloride. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-100. Analytical Methods for Vinyl Chloride

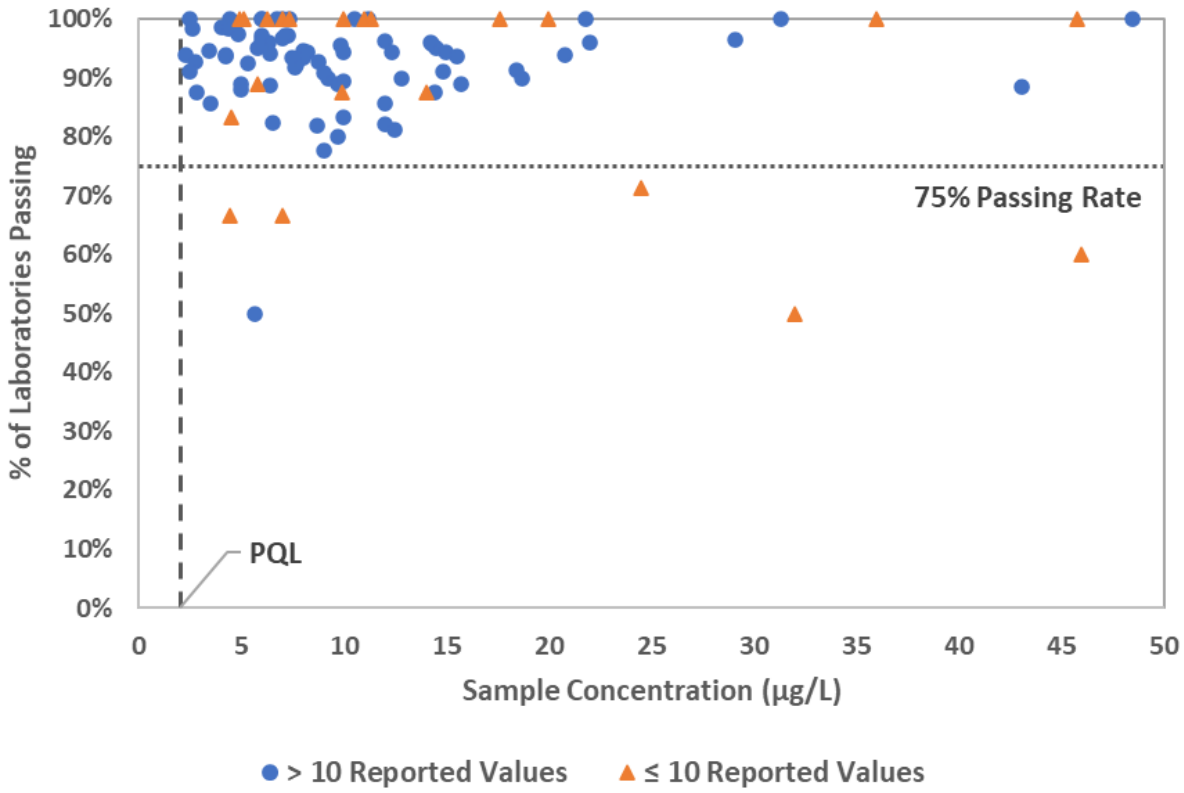
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.01 – 0.18	1.9%
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.04 – 0.17	85.0%
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.029 SIM mode: not given	7.2%
EPA 524.4* (USEPA, 2013)	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.063 SIM mode: 0.007	0.5%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 2 µg/L (0.002 mg/L in 40 CFR 141.61)
Current PQL = 2 µg/L (52 *FR* 25690, July 8, 1987)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.1.22.2 Results of the PT Data Analysis

The chart in **Exhibit 5-101** shows the PT study passing rates at various concentrations along with the current PQL of 2 µg/L. The data reflect the methods listed above as well as other methods. There were no studies conducted for concentrations below the current PQL. Five of the six studies with passing rates less than 75% for concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-101. Evaluation of PT Data for Vinyl Chloride



Acceptance Criteria = ±40% [40 CFR 141.24(f)(17)(ii)]

5.1.22.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is two orders of magnitude less than PQL. This usage pattern suggests widespread capability to quantitate below the PQL. The PT data do not show quantitation capabilities at concentrations less than the PQL. Therefore, the PQL assessment indicates uncertain potential for a lower PQL.

5.1.22.4 Results of the MRL Analysis

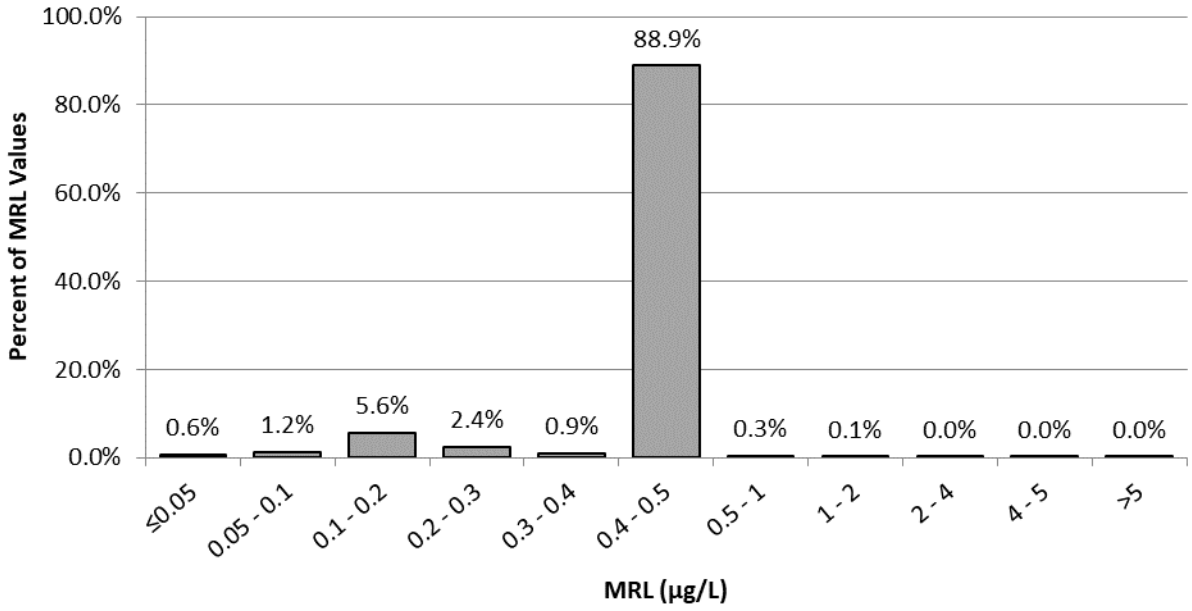
As shown in **Exhibit 5-102**, the modal MRL for vinyl chloride is 0.5 µg/L. Summary data show that 88.9% of the MRLs are equal to this value and 99.6% are equal to or less than it. **Exhibit 5-103** shows that the range including the mode dominates the probability distribution. Like the PT data, the MRL data indicate potential to lower the PQL. Almost all the MRL values are below the PQL of 5 µg/L. The percentage of the MRL values that are less than or equal to the mode exceeds the 80% threshold to use the mode as an EQL. Therefore, EPA based the EQL on the modal MRL.

Exhibit 5-102. Summary of MRL Data for Vinyl Chloride

MRL Value Category	Number of Records	Percentage of Records
All	424,050	100%
Less than mode	45,541	10.7%
Equal to mode (0.5 µg/L)	376,780	88.9%
Greater than mode	1,729	0.4%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-103. MRL Distribution for Vinyl Chloride



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.1.22.5 Results of MDL Multiplier Analysis

Exhibit 5-104 shows EPA's approved methods for the detection of vinyl chloride, and corresponding MDLs or upper bound values of MDL ranges. Multiplying the MDLs by 10 results in a possible EQL range from 0.07 to 1.8 µg/L. Although the range of values is less than the PQL, the upper bound is greater than the MRL mode. The MDL multiplier range for method EPA 524.2 is 0.07-1.8 µg/L, which was the most reported method in the PT data. Nevertheless, the MDL data support an EQL below the PQL.

Exhibit 5-104. MDL Multiplier Values for Vinyl Chloride

Approved Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.18	1.8
EPA 524.2	0.17	1.7
EPA 524.3	Full scan mode: 0.029	0.29
EPA 524.4	Full scan mode: 0.063 SIM mode: 0.007	Full scan mode: 0.63 SIM mode: 0.07

5.1.22.6 EQL Assessment Recommendation

The MRL data support an EQL value equal to the mode of 0.5 µg/L. The MDL multiplier analysis supports an EQL less than the PQL, but the upper bound of the range is greater than the MRL mode. Nevertheless, EPA selected the MRL mode as an EQL given the overwhelming evidence in the monitoring results that laboratories can quantitate the contaminant above 0.5 µg/L.

5.2 Contaminants for which PQL is Greater than Potential MCLG and MCL

During SYR 4, EPA determined that there as health effects information that could affect the MCLG values for several contaminants (USEPA, 2024b). For several of these, there is potential to reduce the MCLG to a value lower than both the current MCLG and PQL. **Exhibit 1-3** provided a list of these contaminants and the following sections provide assessments of whether analytical feasibility support quantitating to levels as low as the potential MCLG.

5.2.1 Antimony

EPA identified a potential MCLG value of 2 µg/L for antimony (USEPA, 2024b). The current PQL of 6 µg/L would limit setting an MCL equal to 2 µg/L. Thus, the analytical feasibility analysis specifically seeks to determine whether a PQL as low as 2 µg/L is feasible.

5.2.1.1 Results of the Method Comparison

Exhibit 5-105 summarizes the MDLs for antimony as documented in EPA-approved analytical methods. EPA has approved updated or new analytical methods for the analysis of antimony in drinking water samples since NPDWR promulgation.

Exhibit 5-105. Analytical Methods for Antimony

Method	Technique	MDL (µg/L)
EPA 200.8 (USEPA, 1994b)	ICP/MS	0.02 – 0.4
EPA 200.9 (USEPA, 1994c)	Graphite Furnace Atomic Absorption	0.8
EPA 200.5* (USEPA, 2003c)	AVICP – AES	0.9
SM 3113 B* (Rodger et al., 2017)	Electrothermal Atomic Absorption Spectrometry	3
ASTM D3697-12* (ASTM, 2012)	Atomic Absorption Spectrometry	1

Notes:
* New approved analytical method since NPDWR promulgation (83 *FR* 51644, October 12, 2018).
MCL = 6 µg/L (0.006 mg/L in 40 CFR 141.23)
Current PQL = 6 µg/L (57 *FR* 31776, July 17, 1992)
DL = 3 µg/L [40 CFR 141.23(a)(4)(i)]

5.2.1.2 Results of the PT Data Analysis

EPA did not obtain PT data for antimony during the current review cycle. PT data provided for prior review cycles did not include studies conducted at concentrations less than the PQL (USEPA, 2009a). Thus, PT data are not sufficient to indicate potential for a lower PQL.

5.2.1.3 PQL Assessment Recommendation

The MDL ranges for newer methods do not indicate potential to reduce the PQL. There are no recent PT data demonstrating potential to reduce the PQL and data available during prior review cycles were limited and did not indicate potential to reduce the PQL (USEPA, 2009a). Therefore, the PQL assessment does not indicate potential to reduce the PQL.

5.2.1.4 Results of the MRL Analysis

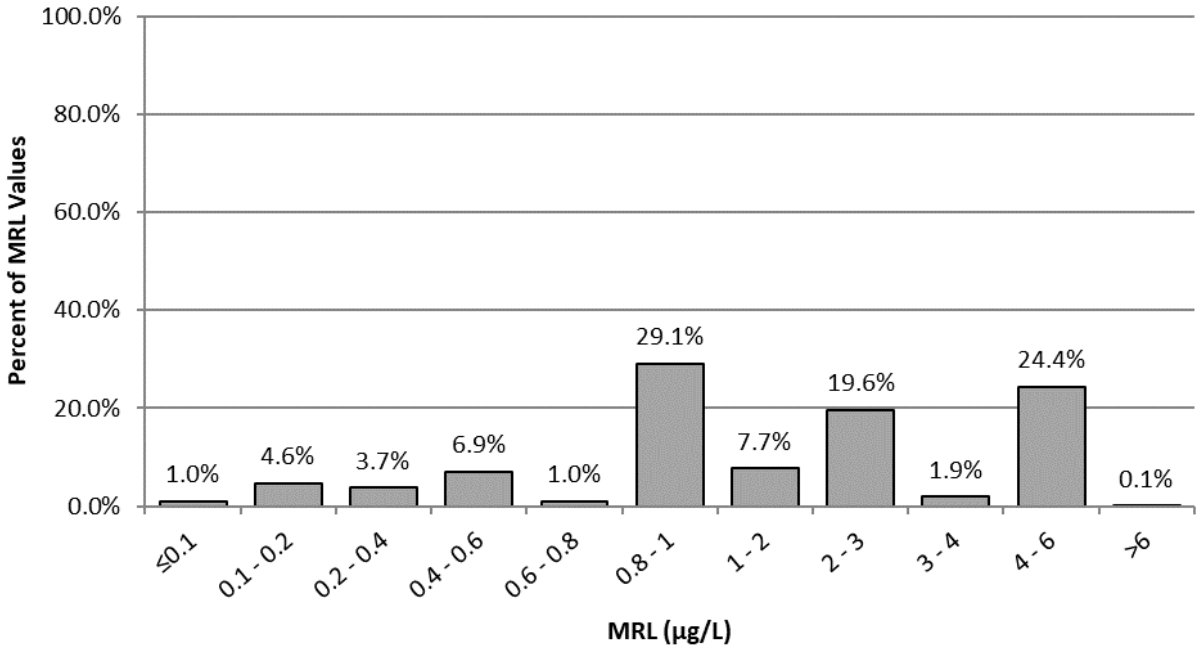
As shown in **Exhibit 5-106** the modal MRL for antimony is 1 µg/L, which is less than the PQL. Summary data show that 29.1% of the MRLs are equal to this value, and 46.3% of the MRL values are equal to or less than it. The mode is also less than the potential MCLG of 2 µg/L. **Exhibit 5-107** shows that only 54% of the MRL values are less than or equal to 2 µg/L. Thus, the MRL data do not support use of the potential MCLG for the occurrence analysis.

Exhibit 5-106. Summary of MRL Data for Antimony

MRL Value Category	Number of Records	Percentage of Records
All	185,382	100%
Less than mode	31,973	17.2%
Equal to mode (1 µg/L)	53,912	29.1%
Greater than mode	99,497	53.7%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-107. MRL Distribution for Antimony



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, can have a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.2.1.5 Results of MDL Multiplier Analysis

Exhibit 5-108 shows EPA's approved methods for the detection of antimony, and the MDLs. Applying a multiplier of 10 would result in possible EQL values ranging from 4 to 30 µg/L. Four of the values are greater than the current PQL. The only value less than the PQL, 4 µg/L, is also less than more than 24% of MRL values in **Exhibit 5-107**. The MDL approach does not indicate a feasible EQL.

Exhibit 5-108. MDL Multiplier Values for Antimony

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 200.8	0.4	4
EPA 200.9	0.8	8
EPA 200.5	0.9	9
SM 3113 B	3	30
ASTM D3697	1	10

5.2.1.6 EQL Assessment Recommendation

Thus, EPA determined that the potential MCLG cannot be the occurrence threshold. EPA did not identify a feasible EQL less than the PQL.

5.2.2 Cadmium

EPA identified a potential MCLG value of 0.7 µg/L for cadmium (USEPA, 2024b). The current PQL of 2 µg/L would limit setting an MCL equal to 0.7 µg/L. Thus, the analytical feasibility analysis specifically seeks to determine whether a PQL as low as 0.7 µg/L is feasible.

5.2.2.1 Results of the Method Comparison

Exhibit 5-109 summarizes the MDLs for cadmium as documented in EPA-approved analytical methods. EPA has approved updated or new analytical methods for the analysis of cadmium in drinking water samples since NPDWR promulgation. The MDL values are similar to the methods promulgated with the rule.

Exhibit 5-109. Analytical Methods for Cadmium

Method	Technique	MDL (µg/L)
EPA 200.7 (USEPA, 2001a)	Inductively Coupled Plasma – Atomic Emission Spectrometry	1
EPA 200.8 (USEPA, 1994b)	ICP with MS	0.03 – 0.5
EPA 200.9 (USEPA, 1994c)	Graphite Furnace Atomic Absorption	0.05
EPA 200.5* (2003c)	AVICP – AES	0.1
SM 3113 B* (Rodger et al. 2017)	Electrothermal Atomic Absorption Spectrometry	0.05

Notes:
* New approved analytical method since NPDWR promulgation (83 *FR* 51644, October 12, 2018).
MCL = 5 µg/L (0.005 mg/L in 40 CFR 141.23)
Current PQL = 2 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.1 µg/L [40 CFR 141.23(a)(4)(i)]

5.2.2.2 Results of the PT Data Analysis

EPA did not receive PT data for cadmium during the current review cycle. PT data provided for prior review cycles did not include studies conducted at concentrations less than the PQL (USEPA, 2009a). Thus, PT data are not sufficient to indicate potential for a lower PQL.

5.2.2.3 PQL Assessment Recommendation

The MDL ranges for newer methods do not indicate potential to reduce the PQL. EPA did not obtain PT data for antimony during the current review cycle. PT data provided for prior review cycles did not include studies conducted at concentrations less than the PQL (USEPA, 2009a). Thus, PT data are not sufficient to indicate potential for a lower PQL. Therefore, the PQL assessment does not indicate potential to reduce the PQL.

5.2.2.4 Results of the MRL Analysis

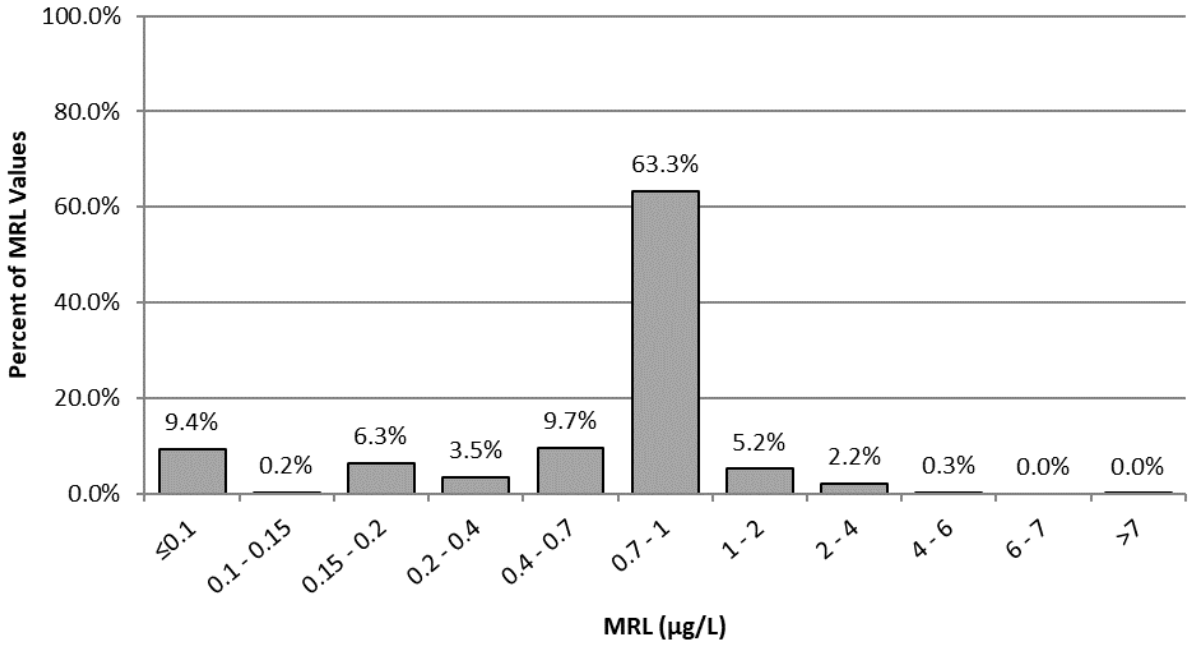
As shown in **Exhibit 5-110**, the modal MRL for cadmium is 1 µg/L, which is less than the PQL of 2 µg/L. Summary data show that 62.9 % of the MRLs are equal to this value, and 92.3% of the MRL values are equal to or less than it. **Exhibit 5-111** shows that a majority of the MRL values are greater than the potential MCLG of 0.7 µg/L. Thus, the MRL data support use of the modal MRL as the EQL, but not the potential MCLG.

Exhibit 5-110. Summary of MRL Data for Cadmium

MRL Value Category	Number of Records	Percentage of Records
All	185,346	100%
Less than mode	54,543	29.4%
Equal to mode (1 µg/L)	116,615	62.9%
Greater than mode	14,188	7.7%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-111. MRL Distribution for Cadmium



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.2.2.5 Results of MDL Multiplier Analysis

Exhibit 5-112 shows EPA's approved methods for the detection of cadmium, and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 would result in possible EQL values ranging from 0.5 to 10 µg/L. Three of the values are greater than the potential MCLG of 0.7 µg/L and two are greater than the PQL of 2 µg/L. The highest value that is less than the PQL is 1 µg/L, which is also the modal MRL.

Exhibit 5-112. MDL Multiplier Values for Cadmium

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 200.7	1	10
EPA 200.8	0.5	5
EPA 200.9	0.05	0.5
EPA 200.5*	0.1	1
SM 3113 B*	0.05	0.5

5.2.2.6 EQL Assessment Recommendation

EPA determined that the potential MCLG cannot be the occurrence threshold. EPA identified the modal MRL of 1 µg/L as an EQL and the MDL data support this selection.

5.2.3 Carbofuran

EPA identified a potential MCLG value of 0.3 µg/L for carbofuran (USEPA, 2024b). The current PQL of 7 µg/L would limit setting an MCL equal to 0.3 µg/L. Thus, the analytical feasibility analysis specifically seeks to determine whether a PQL as low as 0.3 µg/L is feasible.

5.2.3.1 Results of the Method Comparison

Exhibit 5-113 summarizes the MDLs for carbofuran as documented in EPA-approved analytical methods. EPA has not approved updated or new analytical methods for the analysis of carbofuran in drinking water samples since SYR 3, but approved methods since NPDWR promulgation including SM 6610 B in 2009. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 531.1, followed by EPA 531.2.

Exhibit 5-113. Analytical Methods for Carbofuran

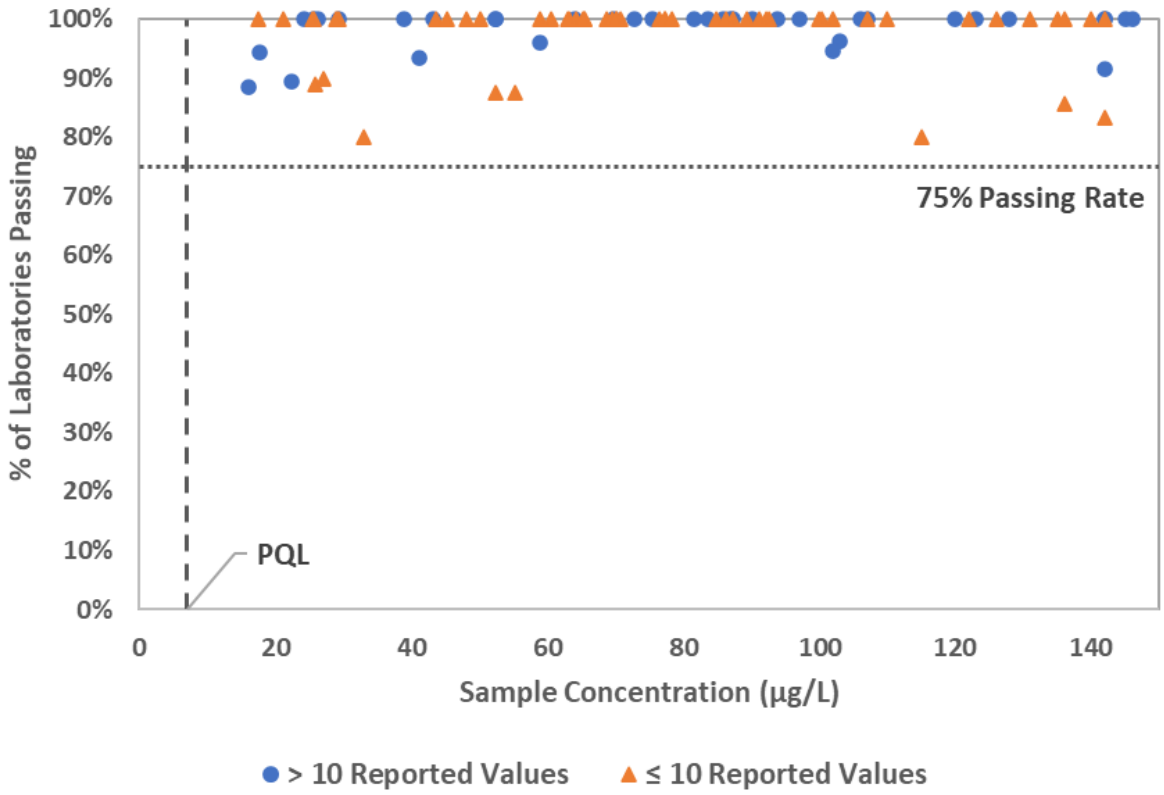
Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 531.1 (USEPA, 1995k)	DAI/HPLC	0.52	66.7%
EPA 531.2* (USEPA, 2001b)	DAI/HPLC	0.043 – 0.058	26.3%
SM 6610 B** (Rodger et al., 2017)	HPLC with Post Column Derivatization and Fluorescence Detection	1.5	0.0%

Notes:
* New approved analytical method since NPDWR promulgation (83 *FR* 51644, October 12, 2018).
**Approved in expedited approval action for the determination of carbofuran in 2009 (74 *FR* 38348).
MCL = 40 µg/L (0.04 mg/L in 40 CFR 141.61)
Current PQL = 7 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.9 µg/L [40 CFR 141.24(h)(18)]

5.2.3.2 Results of the PT Data Analysis

The chart in **Exhibit 5-114** shows the PT study passing rates at various concentrations along with the current PQL of 7 µg/L. The data reflect the methods listed above as well as other methods. There were no studies conducted for concentrations below the current PQL. The passing rates for all the studies for concentrations greater than the PQL are greater than 75%. The lower passing rates tend to involve studies that included ten or fewer laboratories.

Exhibit 5-114. Evaluation of PT Data for Carbofuran



Acceptance Criteria = ±45% [40 CFR 141.24(h)(19)(i)(B)]

5.2.3.3 PQL Assessment Recommendation

There are no PT data demonstrating potential to reduce the PQL. Although one new analytical method has been approved since 2007 (SM 6610 B), the PT data indicate no use of this method. Frequent use of EPA 531.1 indicates limited potential to reduce the PQL. Therefore, the PQL assessment does not indicate potential to reduce the PQL.

5.2.3.4 Results of the MRL Analysis

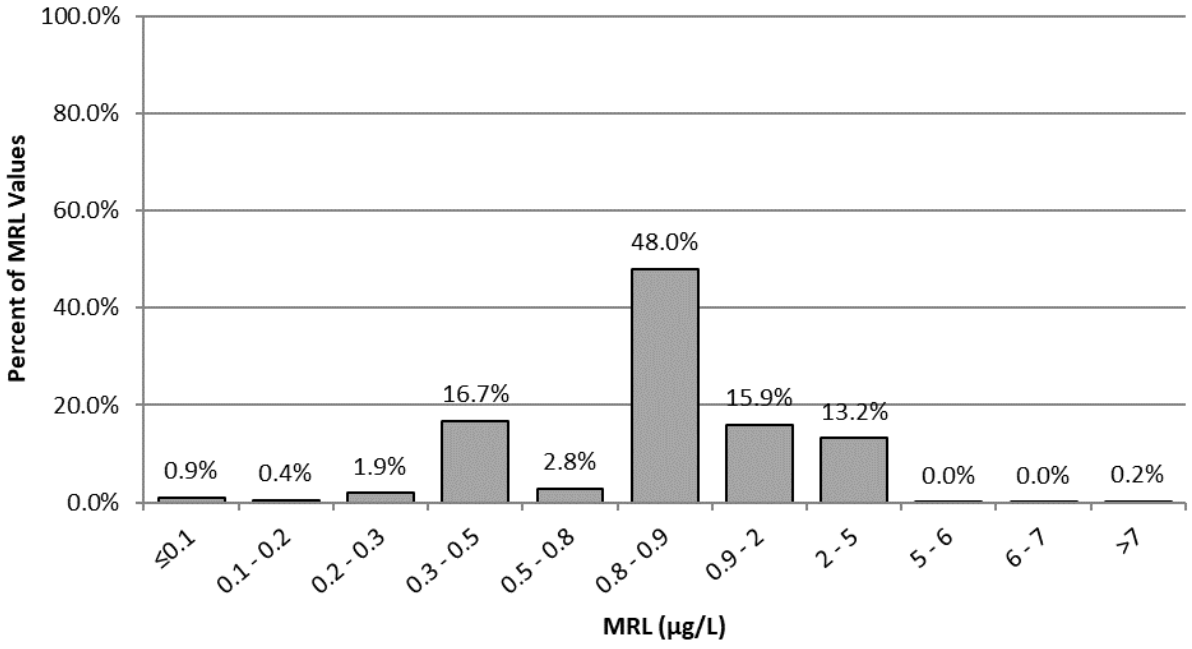
As shown in **Exhibit 5-115,** the modal MRL for carbofuran is 0.9 µg/L, which is less than the PQL of 7 µg/L, but greater than the potential MCLG of 0.3 µg/L. **Exhibit 5-116** shows that a majority of MRL values exceed the potential MCLG, which means it cannot be used for the occurrence analysis. Summary data show that 47.9% of the MRLs are equal to the mode, and 70.7% of the MRL values are equal to or less than it. Therefore, a threshold cannot be based on the mode. EPA reviewed MDL values to determine whether they support a threshold between the potential MCLG and the PQL.

Exhibit 5-115. Summary of MRL Data for Carbofuran

MRL Value Category	Number of Records	Percentage of Records
All	138,416	100%
Less than mode	31,489	22.7%
Equal to mode (0.9 µg/L)	66,321	47.9%
Greater than mode	40,606	29.3%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-116. MRL Distribution for Carbofuran



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.2.3.5 Results of MDL Multiplier Analysis

Exhibit 5-117 shows EPA's approved methods for the detection of carbofuran, and the MDLs. Applying a multiplier of 10 would result in possible EQL values ranging from 0.58 to 15 µg/L. The range exceeds the potential MCLG but extends below the current PQL. Excluding the value greater than the PQL, the next highest value is 5.2 µg/L, which rounds to 5 µg/L. Almost all the MRL values are less than or equal to 5 µg/L.

Exhibit 5-117. MDL Multiplier Values for Carbofuran

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 531.1	0.52	5.2
EPA 531.2	0.058	0.58
SM 6610 B	1.5	15

5.2.3.6 EQL Assessment Recommendation

Thus, EPA determined that the potential MCLG cannot be the occurrence threshold. EPA used the highest value below the PQL (5.2 µg/L) and rounded down to 5.0 µg/L to obtain an EQL. **Exhibit 5-116** shows that over 99% of the MRL values are less than or equal to this value.

5.2.4 Cyanide

EPA identified a potential MCLG value of 4 µg/L for cyanide (USEPA, 2024b). The current PQL of 100 µg/L would limit setting an MCL equal to 4 µg/L. Thus, the analytical feasibility analysis specifically seeks to determine whether a PQL as low as 4 µg/L is feasible.

5.2.4.1 Results of the Method Comparison

Exhibit 5-118 summarizes the MDLs for cyanide as documented in EPA-approved analytical methods. The MDL for one of the methods is not reported. EPA approved several methods after NDPWR promulgation. In addition to the analytical methods approved for the analysis of cyanide in drinking water samples during the years 2008-2014, Kelada-01 (USEPA, 2001c), QuickChem-10-204-00-1-X (Lachat) (Lachat Instruments, 2000), OIA-1677, DW (USEPA, 2004), and ME355.01 were approved in 2009. Three methods—EPA 335.4, SM 4500-CN C, and SM 4500-CN D—now have MDLs that were previously not reported (MWRA, 2017). The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is SM 4500-CN E, followed by EPA 335.4.

Exhibit 5-118. Analytical Methods for Cyanide

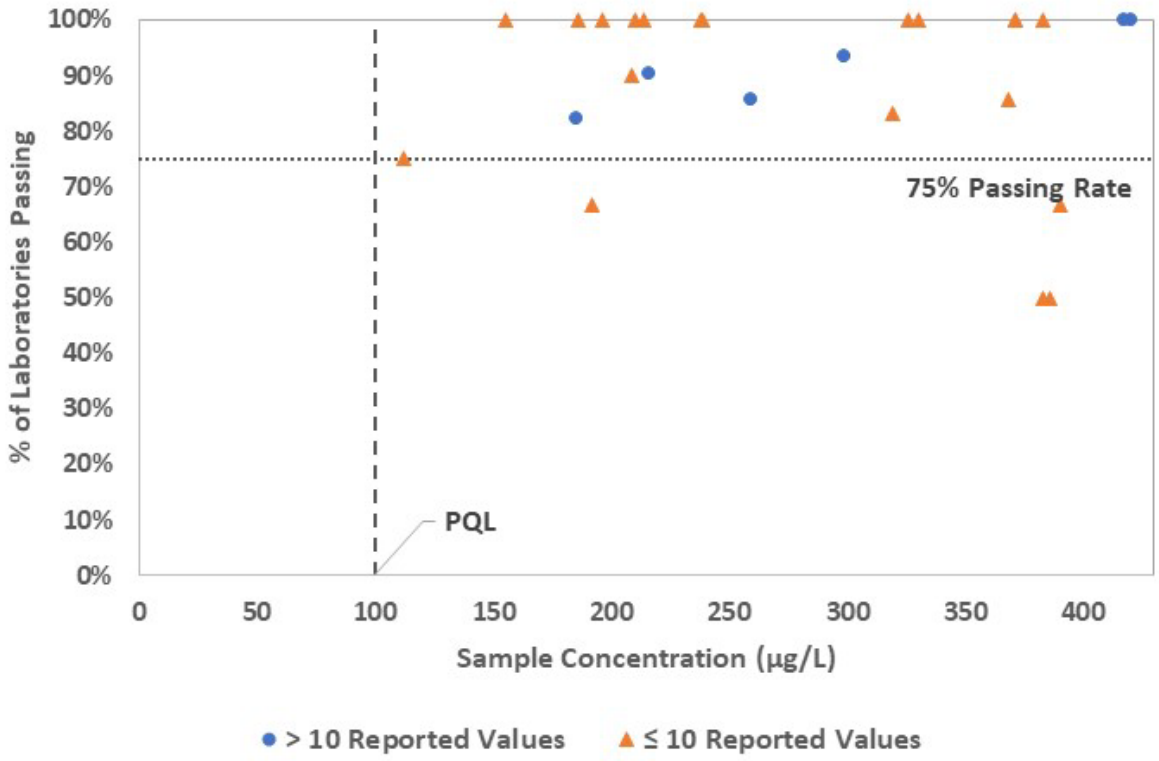
Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 335.4 (USEPA, 1993)	Colorimetry	5	26.3%
SM 4500-CN C* [1] (Rodger et al., 2017)	Spectroscopy (Colorimetry; Photometry)	20	4.0%
SM 4500-CN E* [1] (Rodger et al., 2017)	Colorimetry	20	32.4%
SM 4500-CN F* (Rodger et al., 2017)	Ion Selective Electrode	50	7.7%
SM 4500-CN G* [2] (Rodger et al., 2017)	Spectroscopy (Colorimetry; Photometry)	20	3.6%
Kelada-01* (USEPA, 2001c)	UV, Distillation, Spectrophotometric	0.5	3.2%
QuickChem-10-204-00-1-X (Lachat Instruments, 2000)*	Micro Distillation, Spectrophotometric	0.6	0.8%
OIA-1677, DW* [3] (USEPA, 2004)	Ligand Exchange and Amperometry	0.5	3.6%
EPA ME355.01** (USEPA, 2009d)	GC/MS	No MDL	0.8%

Notes:
* New approved analytical method since NPDWR promulgation (83 *FR* 51644, October 12, 2018).
** Method approved in expedited approval action for the determination of free cyanide in 2009 (74 *FR* 38348).
1-This method is equivalent to American Society for Testing and Materials (ASTM) 2036-98 A [40 CFR 141.23(k)(1)].
2-This method is equivalent to ASTM 2036-98 B [40 CFR 141.23(k)(1)].
3-This method is equivalent to ASTM D6668-04 [40 CFR 141.23(k)(1)].
MCL = 200 µg/L (0.2 mg/L in 40 CFR 141.62)
Current PQL = 100 µg/L (57 *FR* 31776, July 17, 1992)
DL = 0.6-50 µg/L [40 CFR 141.23(a)(4)(i)]

5.2.4.2 Results of the PT Data Analysis

The chart in **Exhibit 5-119** shows the PT study passing rates at various concentrations along with the current PQL of 100 µg/L. The data reflect the methods listed above as well as other methods. There were no studies conducted for concentrations below the current PQL. The three studies with passing rates less than 75% for concentrations that are greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-119. Evaluation of PT Data for Cyanide



Acceptance Criteria = ± 25% (≥ 100 µg/L) [40 CFR 141.23(k)(3)(ii)]

5.2.4.3 PQL Assessment Recommendation

There are no PT data demonstrating potential to reduce the PQL. Although one new analytical method has been approved since 2007 (EPA ME 355.01), there is no MDL information, and the PT data indicate limited use of this method. Therefore, the PQL assessment does not indicate potential to reduce the PQL.

5.2.4.4 Results of the MRL Analysis

As shown in **Exhibit 5-120**, the modal MRL for cyanide is 10 µg/L, which is greater than the potential MCLG of 4 µg/L, but less than the PQL of 100 µg/L. **Exhibit 5-121** shows that approximately 10% of the MRL values are less than 4 µg/L, which means the EQL cannot equal the potential MCLG. Summary data show that 23.8% of the MRLs are equal to the mode, and 46.7% of the MRL values are equal to or less than it. The percentage of the MRL values that are less than or equal to the mode does not meet the 80% threshold. Therefore, EPA did not base the EQL on the modal MRL. **Exhibit 5-121** shows that about 96% of MRL values are less than or

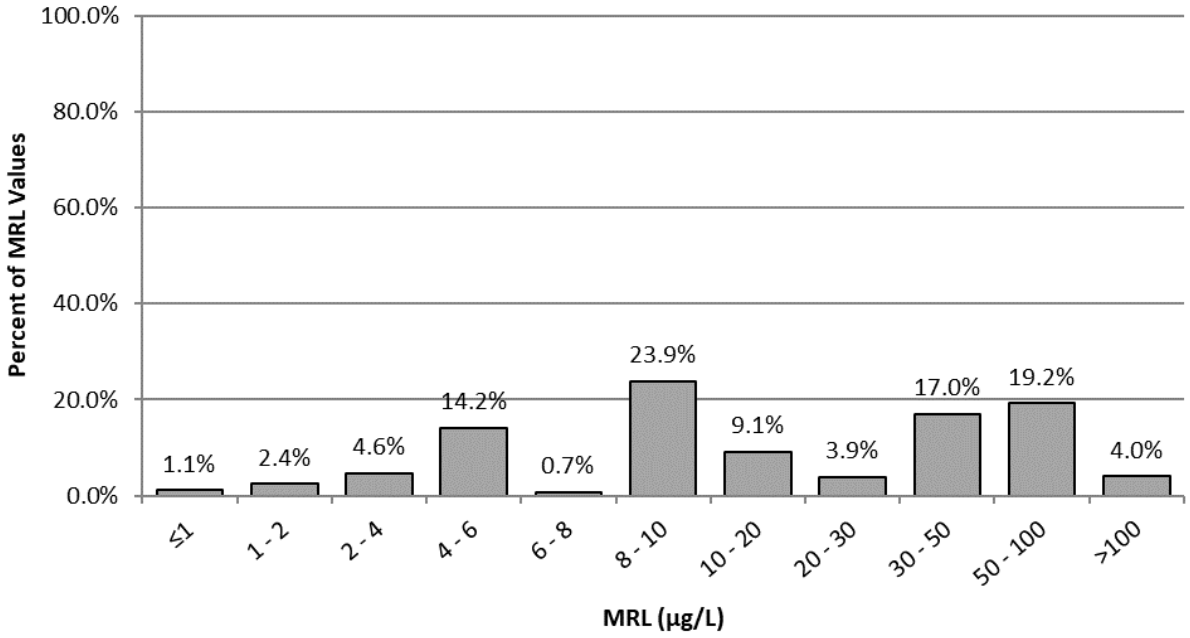
equal to the PQL. Therefore, EPA reviewed MDL values to determine whether they indicate an EQL value that is less than the PQL.

Exhibit 5-120. Summary of MRL Data for Cyanide

MRL Value Category	Number of Records	Percentage of Records
All	119,685	100%
Less than mode	27,446	22.9%
Equal to mode (10 µg/L)	28,539	23.8%
Greater than mode	63,700	53.2%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-121. MRL Distribution for Cyanide



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.2.4.5 Results of MDL Multiplier Analysis

Exhibit 5-122 shows EPA's method for the detection of cyanide and the corresponding MDL as well as additional methods including several newer, proprietary methods that have lower MDL values. Applying a multiplier of 10 gives a range of 5 to 500 µg/L. Excluding the values greater than the current PQL, the next highest value indicates a possible EQL of 50 µg/L, which is greater than the potential MCLG, but less than the PQL. The distribution in **Exhibit 5-121** shows that almost 78% of the MRL values are less than or equal to 50 µg/L.

Exhibit 5-122. MDL Multiplier Values for Cyanide

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 335.4	5	50
SM 4500-CN C	20	200
SM 4500-CN E	20	200
SM 4500-CN F	50	500
SM 4500-CN G	20	200
Kelada-01	0.5	5
QuickChem-10-204-00-1-X (Lachat)	0.6	6
OIA-1677, DW	0.5	5

5.2.4.6 EQL Assessment Recommendation

EPA did not base the EQL on the MRL mode because too few MRL values were less than or equal to the mode. EPA used the MDL multiplier approach to identify an EQL of 50 µg/L, which is greater than the potential MCLG.

5.2.5 Endothall

EPA identified a potential MCLG value of 40 µg/L for endothall (USEPA, 2024b). The current PQL of 90 µg/L would limit setting an MCL equal to 40 µg/L. Thus, the analytical feasibility analysis specifically seeks to determine whether a PQL as low as 40 µg/L is feasible.

5.2.5.1 Results of the Method Comparison

Exhibit 5-123 shows the MDL for endothall as documented in EPA-approved analytical methods. No new analytical methods have been approved for the analysis of endothall in drinking water samples since NPDWR promulgation. The last column of the exhibit shows how frequently the approved method occurs in the PT database. The approved method accounts for almost all the reported PT data.

Exhibit 5-123. Analytical Methods for Endothall

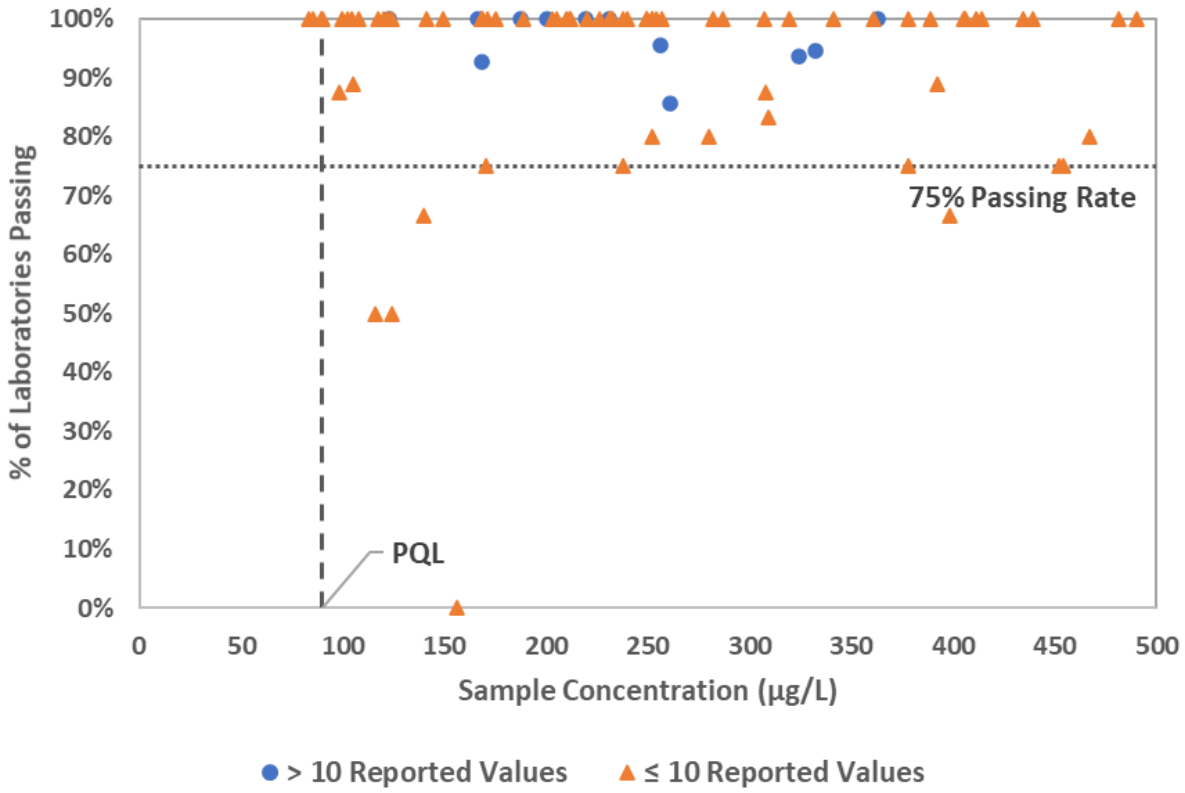
Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 548.1 (USEPA, 1992a)	IEE and GC/MS	0.7 – 1.79	97.3%

Notes:
MCL = 100 µg/L (0.1 mg/L in 40 CFR 141.61)
Current PQL = 90 µg/L (57 *FR* 31776, July 17, 1992)
DL = 9 µg/L [40 CFR 141.24(h)(18)]

5.2.5.2 Results of the PT Data Analysis

The chart in **Exhibit 5-124** shows the PT study passing rates at various concentrations along with the current PQL of 90 µg/L. The data reflect the methods listed above as well as other methods. There were three studies conducted for concentrations below the current PQL, all of which had passing rates greater than 75%. The five studies with passing rates less than 75% are for concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-124. Evaluation of PT Data for Endothall



Acceptance Criteria = mean ± 2 SD [40 CFR 141.24(h)(19)(i)(B)]

5.2.5.3 PQL Assessment Recommendations

There is uncertain potential to reduce the PQL. Although the MDL range for the approved method is substantially lower than the PQL, the PT data include a few high passing rates below the PQL as well as low passing rates at values greater than the PQL.

5.2.5.4 Results of the MRL Analysis

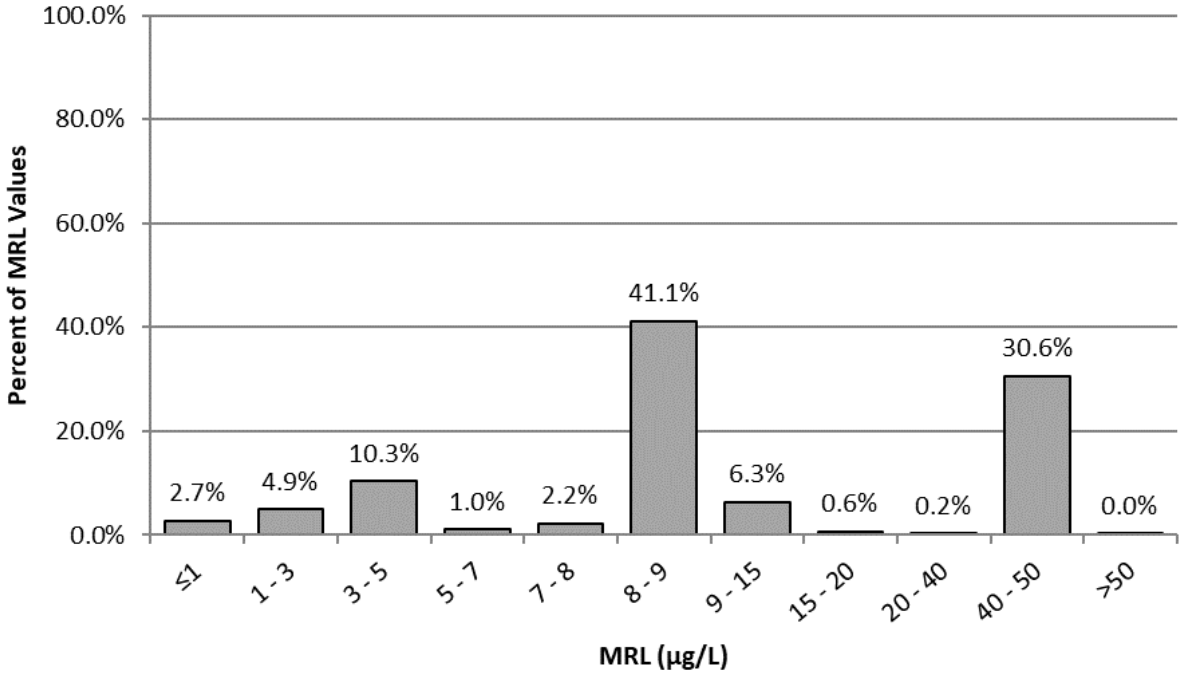
As shown in **Exhibit 5-125,** the modal MRL for endothall is 9 µg/L, which is less than the PQL. Summary data show that 41.1 % of the MRLs are equal to this value, and 62.3% of the MRL values are equal to or less than it. The mode is also less than the potential MCLG of 40 µg/L. **Exhibit 5-126** shows that more than 30% of the MRL values are greater than or equal to 40 µg/L. Thus, the MRL data do not support use of the potential MCLG for the occurrence analysis. The data show, however, that almost all the MRL values are less than or equal to 50 µg/L.

Exhibit 5-125. Summary of MRL Data for Endothall

MRL Value Category	Number of Records	Percentage of Records
All	41,473	100%
Less than mode	8,773	21.2%
Equal to mode (9 µg/L)	17,043	41.1%
Greater than mode	15,657	37.8%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-126. MRL Distribution for Endothall



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, can have a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.2.5.5 Results of MDL Multiplier Analysis

Exhibit 5-127 shows EPA's approved method for the detection of endothall, and the upper bound of the MDL range. Applying a multiplier of 10 gives a possible EQL 17.9 µg/L, which is less than 40 µg/L. Thus, the MDL data support the use of the potential MCLG as a threshold in the occurrence analysis.

Exhibit 5-127. MDL Multiplier Values for Endothall

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 548.1	1.79	17.9

5.2.5.6 EQL Assessment Recommendation

Although the PT data provide limited support for a PQL reduction, the MRL and MDL data clearly support an EQL less than the PQL, but the MRL data do not support use of the potential MCLG value of 40 µg/L as a threshold for the occurrence analysis. A slightly higher EQL threshold of 50 µg/L is feasible, however. This was the EQL identified in SYR 3 (USEPA, 2016c).

5.2.6 Methoxychlor

EPA identified a potential MCLG value of 0.1 µg/L for methoxychlor (USEPA, 2024b). The current PQL of 10 µg/L would limit setting an MCL equal to 0.1 µg/L. Thus, the analytical feasibility analysis specifically seeks to determine whether a PQL as low as 0.1 µg/L is feasible.

5.2.6.1 Results of the Method Comparison

Exhibit 5-128 summarizes the MDLs for methoxychlor as documented in EPA-approved analytical methods. EPA has approved four updated or new analytical methods for the analysis of methoxychlor since NPDWR promulgation. Three of these methods have lower MDL values. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 525.2, followed by EPA 505.

Exhibit 5-128. Analytical Methods for Methoxychlor

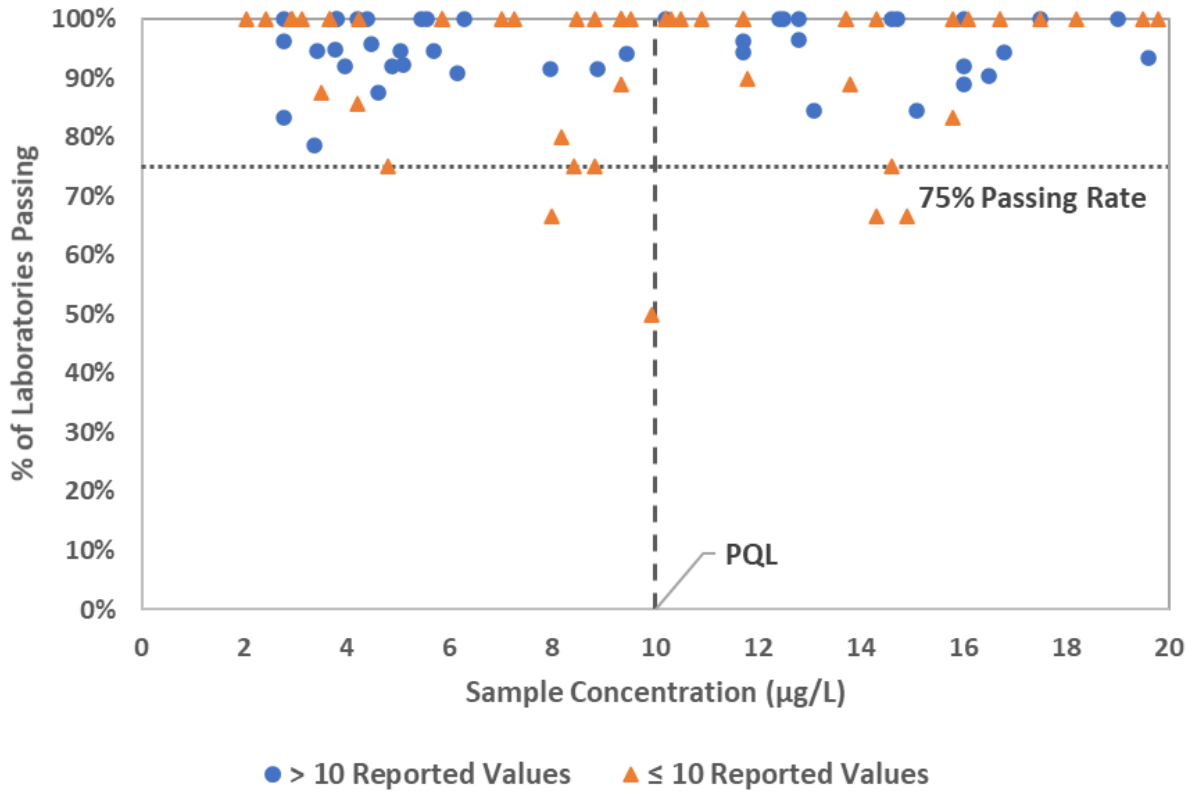
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 505 (USEPA, 1995c)	ME and GC	0.96	20.2%
EPA 508 (USEPA, 1995e)	GC/ECD	0.022	12.1%
EPA 508.1* (USEPA, 1995f)	LSE and ECGC	0.003	12.5%
EPA 525.2* (USEPA, 1995j)	LSE and CCGC/MS	0.033 – 0.13	47.1%
EPA 525.3* (USEPA, 2012)	SPE and CCGC/MS	Full scan mode: 0.0064 – 0.024 SIM mode: 0.0025	1.7%
EPA 551.1* (USEPA, 1995l)	LLE and GC/ECD	0.008 – 0.026	0.0%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 525.2 replaced EPA 525.1 with nominal effect on the MDL range. EPA 525.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 40 µg/L (0.04 mg/L in 40 CFR 141.61)
Current PQL = 10 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.1 µg/L [40 CFR 141.24(h)(18)]

5.2.6.2 Results of the PT Data Analysis

The chart in **Exhibit 5-129** shows the PT study passing rates at various concentrations along with the current PQL of 10 µg/L. The data reflect the methods listed above as well as other methods. There were 44 studies conducted for concentrations below the current PQL, all but two of which had passing rates greater than 75%. The two studies with passing rates less than 75% for concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-129. Evaluation of PT Data for Methoxychlor



Acceptance Criteria = ±45% [40 CFR 141.24(h)(19)(i)(B)]

5.2.6.3 PQL Assessment Recommendations

The PT studies with spiked concentrations less than the PQL predominantly have passing rates equal to or greater than 75%. Lower passing rates occur in two studies of ten or fewer laboratories. Thus, the PT data indicate potential to lower the PQL. Three of the four most frequently used methods (EPA 525.2, EPA 508, and EPA 508.1) also indicate potential to lower the PQL.

5.2.6.4 Results of MRL Analysis

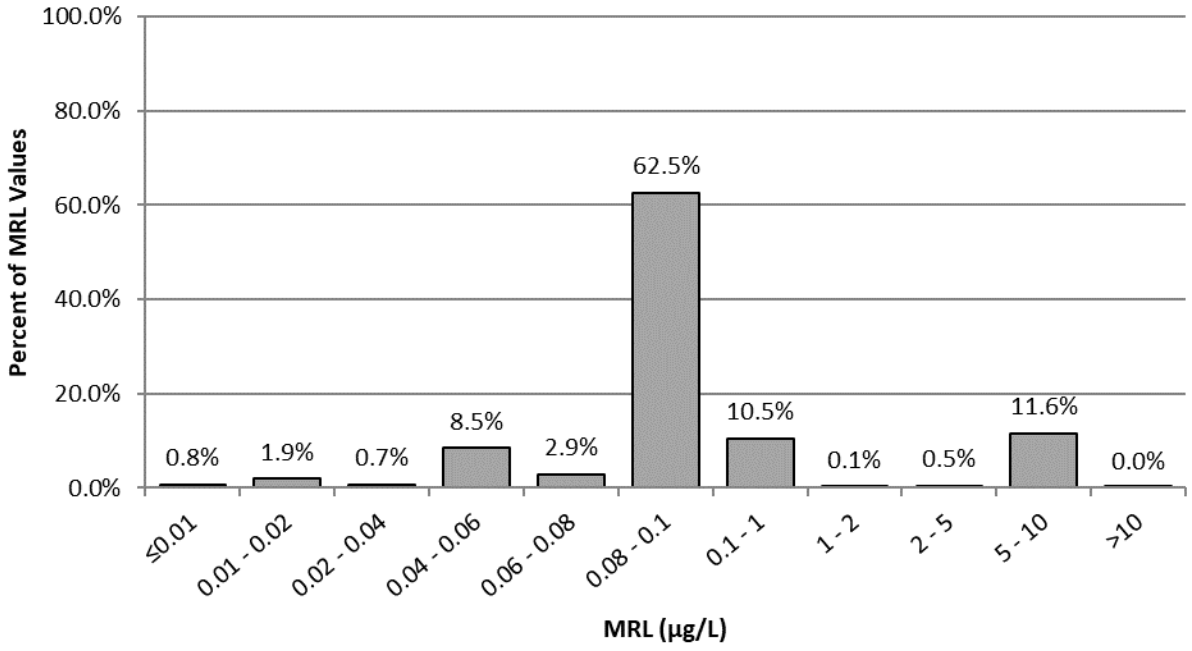
As shown in **Exhibit 5-130**, the modal MRL for methoxychlor is 0.1 µg/L, which equals the potential MCLG. Summary data show that 58.6% of the MRLs are equal to this value, and 77.2% of the MRL values are equal to or less than it. The percentage of MRL values less than or equal to the mode does not meet the 80% threshold. Therefore, the MRL data do not support the use of the potential MCLG for the occurrence analysis. **Exhibit 5-131** shows that almost all the MRL values are less than the PQL of 10 µg/L, suggesting potential for a lower PQL.

Exhibit 5-130. Summary of MRL Data for Methoxychlor

MRL Value Category	Number of Records	Percentage of Records
All	156,842	100%
Less than mode	29,248	18.6%
Equal to mode (0.1 µg/L)	91,936	58.6%
Greater than mode	35,658	22.7%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-131. MRL Distribution for Methoxychlor



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.2.6.5 Results of MDL Multiplier Analysis

Exhibit 5-132 shows EPA's approved methods for the detection of methoxychlor, and the MDLs or upper bound values of MDL ranges. Applying a multiplier of 10 would give a possible EQL range from 0.025 to 9.6 µg/L. This entire range is below the PQL. The highest value, 9.6 µg/L, rounds to the PQL. The next highest value rounds to 1.0 µg/L, which is less than the current PQL.

Exhibit 5-132. MDL Multiplier Values for Methoxychlor

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 505	0.96	9.6
EPA 508	0.022	0.22
EPA 508.1	0.003	0.03
EPA 525.2	0.13	1.3
EPA 525.3	Full scan mode: 0.024 SIM mode: 0.0025	Full scan mode: 0.24 SIM mode: 0.025
EPA 551.1	0.026	0.26

5.2.6.6 EQL Assessment Recommendation

The MRL mode equals the potential MCLG, but too many MRL values exceed the mode for EPA to base the EQL on the mode. EPA identified an EQL of 1.0 µg/L based on the MDL multiplier approach.

5.2.7 Oxamyl

EPA identified a potential MCLG value of 9 µg/L for oxamyl (USEPA, 2024b). The current PQL of 20 µg/L would limit setting an MCL equal to 9 µg/L. Thus, the analytical feasibility analysis specifically seeks to determine whether a PQL as low as 9 µg/L is feasible.

5.2.7.1 Results of the Method Comparison

Exhibit 5-133 summarizes the MDLs for oxamyl as documented in EPA-approved analytical methods. EPA has approved two updated or new analytical methods for the analysis of oxamyl since NPDWR promulgation. EPA approved an alternative method in 2009 (SM 6610 B). Additionally, the MDL range for EPA Method 531.2, approved in 2001, was updated to reflect the lower MDL when using post-column carbamate analysis and the water's model 2475 detector (USEPA, 2001b). The last column of the exhibit shows how frequently each method occurs in the PT database, which contains 919 results for oxamyl. The most common method is EPA 531.1, followed by EPA 531.2.

Exhibit 5-133. Analytical Methods for Oxamyl

Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 531.1	DAI/HPLC	0.86	68.1%
EPA 531.2*	DAI/HPLC	0.044-0.065	27.1%
SM 6610 B**	HPLC with Post Column Derivatization and Fluorescence Detection	2	0.0%

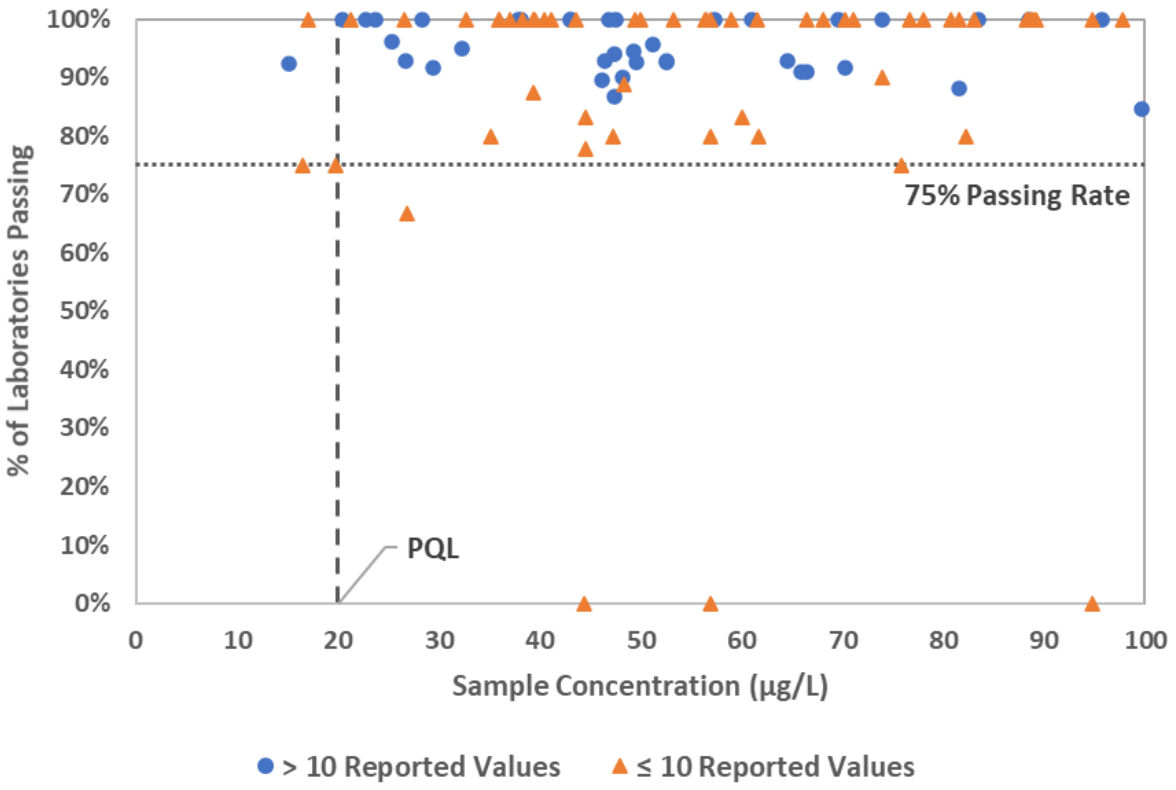
Notes:
* New approved analytical method since NPDWR promulgation (83 *FR* 51644, October 12, 2018).
** Method approved in expedited approval action for the determination of oxamyl in 2009. (74 *FR* 38348).
MCL = 200 µg/L
Current PQL =20 µg/L (57 *FR* 31776, July 17, 1992)
DL = 2.0 µg/L [40 CFR 141.24(h)(18)]

5.2.7.2 Results of the PT Data Analysis

The chart in **Exhibit 5-134** shows the PT study passing rates at various concentrations along with the current PQL of 20 µg/L. The data reflect the methods listed above as well as other

methods. There were 4 studies conducted for concentrations below the current PQL, all of which had passing rates greater than or equal to 75%. The four studies with passing rates less than 75% for concentrations greater than the PQL are studies that included 10 or fewer laboratories.

Exhibit 5-134. Evaluation of PT Data-Oxamyl



Acceptance Criteria = mean ± 2 SD [40 CFR 141.24(h)(19)(i)(B)]

5.2.7.3 PQL Assessment Recommendation

The most frequently used methods, EPA 531.1 and 531.2, have MDL ranges substantially lower than the PQL, which would seem to indicate potential to lower the PQL. The limited PT data at concentrations less than the PQL do not indicate potential to reduce the PQL. Therefore, the PQL assessment does not indicate potential to reduce the PQL.

5.2.7.4 Results of the MRL Analysis

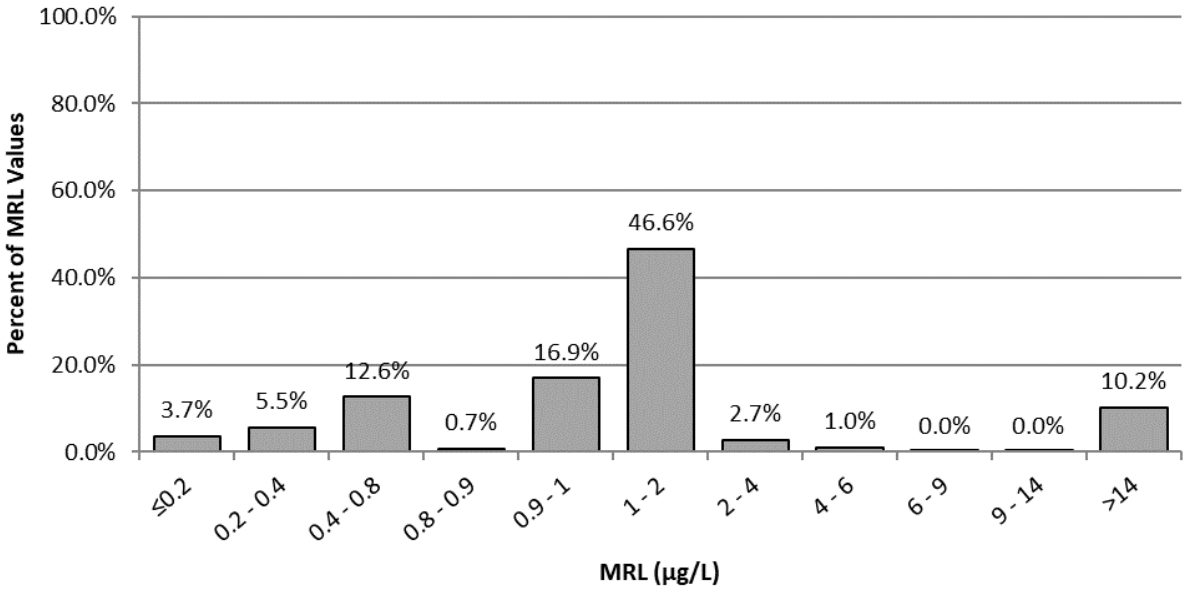
As shown in **Exhibit 5-135**, the modal MRL for oxamyl is 2 µg/L, which is less than the potential MCLG. Summary data show that 46.3% of the MRLs are equal to this value, and 86.1% of the MRL values are equal to or less than it. The fraction of MRL values less than or equal to the mode meets the 80% threshold. Therefore, the MRL data also support the use of the potential MCLG for the occurrence analysis. **Exhibit 5-136** shows that 10.2% of the MRL values exceed 9 µg/L. Thus, censored values will not have a substantial effect on the occurrence estimates.

Exhibit 5-135. Summary of MRL Data for Oxamyl

MRL Value Category	Number of Records	Percentage of Records
All	137,574	100%
Less than mode	54,756	39.8%
Equal to mode (2 µg/L)	63,648	46.3%
Greater than mode	19,170	13.9%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-136. MRL Distribution for Oxamyl



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.2.7.5 Results of MDL Multiplier Analysis

Exhibit 5-137 shows EPA's approved methods for the detection of oxamyl, and the MDLs. Applying a multiplier of 10 would give a possible EQL range from 0.65 to 20 µg/L. This range contains the modal MRL. The more commonly used methods have 10 × MDL values that are less than the potential MCLG of 9 µg/L.

Exhibit 5-137. MDL Multiplier Values for Oxamyl

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 531.1	0.86	8.6
EPA 531.2	0.065	0.65
SM 6610 B	2	20

5.2.7.6 EQL Assessment Recommendation

EPA determined that an EQL based on the potential MCLG of 9 µg/L is possible based on the distribution of MRL data. Two of the three MDL multiplier results are less than this EQL value.

5.2.8 Styrene

EPA identified a potential MCLG value of zero for styrene (USEPA, 2024b). The current PQL of 5 µg/L would limit setting an MCL below the PQL. Thus, the analytical feasibility analysis specifically seeks to determine whether a lower PQL is feasible.

5.2.8.1 Results of the Method Comparison

Exhibit 5-138 summarizes the MDLs for styrene as documented in EPA-approved analytical methods. EPA approved two new analytical methods for styrene since NPDWR promulgation: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The full scan mode and SIM mode sub-method MDLs for EPA Method 524.4 are within the range of other approved methods for styrene. The full scan mode MDL for EPA Method 524.3 is higher than other approved methods for styrene. The last column of the exhibit shows how frequently each method occurs in the PT database. The most common method is EPA 524.2, followed by EPA 524.3.

Exhibit 5-138. Analytical Methods for Styrene

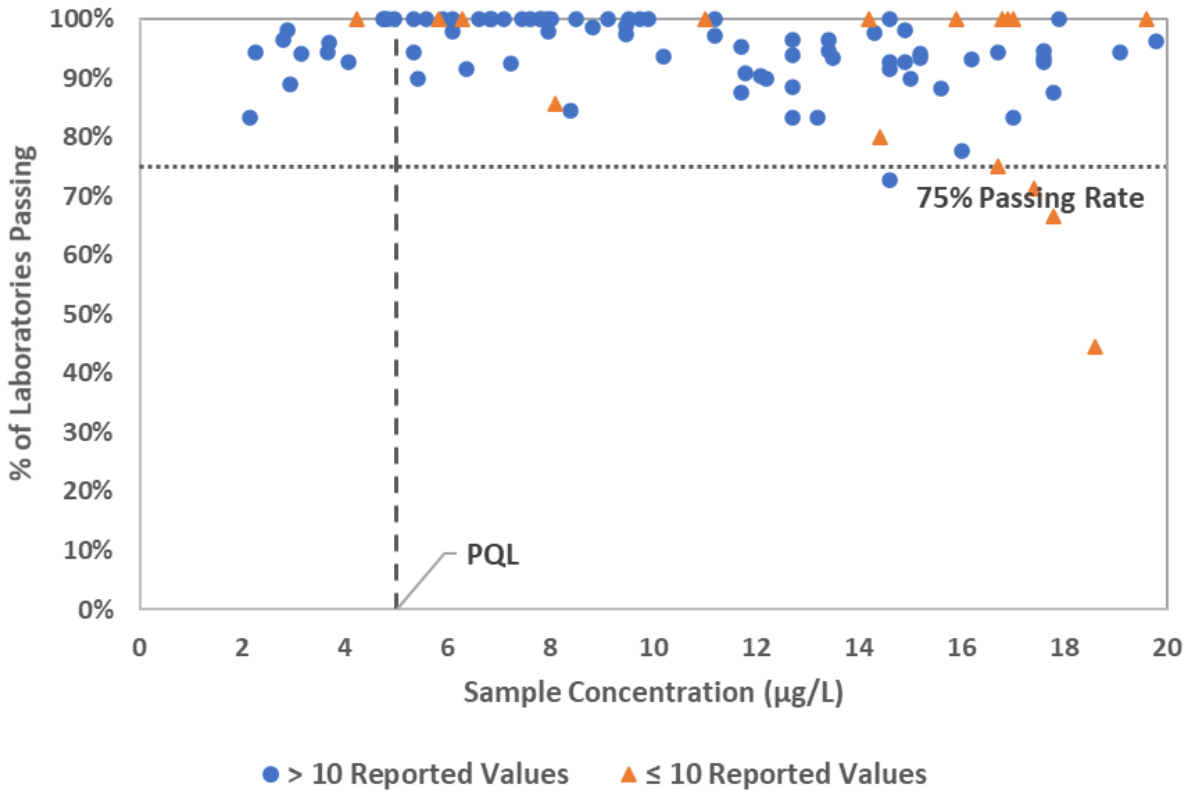
Approved Method	Technique	MDL (µg/L)	PT Data Frequency
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.01 – 0.1	1.7%
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.04 – 0.06	83.1%
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.11 SIM mode: not given	7.1%
EPA 524.4* (USEPA, 2013)	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.033 SIM mode: 0.012	0.5%

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 100 µg/L (0.1 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.2.8.2 Results of the PT Data Analysis

The chart in **Exhibit 5-139** shows the PT study passing rates at various concentrations along with the current PQL of 5 µg/L. The data reflect the methods listed above as well as other methods. There were 14 studies conducted for concentrations below the current PQL, all of which had passing rates greater than 75%. Three of the four studies with passing rates less than 75% for concentrations greater than the PQL are studies that included ten or fewer laboratories.

Exhibit 5-139. Evaluation of PT Data for Styrene



Acceptance Criteria = ±20% (≥10 µg/L) or ±40% (<10 µg/L) [40 CFR 141.24(f)(17)(i)]

5.2.8.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have MDLs substantially lower than the current PQL. The most frequently used method, EPA 524.2, has an MDL range that is two orders of magnitude less than PQL. This usage pattern suggests widespread capability to quantitate below the PQL. The PT data further demonstrate laboratory capability to quantitate below the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.2.8.4 Results of the MRL Analysis

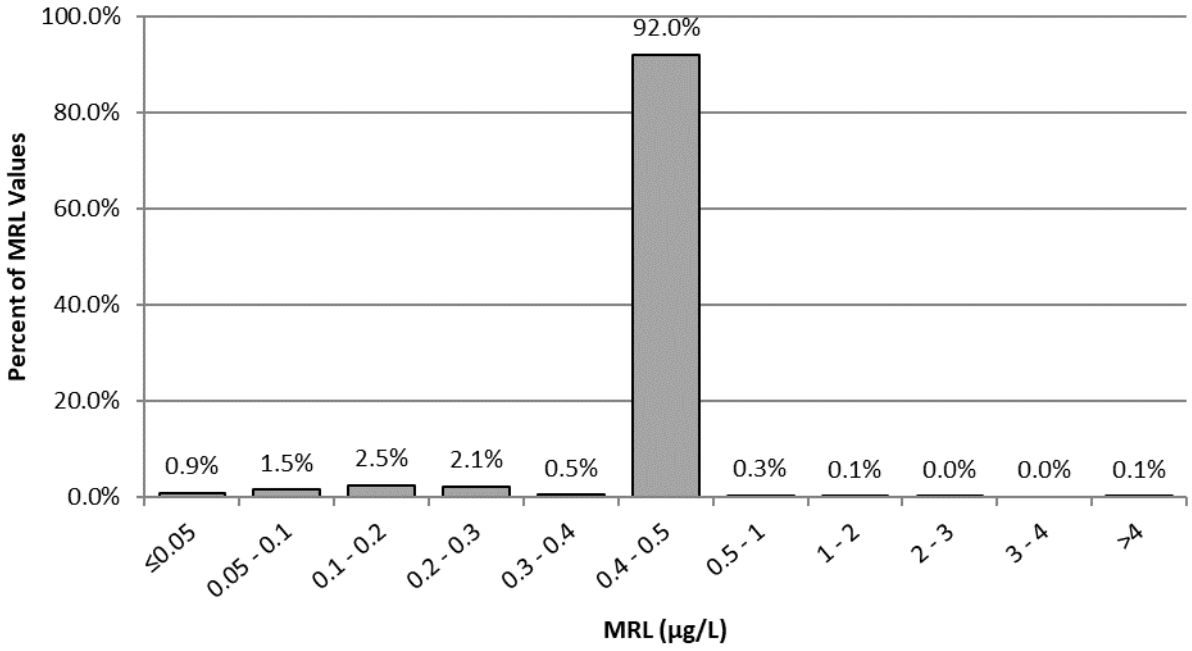
As shown in **Exhibit 5-140**, the modal MRL for styrene is 0.5 µg/L. Summary data show that 92% of the MRLs are equal to this value, and 99.6% of the MRL values are equal to or less than it. The fraction of MRL values less than or equal to the mode meets the 80% threshold. Therefore, the MRL data support the use of the modal MRL for the occurrence analysis. **Exhibit 5-141** shows that about 0.5% of the MRL values exceed 0.5 µg/L. Thus, censored values will not have a substantial effect on the occurrence estimates.

Exhibit 5-140. Summary of MRL Data for Styrene

MRL Value Category	Number of Records	Percentage of Records
All	416,775	100%
Less than mode	31,769	7.6%
Equal to mode (0.5 µg/L)	383,286	92.0%
Greater than mode	1,720	0.4%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-141. MRL Distribution for Styrene



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.2.8.5 Results of MDL Multiplier Analysis

Exhibit 5-142 shows EPA's approved methods for the detection of styrene, and the MDLs. Applying a multiplier of 10 would give a possible EQL range from 0.12 to 1.1 µg/L. This range contains the modal MRL.

Exhibit 5-142. MDL Multiplier Values for Styrene

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.1	1.0
EPA 524.2	0.06	0.6
EPA 524.3	Full scan mode: 0.11	1.1
EPA 524.4	Full scan mode: 0.033 SIM mode: 0.012	Full scan mode: 0.33 SIM mode: 0.12

5.2.8.6 EQL Assessment Recommendation

EPA based the EQL value on the MRL mode of 0.5 µg/L. The MDL multiplier range contains this value. The high proportion of MRL values less than or equal to the mode suggests quantitation is feasible at this value.

5.2.9 1,2,4-Trichlorobenzene

EPA identified a potential MCLG value of zero for 1,2,4-trichlorobenzene (USEPA, 2024b). The current PQL of 5 µg/L would limit setting an MCL below the PQL. Thus, the analytical feasibility analysis specifically seeks to determine whether a lower PQL is feasible.

5.2.9.1 Results of the Method Comparison

Exhibit 5-143 summarizes the MDLs for 1,2,4-trichlorobenzene as documented in EPA-approved analytical methods. EPA approved two new analytical methods for 1,2,4-trichlorobenzene since NPDWR promulgation: EPA Method 524.3 and EPA Method 524.4 (83 *FR* 51644, October 12, 2018). The MDLs for both of the newer methods range from slightly lower to comparable to the other approved methods for 1,2,4-trichlorobenzene.

Exhibit 5-143. Analytical Methods for 1,2,4-Trichlorobenzene

Approved Method	Technique	MDL (µg/L)
EPA 502.2 (USEPA, 1995a)	GC/ECD	0.02 – 0.08
EPA 524.2 (USEPA, 1995i)	CCGC/MS	0.04 – 0.2
EPA 524.3* (USEPA, 2009c)	CCGC/MS	Full scan mode: 0.013 SIM mode: not given
EPA 524.4* (USEPA, 2013)	GC/MS using Nitrogen Purge Gas	Full scan mode: 0.071 SIM mode: 0.013

Notes:
* New approved analytical method since NPDWR promulgation. EPA 524.3 is an Alternative Testing Method (83 *FR* 51644, October 12, 2018).
MCL = 70 µg/L (0.07 mg/L in 40 CFR 141.61)
Current PQL = 5 µg/L (56 *FR* 3526, January 30, 1991)
DL = 0.5 µg/L [40 CFR 141.24(f)(7)]

5.2.9.2 Results of the PT Data Analysis

EPA did not receive PT data for 1,2,4-trichlorobenzene during the current review cycle. PT data provided for prior review cycles did include studies conducted at concentrations less than the PQL with passing rates greater than 75% (USEPA, 2009a). Thus, prior PT data indicated potential for a lower PQL.

5.2.9.3 PQL Assessment Recommendation

The analytical methods approved since promulgation have slightly lower MDLs than the methods approved at promulgation. Prior review cycle PT data demonstrate laboratory capability to quantitate below the PQL. Therefore, the PQL assessment indicates potential for a lower PQL.

5.2.9.4 Results of the MRL Analysis

As shown in **Exhibit 5-144**, the modal MRL for 1,2,4-trichlorobenzene is 0.5 µg/L. Summary data show that 92% of the MRLs are equal to this value, and 99.4% of the MRL values are equal to or less than it. The fraction of MRL values less than or equal to the mode meets the 80%

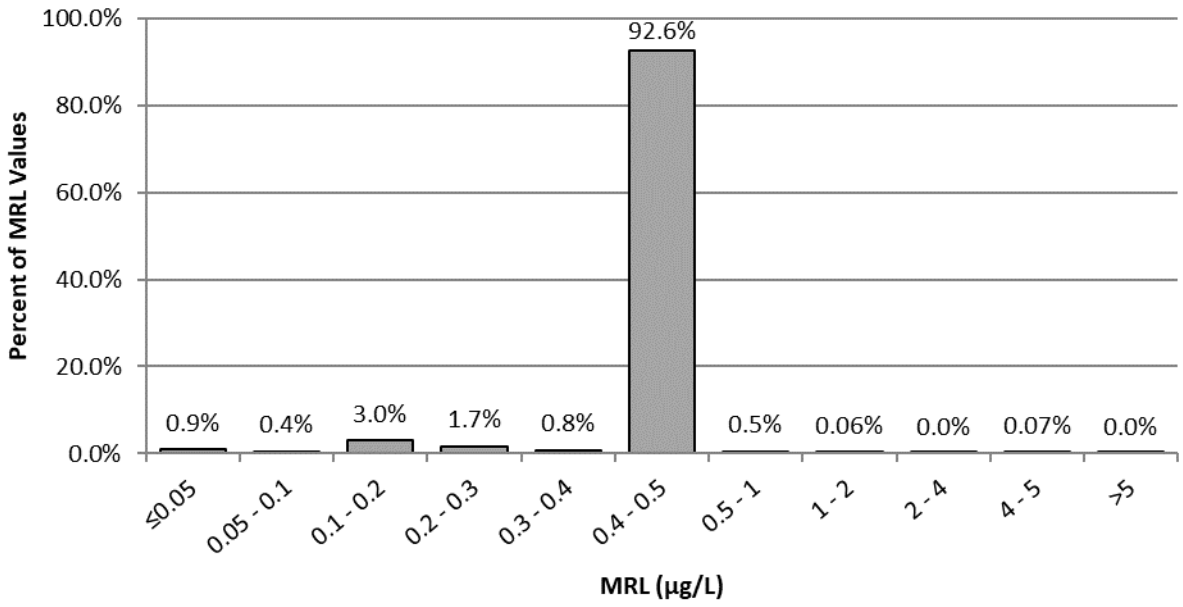
threshold. Therefore, the MRL data support the use of the modal MRL for the occurrence analysis. **Exhibit 5-145** shows that about 0.6% of the MRL values exceed 0.5 µg/L. Thus, censored values will not have a substantial effect on the occurrence estimates.

Exhibit 5-144. Summary of MRL Data for 1,2,4-Trichlorobenzene

MRL Value Category	Number of Records	Percentage of Records
All	417,203	100%
Less than mode	30,686	7.4%
Equal to mode (0.5 µg/L)	383,849	92.0%
Greater than mode	2,668	0.6%

Note: Percentages may not sum to 100% because of independent rounding. Aggregate percentages in the table may differ from detail in the accompanying chart because of independent rounding.
Source: SYR 4 ICR database (USEPA, 2024a)

Exhibit 5-145. MRL Distribution for 1,2,4-Trichlorobenzene



Note: The horizontal axis shows the MRL values for 11 discrete ranges. The sixth range includes the modal MRL as an upper bound. It includes MRL values throughout the range shown and, therefore, has a greater percentage than the one reported in the preceding table for the modal MRL.
Source: SYR 4 ICR database (USEPA, 2024a)

5.2.9.5 Results of MDL Multiplier Analysis

Exhibit 5-146 shows EPA's approved methods for the detection of 1,2,4-trichlorobenzene, and the MDLs. Applying a multiplier of 10 would give a possible EQL range from 0.13 to 2.0 µg/L. This range contains the modal MRL.

Exhibit 5-146. MDL Multiplier Values for 1,2,4-Trichlorobenzene

Method	MDL (µg/L)	MDL x 10 (µg/L)
EPA 502.2	0.08	0.8
EPA 524.2	0.2	2
EPA 524.3	Full scan mode: 0.013	0.13
EPA 524.4	Full scan mode: 0.071 SIM mode: 0.013	0.71 0.13

5.2.9.6 EQL Assessment Recommendation

EPA based the EQL value on the MRL mode of 0.5 µg/L. The MDL multiplier range contains this value. The high proportion of MRL values less than or equal to the mode suggests quantitation is feasible at this value.

5.3 Contaminants for which Potential MCLG is Not Limited by PQL

During SYR 4, EPA determined that there was health effects information that could affect the MCLG values for additional contaminants not discussed in section 5.2 (USEPA, 2024b). For each of those additional contaminants, the potential MCLG is greater than the PQL. In other words, the potential health-based concentration goal can be detected by the analytical capabilities identified during rule promulgation such that it is analytically feasible to set an MCL equal to the potential MCLG. Therefore, neither PQL nor EQL assessments were necessary for the contaminants shown in **Exhibit 5-147**.

Exhibit 5-147. Contaminants for which Potential MCLG is Not Limited by PQL

Contaminant	PQL (µg/L)	Potential MCLG (µg/L)	MCLG and MCL (µg/L)
Cis-1,2-dichloroethylene	5	10	70
Hexachlorocyclopentadiene	1	40	50
Fluoride	500	900	4,000
Selenium	10	30	50
Toluene	5	60	1,000
Xylenes	5	80	10,000

Source: USEPA (2024b).

6 Summary

This document examines analytical method performance over time by determining if the PQLs may have changed since promulgation. PQL assessments are presented by means of linear regression of available PT data. A qualitative conclusion is drawn by presenting a recommendation of whether a PQL might be reduced. In addition, analytical method performance is also assessed by comparing the MDL of the analytical methods which were available at the time of promulgation to those of the currently approved methods.

Exhibit 6-1 and **Exhibit 6-2** provide summary observations from the analytical feasibility analysis of the 30 contaminants that were included in SYR 4. The tables summarize the PQL assessment and EQL assessment findings.

The overall assessment recommendations for the 22 contaminants in **Exhibit 6-1** are:

- For ten of the contaminants, the PQL assessment supports reduction of the current PQL and the EQL assessment identified an EQL equal to the MRL mode.
- For one of the contaminants, the PQL assessment supports reduction of the current PQL and the EQL assessment identified an EQL equal to the MCLG.
- For six contaminants, the PQL assessment concluded that a PQL reduction was uncertain or not indicated, so EPA used either MRL or MDL data to identify an EQL value.
- For five contaminants, neither the PQL assessment nor the EQL assessment supports reduction of the PQL.

The overall assessment recommendations for the nine contaminants **Exhibit 6-2** are:

- EPA identified EQL values for eight contaminants.
- The EQL values for three contaminants can be based on the MRL mode.
- The EQL values for three of the contaminants can be based on MDL multipliers.
- The EQL value for one contaminant is the potential MCLG.
- The EQL value for one contaminant is based on a prior review cycle decision that is supported by the MRL data and MDL multiplier.

Exhibit 6-1. Analytical Feasibility Assessment Summary for Contaminants with MCL Equal to the Current PQL

Contaminant	Current PQL (µg/L)	MCLG (µg/L)	PQL Assessment Recommendation	EQL Assessment Recommendation
Benzene	5	Zero	Potential to lower PQL	0.5 µg/L (MRL mode)
Benzo[a]pyrene	0.2	Zero	No change	No EQL
Carbon tetrachloride	5	Zero	Potential to lower PQL	0.5 µg/L (MRL mode)
Chlordane	2	Zero	Uncertain	1 µg/L (MDL multiplier)
DBCP	0.2	Zero	Uncertain	No EQL
1,2-Dichloroethane	5	Zero	Potential to lower PQL	0.5 µg/L (MRL mode)
Dichloromethane	5	Zero	Potential to lower PQL	0.5 µg/L (MRL mode)
1,2-Dichloropropane	5	Zero	Potential to lower PQL	0.5 µg/L (MRL mode)
DEHP	5	Zero	Uncertain	No EQL
Ethylene dibromide	0.05	Zero	No change	No EQL
Heptachlor	0.4	Zero	Uncertain	0.1 µg/L (MDL multiplier)
Heptachlor epoxide	0.2	Zero	No change	0.1 µg/L (MDL multiplier)
Hexachlorobenzene	1	Zero	Uncertain	0.1 µg/L (MRL mode)
Pentachlorophenol	1	Zero	No change	0.9 µg/L (MDL multiplier)
PCBs	0.5	Zero	No change	No EQL
2,3,7,8-TCDD	0.00003	Zero	Uncertain	0.000005 µg/L (MRL mode)
Tetrachloroethylene	5	Zero	Potential to lower PQL	0.5 µg/L (MRL mode)
Thallium	2	0.5	Potential to lower PQL	1 µg/L (MRL mode)
Toxaphene	3	Zero	Potential to lower PQL	1 µg/L (MRL mode)
Trichloroethylene	5	Zero	Potential to lower PQL	0.5 µg/L (MRL mode)
1,1,2-Trichloroethane	5	3	Potential to lower PQL	3 µg/L (MCLG)
Vinyl chloride	2	Zero	Potential to lower PQL	0.5 µg/L (MRL mode)

Exhibit 6-2. Analytical Feasibility Assessment Summary for Contaminants with MCL Greater than the Current PQL

Contaminant	Current PQL (µg/L)	Potential MCLG (µg/L)	PQL Assessment Recommendation	EQL Assessment Recommendation
Antimony	6	2	No change	No EQL
Cadmium	2	0.7	No change	1 µg/L (MRL mode)
Carbofuran	7	0.3	No change	5 µg/L (MDL multiplier)
Cyanide	100	4	No change	50 µg/L (MDL multiplier)
Endothall	90	40	Uncertain	50 µg/L (prior review)
Methoxychlor	10	0.1	Potential to lower PQL	1 µg/L (MDL multiplier)
Oxamyl	20	9	No change	9 µg/L (potential MCLG)
Styrene	5	zero	Potential to lower PQL	0.5 µg/L (MRL mode)
1,2,4-Trichlorobenzene	5	zero	Potential to lower PQL	0.5 µg/L (MRL mode)

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