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Agency

Chemical Contaminant Summaries for the Third Six-Year Review of Existing National Primary Drinking Water Regulations

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1 Introduction

The U.S. Environmental Protection Agency (EPA or the Agency) has completed its third Six-Year Review (Six-Year Review 3) of national primary drinking water regulations (NPDWRs). The 1996 Safe Drinking Water Act (SDWA) Amendments require the Agency to periodically review existing NPDWRs. Section 1412(b)(9) of SDWA reads:

> …[t]he Administrator shall, not less often than every 6 years, review and revise, as appropriate, each national primary drinking water regulation promulgated under this subchapter. Any revision of a national primary drinking water regulation shall be promulgated in accordance with this section, except that each revision shall maintain, or provide for greater, protection of the health of persons.

The primary goal of the Six-Year Review process is to identify NPDWRs for possible regulatory revision. Although the statute does not define when a revision is "appropriate," as a general benchmark, EPA considered a possible revision to be "appropriate" if, at a minimum, it presents a meaningful opportunity to:

- improve the level of public health protection, and/or
- achieve cost savings for public water systems (PWS) while maintaining or improving the level of public health protection.

For SYR3, EPA implemented the NPDWR review protocol that it developed for the first Six-Year Review (USEPA, 2003a), including minor revisions developed during the second review process (USEPA, 2009c) and the third review process (USEPA, 2016e). Following the review method in the protocol, EPA sought new information that might affect the following NPDWR components:

- **Maximum Contaminant Level Goals** (MCLGs; the health goal) – for some contaminants new health effects assessments completed since the MCLG was promulgated or last revised provide a revised reference dose (RfD) and/or cancer classification.
- **Maximum Contaminant Levels** (MCLs; the enforceable standard) – for some contaminants, the MCL is equal to the MCLG, and the health effects assessment indicates potential to revise the MCLG. Improvements in analytical feasibility as indicated by the practical quantitation limit (PQL) may also indicate feasibility to set the MCL closer to the MCLG[1].
- **Treatment Technique** (TT; sometimes established in lieu of an MCL) – new information on health effects, analytical feasibility, or treatment feasibility may suggests a possibility to revise TT.
- **Other Regulatory Requirements** (Monitoring) – Other regulatory revisions may be appropriate if information suggest that changes in monitoring standards (e.g., frequency) could reduce health risks or costs while maintaining or improving the level of public health protection.

[1] For some contaminants, new information on analytical feasibility could affect the NPDWR because these are contaminants for which the MCL equals a PQL that is greater than the MCLG. EPA evaluated new information for performance testing data, method minimum detection limits (MDL), and compliance data minimum reporting levels (MRL) to determine whether it could develop an estimated quantitation level (EQL) threshold for occurrence analysis below the current PQL

EPA obtained and evaluated new information available through the cutoff date for the Six-Year Review 3, which was December 2015. EPA's research methods and findings are documented in technical support documents for the following topics:

- Health effects (USEPA, 2016g);
- Analytical feasibility (USEPA, 2016b and 2009a);
- Estimated quantitation levels for occurrence thresholds (USEPA, 2016d);
- Occurrence (USEPA, 2016a and 2016f); and
- Other regulatory considerations such as monitoring (USEPA, 2016c).

Based on the information provided in these technical support documents, this document provides summaries of the review findings for 62 regulated chemical contaminants. In particular, as a result of the review process, EPA identified new health effects or analytical methods information that indicated it may be possible to revise NPDWRs for several contaminants. Consequently, EPA conducted occurrence and exposure analyses at threshold concentrations that differ from current MCLs to determine if there is a meaningful opportunity to improve the level of public health protection by reducing MCLs or achieve cost savings while maintaining the level of health protection by increasing MCLs. This document reports EPA's final recommendations regarding these contaminants.

2 Chemical Contaminant Review Summaries

2.1. Acrylamide

a. Background. EPA published the current NPDWR for acrylamide on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR imposes a treatment technique requirement that limits the allowable monomer levels in products used during drinking water treatment, storage, and distribution to 0.05 percent acrylamide in polyacrylamide coagulant aids, and limits the dosage of such products to a maximum of 1 mg/L (ppm). Each water system is required to certify, in writing, to the State (using third-party or manufacturer's certification) that the product used meets these residual monomers and use-level specifications.

b. Technical Reviews. The NPDWR for acrylamide was previously identified as a candidate for regulatory revision (75 FR 15500, USEPA, 2010e). The polyacrylamides-based polymers available today for water treatment have lower residual monomer content than when EPA promulgated residual content as a treatment technique (USEPA, 2016h). For example, manufacturer product certification tests conducted by the NSF International from 2013 to 2016 indicated that the 90th percentile concentration of acrylamide residual monomer levels (in either dry or emulsion form) approximately one-half the residual level listed in the current NPDWR (USEPA, 2016h).

The health benefits associated with the lower impurity levels are already being realized by communities throughout the country. Therefore, a regulatory revision will minimally affect health risk. Given resource limitations, competing workload priorities, and administrative costs and burden to states to adopt any regulatory changes associated with the rulemaking, the revisions to these NPDWRs are a low priority.

c. Review Result. Although there are data from the second Six-Year Review that support consideration of whether to revise the treatment technique for acrylamide, EPA does not believe a revision to the NPDWR for acrylamide is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for acrylamide is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration that the health benefits of lower impurity levels are being realized, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.2. Alachlor

a. *Background*. EPA published the current NPDWR for alachlor on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.002 mg/L, based on analytical feasibility.

b. *Technical Reviews.* In 2006, EPA identified a change in the health effects assessment for alachlor that could affect the MCLG (USEPA, 2006a). The assessment considered relevant

studies on the toxicity of alachlor including developmental and reproductive toxicity. For noncancer effects, the assessment confirmed the RfD of 0.01 mg/kg-day (milligrams per kilogram of body weight per day). The assessment also concluded that alachlor is likely to be a human carcinogen at high doses, but not at low doses. Therefore, a linear dose-response extrapolation is no longer appropriate. EPA established a health reference value of 0.005 mg/kg-day for the nonlinear cancer assessment (USEPA, 2006a). During the second Six-Year Review, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for cost savings to public water systems or their customers, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, EPA did not identify any changes in health effects information. Therefore, health reference value of 0.005 mg/kg-day remains the appropriate basis to calculate a possible MCLG. Based on this value and assuming a 70-kg adult body weight and 2 liters water intake per day, the drinking water equivalent level (DWEL) could be 0.175 mg/L. A relative source contribution (RSC) of 20 percent results in a possible MCLG of 0.035 mg/L, rounded to 0.04 mg/L (USEPA, 2016g).

Since the health review for alachlor indicates that the MCLG could possibly increase to 0.04 mg/L (from its current MCLG of zero) and because the current MCL is based on a PQL of 0.002 mg/L, neither analytical nor treatment feasibility would be a limiting factor for a possible higher level of 0.04 mg/L.

EPA evaluated the results of the occurrence and exposure analyses for alachlor to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity for cost savings to PWSs and their customers while maintaining or improving the level of public health protection (USEPA, 2016f). Review of health information for alachlor indicated that the MCLG could be increased to 0.04 mg/L from its current MCLG of zero. Consequently, the MCL of alachlor possibly can also increase to 0.04 mg/L. Although the Agency obtained and evaluated the finished water occurrence data for alachlor, its usefulness is limited for determining potential cost savings to public water system (PWSs) and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency evaluated available data on source water quality and conducted a qualitative assessment of treatment cost savings.

Table 2-1 provides summary data for contaminant occurrence based on maximum sample values for the locations included in the National Ambient Water Quality Assessment (NAWQA) data collected by the U.S. Geological Survey. Although the degree to which these occurrence rates represent national drinking water source occurrence is uncertain, the information shows no to low occurrence at threshold levels of interest. This information indicates that any resulting NPDWR change would affect systems that rely on source water at less than 0.3 percent of the NAWQA locations.

Table 2-1. Summary of Alachlor Occurrence for Locations in NAWQA

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Total locations	2,371 (100%)	8,702 (100%)	211 (100%)	11,284 (100%)
All samples are nondetects[1]	1,813 (76.5%)	8,578 (98.6%)	203 (96.2%)	10,594 (93.9%)
At least one detection	558 (23.5%)	124 (1.4%)	8 (3.8%)	690 (6.1%)

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Maximum concentration exceeds current MCL[2] (0.002 mg/L)	33 (1.4%)	4 (<0.1%)	0 (0%)	37 (0.3%)
Maximum concentration exceeds possible MCLG (0.04 mg/L)	1 (<0.1%)	0 (0%)	0 (0%)	1 (<0.1%)

Source: USEPA, 2016f (national data from 1991 to 2014; estimates based on maximum sample values at each location).
1. The detection limits range from 0.038 to 0.1 mg/L; the mode is 0.000002 mg/L.
2. The current MCLG is zero. Because of analytical limitations, EPA cannot determine the number of samples that do not exceed the current MCLG. Consequently, EPA reports the number exceeding the current MCL instead of the MCLG.

The BATs and small system compliance technologies for alachlor have other beneficial effects, e.g., reduction of other co-occurring contaminants, precursors for disinfection byproducts (DBPs) or other common impurities. Therefore, if EPA were to consider a higher level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 0.002 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. The Agency recognizes, however, that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for alachlor, EPA does not believe a revision to the NPDWR for alachlor is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for alachlor is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.3. Alpha Particle Emitters

a. *Background*. EPA published an interim NPDWR and set an MCL of 15 pCi/L for gross alpha particle activity on July 9, 1976 (41 FR 28402, USEPA, 1976). As noted in the August 14, 1975 proposal (40 FR 34324, USEPA, 1975) and a subsequent September 30, 1986 FR notice (51 FR 34836, USEPA, 1986), EPA considered the feasibility of treatment techniques, analytical methods and monitoring when establishing the MCL of 15 pCi/L. EPA also considered the risks associated with other alpha particle emitters relative to radium-226, which generally fell within the Agency's acceptable risk range of 10^{-4} to 10^{-6} at the MCL of 15 pCi/L. On December 7, 2000 (65 FR 76708, USEPA, 2000), EPA established an MCLG of zero based on a cancer classification of A (known human carcinogen) and finalized the NPDWR by retaining the MCL

of 15 pCi/L. EPA noted in the December 7, 2000, FR notice that new risk estimates from *Federal Guidance Report 13* reaffirmed that the 15 pCi/L gross alpha particle MCL (including radium 226 but excluding uranium and radon) was appropriate and protective.

b. *Technical Reviews.* The Office of Radiation and Indoor Air (ORIA) has initiated a reassessment of the health risks resulting from exposure to alpha particle emitters. The revised health effects assessment will consider relevant studies on the toxicity of alpha particle emitters. The new health effects assessment was not completed by December 2015, the cutoff date for the SYR3 cycle (USEPA, 2016g).

Although there is an ongoing health effects assessment, the MCLG is zero and the current MCL is higher than the MCLG. Therefore, EPA reviewed whether there is potential to revise the MCL based on new information regarding analytical and treatment feasibility for gross alpha particles. EPA promulgated a detection limit of 3 pCi/L in 1976 (41 FR 28402, USEPA, 1976) and retained the use of a detection limit as the required measure of sensitivity for radiochemical analysis in lieu of an MDL or PQL in the final rule (65 FR 76708, USEPA, 2000). EPA did not identify new information that would lower the detection limit. In addition, since the December 7, 2000, regulation, there is no new information regarding treatment feasibility. Since there is no new information regarding analytical or treatment feasibility that suggests changes to the MCL, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* The Agency does not believe a revision to the NPDWR for gross alpha particles is appropriate at this time because a reassessment of the health risks resulting from exposure to alpha particles is in progress (USEPA, 2016g). Furthermore, there is no new information regarding analytical or treatment feasibility that would warrant reconsideration of the MCL.

2.4. Antimony

a. *Background*. EPA published the current NPDWR for antimony on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.006 mg/L. EPA based the MCLG on a reference dose of 0.0004 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the toxicology of antimony, including reproductive and developmental effects. The literature search did not identify any studies that warrant a review of the RfD or the cancer classification (USEPA, 2016g).

A review of analytical or treatment feasibility is not necessary for antimony because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA did not identify a health or technology basis for revising the antimony NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* EPA's review shows that there are no data supporting a change to the antimony NPDWR. As a result, a revision to the NPDWR would not be appropriate at this time.

2.5. Arsenic

a. *Background*. EPA published the current NPDWR for arsenic on January 22, 2001 (66 FR 6976, USEPA, 2001b). The NPDWR established an MCLG of zero based on a cancer

classification of A, known human carcinogen. The NPDWR also established an MCL of 0.010 mg/L, which is higher than the feasible analytical level of 0.003 mg/L. EPA exercised its discretionary authority to set an MCL at a level higher than feasible (SDWA Section 1412(b)(6)), based on the finding that a final MCL of 0.010 mg/L represents the level that best maximizes health risk reduction benefits at a cost that is justified by the benefits (66 FR 6976, USEPA, 2001b at 7020).

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to arsenic. In June 2007, EPA's Science Advisory Board (SAB) issued its evaluation of the Agency's 2005 draft toxicological review for inorganic arsenic (USEPA, 2007a). In its 2007 report, SAB supports the continued use of a linear cancer risk model for inorganic arsenic, noting that the available data do not describe the shape of the dose-response curve at low doses. The new health effects assessment of cancer and noncancer health effects was not completed by December 2015, the cutoff date for the SYR3 cycle. Therefore, the MCLG remains zero. Furthermore, the outcome of the assessment could affect the MCL, which was based on benefit-cost analysis, by affecting the health risk reduction benefits.

Although there is an ongoing health effects assessment, the MCLG is zero and the current MCL is higher than the MCLG. The MCL is based on benefit-cost analysis, which could be affected by the outcome of a health effects assessment.

Since EPA did not identify a health or technology basis for revising the arsenic NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* The Agency does not believe a revision to the NPDWR for arsenic is appropriate at this time because a reassessment of the health risks resulting from exposure to arsenic is ongoing (USEPA, 2016g). As noted previously, the arsenic MCL is based on the SDWA benefit-cost analysis provision (Section 1412(b)(6)) and the health effects assessment is important for reviewing the benefits associated with the basis of the MCL.

2.6. Asbestos

a. *Background*. EPA published the current NPDWR for asbestos on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 7 million fibers/L. EPA evaluated asbestos as a Category II[2] contaminant (equivalent to Group C, possible human carcinogen) by the oral route of exposure.

b. *Technical Reviews.* The Agency updated the health effects assessment for asbestos in 2014 and retained the RfD and cancer classification on which the 1991 MCLG is based (USEPA, 2014). As a part of the 2014 assessment, EPA considered relevant studies on the toxicity of asbestos, including its potential developmental and reproductive toxicity.

A review of analytical or treatment feasibility is not necessary for asbestos because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA

[2] Category II contaminants include those contaminants for which EPA has determined there is limited evidence of carcinogenicity from drinking water considering weight of evidence, pharmacokinetics, potency, and exposure. For Category II contaminants, EPA has used two approaches to set the MCLG: Either (1) setting the MCLG based upon noncarcinogenic endpoints of toxicity (the RfD) then applying an additional risk management factor of 1 to 10; or (2) setting the MCLG based upon a theoretical lifetime excess cancer risk range of 10^{-5} to 10^{-6} using a conservative mathematical extrapolation model.

did not identify a health or technology basis for revising the asbestos NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* EPA's review shows that there are no data supporting a change to the asbestos NPDWR. As a result, a revision to the NPDWR would not be appropriate at this time.

2.7. Atrazine

a. *Background*. EPA published the current NPDWR for atrazine on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.003 mg/L. EPA based the MCLG on a reference dose of 0.005 mg/kg-day and a cancer classification of C, possible human carcinogen.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to atrazine (USEPA, 2016g). The revised health effects assessment will consider relevant studies on the toxicity of atrazine, including reproductive and developmental effects. The new health effects assessment was not completed by the information cutoff date for SYR3.

c. *Review Result.* Since the MCL for atrazine is set at its MCLG and a reassessment of the health risks resulting from exposure to atrazine is in progress, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.8. Barium

a. *Background*. EPA published the current NPDWR for barium on July 1, 1991 (56 FR 30266, USEPA, 1991a). The NPDWR established an MCLG and an MCL of 2 mg/L. EPA based the MCLG on a reference dose of 0.07 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity via the oral route.

b. *Technical Reviews.* In 2005, EPA completed a health effects assessment for barium that could affect the MCLG (USEPA, 2005b). The assessment considered relevant studies on the toxicity of barium including developmental and reproductive toxicity and revised the RfD for barium from 0.07 mg/kg-day to 0.2 mg/kg-day (USEPA, 2005b). The assessment concluded that barium is not likely to be carcinogenic to humans (USEPA, 2005b). During the second Six-Year Review, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for cost savings to public water systems or their customers, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, EPA did not identify any changes in health effects information. Therefore, the RfD of 0.2 mg/kg-day remains the appropriate basis for health protection. Based on this RfD and assuming 70 kg body weight and 2 liters water intake per day, the DWEL could be 7.0 mg/L. An RSC of 80 percent results in a possible MCLG of 5.6 mg/L, rounded to 6.0 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor if EPA were to raise the MCLG. EPA evaluated the results of the occurrence and exposure analyses for barium to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to achieve cost savings for PWSs and their customers while maintaining, or improving, the level of public health protection (USEPA, 2016f). Although the

Agency obtained and evaluated the finished water occurrence data for barium, its usefulness is limited for determining potential cost savings to PWSs and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency evaluated available data on source water quality and conducted a qualitative assessment of treatment cost savings.

Table 2-2 provides summary data for contaminant occurrence based on maximum sample values for the locations included in the NAWQA data. Although the degree to which these occurrence rates represent national drinking water source occurrence is uncertain, the information shows no to low occurrence at threshold levels of interest. This information indicates that any resulting NPDWR change would affect systems that rely on source water at less than 0.1 percent of the NAWQA locations.

Table 2-2. Summary of Barium Occurrence for Locations in NAWQA

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Total locations	523 (100%)	6,934 (100%)	9 (100%)	7,466 (100%)
All samples are nondetects[1]	1 (0.2%)	31 (0.4%)	1 (11.1%)	33 (0.4%)
At least one detection	522 (99.8%)	6,903 (99.6%)	8 (88.9%)	7,433 (99.6%)
Exceeds current MCLG (2.0 mg/L)	0 (0%)	5 (0.1%)	0 (0%)	5 (0.1%)
Exceeds possible MCLG (6.0 mg/L)	0 (0%)	1 (<0.1%)	0 (0%)	1 (<0.1%)

Source: USEPA, 2016f (national data from 1991 to 2014; estimates based on maximum sample values at each location).
1. The detection limits range from 0.00001 to 0.185 mg/L; the mode is 0.001 mg/L.

The BATs and small system compliance technologies for barium have other beneficial effects, e.g., reduction of other co-occurring contaminants or other common impurities. Therefore, if EPA were to consider a higher level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 2 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. However, the Agency recognizes that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for barium, EPA does not believe a revision to the NPDWR for barium is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for barium is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.9. Benzo(a)pyrene

a. *Background*. EPA published the current NPDWR for benzo(a)pyrene on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.0002 mg/L, based on analytical feasibility.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to benzo(a)pyrene. The revised health effects assessment will consider relevant studies on the toxicity of benzo(a)pyrene, including reproductive and developmental effects. The new health effects assessment was not completed byDecember 2015 the review cutoff date for SYR3 (USEPA, 2016g).

Although a health effects assessment is in process for benzo(a)pyrene, the existing MCLG is still zero and the current MCL is based on a PQL of 0.0002 mg/L. Therefore, EPA reviewed whether there is potential to revise the PQL. Based on PT data obtained during the second Six-Year Review cycle, there are no PT study results at spiked concentrations below the PQL and several passing rates for the available PT studies are below 75 percent (USEPA, 2009a). Because of the lack of data below the PQL and passing rate variability, EPA determined that the PT data did not support a PQL reduction.

For SYR3, EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the SYR3 information collection request (ICR) dataset, and the MDLs for approved methods for the detection of benzo(a)pyrene (Methods 550, 550.1, and 525.2). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The SYR3 ICR dataset contains MRL values for 60,569 samples. Less than 80 percent of these values are less than or equal the modal MRL: 21,563 (35.6 percent) equal the modal MRL of 0.00002 mg/L and an additional 872 (1.4 percent) are lower than 0.00002 mg/L. Therefore, EPA did not set the EQL equal to the modal MRL (USEPA, 2016d). The MDLs of approved methods are 0.000016, 0.000029, and 0.00023 mg/L. Multiplying the MDLs by 10 results in a possible EQL range from 0.00016 to 0.0023 0 mg/L. The lower bound of this range rounds to 0.002 mg/L, which is the PQL. Thus, the MDL data do not support an EQL below the PQL (USEPA, 2016d). Based on these varied and unrelated approaches/sources of information, EPA believes that there is no potential to lower the PQL for benzo(a)pyrene. Since the MCL is constrained by the PQL, and the PQL is unchanged, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* EPA did not identify new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL). Therefore, EPA does not believe a revision to the NPDWR for benzo(a)pyrene is appropriate at this time.

2.10. Beryllium

a. *Background*. EPA published the current NPDWR for beryllium on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.004 mg/L. EPA classified beryllium in Group B2, probable human carcinogen, based on clear evidence of its carcinogenicity via inhalation or injection in several animal species. However, EPA also placed beryllium in drinking water Category II for regulation, based on the weight of evidence for carcinogenicity via ingestion, and the potency, exposure and pharmacokinetics of this chemical. EPA derived the MCLG by applying an additional risk management factor of 10 to the RfD of 0.005 mg/kg-day (57 FR 31776, USEPA, 1992, at 31785).

b. *Technical Reviews.* In 1998, EPA completed a health effects assessment for beryllium that could affect the MCLG (USEPA, 1998). The assessment revised the RfD for beryllium from 0.005 mg/kg-day to 0.002 mg/kg-day (USEPA, 1998). During the first Six-Year Review, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for cost savings to public water systems or their customers, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (68 FR 42908, USEPA, 2003c). Beryllium was excluded from the second Six-Year Review because of an ongoing health effects assessment (75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, EPA did not identify any changes in health effects information. Therefore, the RfD of 0.002 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on this RfD and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 0.07 mg/L. An RSC of 20 percent results in the possible MCLG of 0.014mg/L, rounded to 0.01 mg/L, which no longer includes an additional factor of 0.1 for cancer classification (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor if EPA were to raise the MCLG. EPA evaluated the results of the occurrence and exposure analyses for beryllium to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to achieve cost savings for PWSs and their customers while maintaining, or improving, the level of public health protection (USEPA, 2016f). Although the Agency obtained and evaluated the finished water occurrence data for beryllium, its usefulness is limited for determining potential cost savings to PWSs and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency evaluated available data on source water quality and conducted a qualitative assessment of treatment cost savings.

Table 2-3 provides summary data for contaminant occurrence based on maximum sample values for the locations included in the NAWQA data. Although the degree to which these occurrence rates represent national drinking water source occurrence is uncertain, the information shows no to low occurrence at threshold levels of interest. This information indicates that any resulting NPDWR change would affect systems that rely on source water at less than 0.1 percent of the NAWQA locations.

Table 2-3. Summary of Beryllium Occurrence for Locations in NAWQA

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Total locations	487 (100%)	6,913 (100%)	4 (100%)	7,404 (100%)
All samples are nondetects[1]	465 (95.5%)	5,679 (82.1%)	4 (100%)	6,148 (83.0%)
At least one detection	22 (4.5%)	1,234 (17.9%)	0 (0%)	1,256 (17.0%)
Exceeds current MCLG (0.004 mg/L)	2 (0.4%)	8 (0.1%)	0 (0%)	10 (0.1%)
Exceeds possible MCLG (0.01 mg/L)	2 (0.4%)	3 (<0.1%)	0 (0%)	5 (0.1%)

Source: USEPA, 2016f (national data from 1991 to 2014; estimates based on maximum sample values at each location).
1. The detection limits range from 0.000006 to 0.032 mg/L; the mode is 0.001 mg/L
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The BATs and small system compliance technologies for beryllium have other beneficial effects, e.g., reduction of other co-occurring contaminants, precursors for DBPs, or other common impurities. Therefore, if EPA were to consider a higher level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 0.004 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. However, the Agency recognizes that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for beryllium, EPA does not believe a revision to the NPDWR for beryllium is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for beryllium is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.11. Beta Particle and Photon Emitters

a. *Background*. EPA published an interim NPDWR and set an MCL of 4 millirems/yr (mrem/yr) for beta particle and photon emitters on July 9, 1976 (41 FR 28402, USEPA, 1976). As noted in the August 14, 1975 proposal (40 FR 34324, USEPA, 1975) and a subsequent September 30, 1986 FR (51 FR 34836, USEPA, 1986) advanced notice of proposed rulemaking, EPA considered the feasibility of treatment techniques, analytical methods and monitoring when establishing the MCL of 4 mrem/yr. EPA also considered the risks associated with beta particle

and photon emitters, which generally fell within the Agency's acceptable risk range of 10^{-4} to 10^{-6} at the MCL of 4 mrem/yr. On December 7, 2000 (65 FR 76708, USEPA, 2000), EPA established an MCLG of zero based on a cancer classification of A (known human carcinogen) and finalized the NPDWR by retaining the MCL of 4 mrem/yr. EPA noted in the December 7, 2000, FR notice that new risk estimates from Federal Guidance Report 13 reaffirmed that the 4 mrem/yr MCL was appropriate and protective. [3]

b. *Technical Reviews.* ORIA has initiated a reassessment of the health risks resulting from exposure to beta particle and photon emitters. The revised health effects assessment will consider relevant studies on the toxicity of beta particle and photon emitters. The new health effects assessment was not completed by December 2015, the cutoff date for the SYR3 cycle (USEPA, 2016g).

Although there is an ongoing health effects assessment, the MCLG is zero and the current MCL is higher than the MCLG. Therefore, EPA reviewed whether there is potential to revise the MCL based on new information available regarding the analytical and treatment feasibility for beta particle and photon emitters. EPA promulgated the MCL of 4 mrem/yr for man-made beta particle and photon emitters (present in any combination) in 1976 (41 FR 28402, USEPA, 1976) and retained the use of the detection limit as the required measure of sensitivity in the December 2000 final rule (65 FR 76708, USEPA, 2000). The original rule estimated a risk ceiling of 5.6×10^{-5} for whole body doses. Limits were set in picoCurie units for each nuclide equivalent to a 4 mrem dose. The dosimetry found in Federal Guidance13 and reported in the December 2000 final rule reveals more exact risks that are still within the Agency's acceptable limits. While individual dose estimates changed over time, the overall limit of 4 mrem was retained along with a two-tiered screening level to avoid analyzing each possible nuclide below the screen, and still be protective. EPA did not identify new information that would lower the detection limits for beta particle and photon emitters. In addition, since the December 7, 2000 regulation, there is no new information regarding treatment feasibility. Since there is no new information regarding analytical or treatment feasibility that suggests changes to the MCL, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* The Agency does not believe a revision to the NPDWR for beta particles is appropriate at this time because a reassessment of the health risks resulting from exposure to beta particles is in progress (USEPA, 2016g). Furthermore, there is no new information regarding analytical or treatment feasibility that would warrant reconsideration of the MCL.

2.12. Cadmium

a. *Background*. EPA published the current NPDWR for cadmium on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.005 mg/L. Because of inadequate dose-response data to characterize the presence or lack of a carcinogenic hazard from oral exposure, the Agency classified cadmium as a Group D carcinogen, not

[3] After the December 7, 2000, final regulation, two trade associations and several municipal water systems challenged EPA's standard for the beta photon emitters by claiming that the Agency did not use the best available science when finalizing the standard. In February of 2003, the District of Columbia (DC) Circuit Court of Appeals upheld EPA's regulation for beta and photon emitters (as well as radium 226 and 228 and uranium). In July, 2004, the DC Circuit Court of Appeals also upheld the policy and scientific basis of EPA's application of the beta particle and photon (man-made) drinking water standards to the ground water protection standards used for Yucca Mountain under 40 CFR part 197 (66 FR 32073, USEPA, 2001c).

classifiable as to human carcinogenicity by the oral route of exposure. Therefore, EPA developed the MCLG for cadmium based on the RfD of 0.0005 mg/kg-day.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the toxicology of cadmium, including its potential developmental and reproductive toxicity. The Agency has identified data that indicate it may be appropriate to update the health effects assessment for cadmium. During the third Six-Year Review cycle, EPA identified new information that potentially affects the MCLG for cadmium (USEPA, 2016g). In 2012, the Agency for Toxic Substances and Disease Registry (ATSDR) updated its health effects assessment of cadmium. The ATSDR identified a change in this assessment that could lead to a change in the MCLG (ATSDR, 2012). The assessment reported a minimum risk level of 0.00011 mg/kg-day (ATSDR, 2012), which could support a lower MCLG [i.e., assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 0.0035 mg/L; with an RSC of 25 percent the possible MCLG could be 0.000875 mg/L, rounded to 0.001 mg/L (USEPA, 2016g)]. The ATSDR assessment only provided quantification of noncancer effects. More recent literature, however, indicates a need for a cancer dose-response assessment as well as assessment of additional noncancer effects such as neurodevelopmental and cardiovascular effects (Ciesielski, et al., 2012; Larsson et al., 2015a; Larsson et al., 2015b; Nawrot, et al., 2015; Tellez-Plaza, 2015; and Åkesson et al., 2014). Therefore, EPA nominated cadmium for a new health effects assessment (USEPA, 2016g). Cadmium is also listed in the IRIS Program Multiyear Agenda (USEPA, 2015), which is a list of chemicals for which assessments are either underway or planned. Because the new assessment is not expected to be completed in the time frame of the current Six-Year Review cycle, EPA does not believe it is appropriate to revise the MCLG at this time.

A review of analytical or treatment feasibility is not necessary for cadmium because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA did not identify a health or technology basis for revising the cadmium NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* The Agency is considering whether to initiate a new health assessment for cadmium and therefore does not believe a revision to the NPDWR is appropriate at this time.

2.13. Carbofuran

a. *Background*. EPA published the current NPDWR for carbofuran on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.04 mg/L. EPA based the MCLG on a reference dose of 0.005 mg/kg-day and a cancer classification of E, evidence of non-carcinogenicity for humans.

b. *Technical Reviews.* In 2008, the Agency updated health effects assessment of carbofuran (USEPA, 2008a). The Agency identified a change in this assessment that could lead to a change in the MCLG. This assessment considered relevant studies on the toxicity of carbofuran including developmental and reproductive toxicity. The assessment revised the RfD from 0.005 mg/kg-day to an acute RfD of 0.0003 mg/kg-day (USEPA, 2008a). EPA also concluded that carbofuran is not likely to be carcinogenic to humans (USEPA, 2005a; and USEPA, 2016g). Based on the revised acute RfD of 0.0003 mg/kg-day, and assuming 10 kg body weight and 1 liter water intake per day for a child, the resulting DWEL would be 0.003 mg/L. Using an RSC of 20 percent, a possible new MCLG would be 0.0006 mg/L (USEPA, 2016g).

Because of a possible change in the MCLG for carbofuran, EPA considered whether analytical feasibility is likely to be a limitation if the Agency were to consider lowering the MCL to 0.0006 mg/L (the possible MCLG). EPA analyzed recent data to determine if the PQL could be revised (i.e., analytical feasibility). Available PT data were not sufficient to support a revised PQL. However, EPA evaluated whether more sensitive analytical methods have been approved and put into use by a wide number of laboratories. Passing rates supplied by two PT providers are above 75 percent for almost all sample concentrations. There are, however, no studies with sample concentration below the current PQL. Given the lack of PT data below the current PQL, PT data are insufficient to support a PQL reduction (USEPA, 2016b).

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the SYR3 ICR dataset, and the MDLs for the approved methods for the detection of carbofuran (Methods 531.1 and 531.2). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The SYR3 ICR dataset contains MRL values for 50,018 samples. Less than 80 percent of these values are less than or equal the modal MRL: 14,273 (28.5 percent) equal the modal MRL of 0.0009 mg/L and an additional 14,219 (28.4 percent) are lower than 0.0009 mg/L. Therefore, EPA did not set the EQL equal to the modal MRL (USEPA, 2016d). The MDLs of approved methods are 0.00052 and 0.000058 mg/L. Applying a multiplier of 10, would give a possible PQL range from 0.0052 to 0.00058 mg/L. EPA used the higher value, rounded to 0.005 mg/L, as the EQL (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for carbofuran to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-4 shows the results of the occurrence and exposure analysis for the current MCL and the EQL. The analysis uses single sample or peak results instead of system average results because the health endpoint is associated with acute exposure.[4] The occurrence and exposure analysis shows no exceedance of the current MCL of 0.04 mg/L. Average concentrations exceeded the EQL at 3 systems (0.009 percent of 34,614), serving 24,258 people (0.011 percent of 228.7 million people). Following cancellation of most registered uses of carbofuran in 2009 (74 FR 11551, USEPA, 2009b), declining agricultural applications should further reduce the occurrence of carbofuran in drinking water sources (Ryberg and Gilliom, 2015).

Table 2-4. Number and Percent of Systems with a Peak Concentration that Exceeds Carbofuran Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Peak Concentrations That Are Greater Than The Threshold	Percent of Systems with Peak Concentrations That Are Greater Than The Threshold
> 0.04 mg/L (MCL)	0	0.000%
> 0.005 mg/L (EQL)	3	0.009%

[4] The Six-Year Review ICR occurrence data are based on the Standardized Monitoring Framework for synthetic organic compounds, which is designed to evaluate long-term exposure to contaminants with chronic exposure health endpoints. As a result, EPA recognizes that short-term seasonal peaks, which correspond to past carbofuran application as a pesticide, cannot be readily detected in this dataset. Nonetheless, the peak concentrations in the SYR3 ICR dataset are the best available data to evaluate potential occurrence for carbofuran because the health endpoint is associated with acute exposure.

Threshold	Population Served by Systems with Peak Concentrations That Are Greater Than The Threshold	Percent of Population Served by Systems with Peak Concentrations That Are Greater Than The Threshold
> 0.04 mg/L (MCL)	0	0.000%
> 0.005 mg/L (EQL)	24,258	0.011%

Source: USEPA, 2016a

1. Percentages based on the 34,614 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 228,717,933 people.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for carbofuran, EPA does not believe a revision to the NPDWR for carbofuran is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for carbofuran is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.14. Chlordane

a. *Background*. EPA published the current NPDWR for chlordane on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.002 mg/L, based on analytical feasibility.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the carcinogenicity of chlordane as well as its potential developmental and reproductive toxicity. EPA has not identified any new information that indicates that it is appropriate to consider revisions to the cancer classification for chlordane at this time (USEPA, 2016g). Because the MCLG remains at zero, the Agency believes that a further review of the health effects of chlordane is not warranted at this time.

The current MCL for chlordane is based on a PQL of 0.002 mg/L. The Agency considered whether changes in the analytical feasibility of chlordane might lead to a lower MCL. EPA analyzed recent data to determine if the PQL could be revised (i.e., analytical feasibility). Available PT data were not sufficient to support a revised PQL. However, EPA evaluated whether more sensitive analytical methods have been approved and put into use by a wide number of laboratories. One new method – EPA 525.3 – was approved in 2012 (USEPA, 2016b).

The detection limit for the new method is 0.000002 mg/L, which is lower than the current PQL of 0.002 mg/L, which suggests potential for a lower PQL.

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of chlordane (Methods 505, 508, 508.1, and 525.2). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 59,923 samples. Less than 80 percent of these values are less than or equal the modal MRL: 16,932 (28.3 percent) equal the modal MRL of 0.0002 mg/L and an additional 15,272 (25.5 percent) are lower than 0.0002 mg/L. Therefore, EPA did not set the EQL equal to the modal MRL (USEPA, 2016d). The MDLs of approved methods are 0.0000041, 0.000004, 0.00014, and 0.00022 mg/L. Applying a multiplier of 10 would give possible EQLs of 0.000041, 0.00004, 0.0014, and 0.0022 mg/L. The highest value exceeds the PQL of 0.002 mg/L. Therefore, EPA set the EQL equal to the second largest value, rounded to 0.001 mg/L (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for chlordane to determine whether a revised MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-5 shows the results of the occurrence and exposure analysis for the current MCL and the EQL of 0.001 mg/L. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for 1 of 35,685 systems (0.003 percent) serving 993 people (< 0.001 percent of 217 million people). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on annual average concentrations at entry points. Average concentrations exceed the EQL for 3 systems (0.008 percent) serving 1,353 people (0.001 percent).

Table 2-5. Number and Percent of Systems with Mean Concentrations Exceeding Chlordane Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.002 mg/L (MCL)	1	1	0.003%	0.003%
> 0.001 mg/L (EQL)	3	3	0.008%	0.008%

Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.002 mg/L (MCL)	993	993	<0.001%	<0.001%
> 0.001 mg/L (EQL)	1,353	1,353	0.001%	0.001%

Source: USEPA, 2016a

1. Percentages are based on the 35,685 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 217,637,369 people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL), EPA does not believe a revision to the NPDWR for chlordane is appropriate at this time. The occurrence and exposure analysis based on possible changes in analytical feasibility indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.15. Chromium

a. *Background*. EPA published the current NPDWR for total chromium on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.1 mg/L. Although the NPDWR regulates total chromium, the adverse health effects associated with hexavalent chromium (Cr VI) are the basis of the current MCLG because that is the more toxic species (56 FR 3526, USEPA, 1991c). EPA based the MCLG on an RfD of 0.005 mg/kg-day and an assumed RSC from water of 70 percent for total chromium. EPA regulated chromium as a Group D carcinogen, not classifiable as to human carcinogenicity by the oral route of exposure.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to total chromium (USEPA, 2016g). The revised health effects assessment will consider relevant studies on the toxicity of total chromium, including reproductive and developmental effects. The new health effects assessment was not completed by the information cutoff date for SYR3.

c. *Review Result.* Since the MCL for total chromium is set at its MCLG and a reassessment of the health risks resulting from exposure to total chromium is in progress, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.16. Cyanide

a. *Background*. EPA published the current NPDWR for cyanide on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.2 mg/L. EPA based the MCLG on a reference dose of 0.02 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity. During the first Six-Year Review cycle, EPA recommended a revision to the BATs for cyanide to clarify that "chlorine" should be "alkaline chlorine" to avoid potential for the formation of harmful cyanogen chloride. EPA promulgated that revision in (69 FR 38850, USEPA, 2004).

b. *Technical Reviews.* In 2010, the Agency updated its health effects assessment of cyanide. The Agency identified a change in this assessment that could lead to a change in the MCLG (USEPA, 2010b). This assessment considered relevant studies on the toxicity of cyanide including developmental and reproductive toxicity. The assessment revised the RfD from 0.02 mg/kg-day to 0.0006 mg/kg-day and concluded that information was inadequate to assess carcinogenic potential (USEPA, 2010b). Based on the new integrated risk information system (IRIS) assessment and RfD of 0.0006 mg/kg-day, and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 0.02 mg/L. An RSC of 20 percent results in the possible MCLG of 0.0044 mg/L, rounded to 0.004 mg/L (USEPA, 2016g).

Because of a possible change in the MCLG for cyanide, EPA considered whether analytical feasibility is likely to be a limitation if the Agency were to consider lowering the MCL to 0.004 mg/L (the possible MCLG). EPA analyzed recent data to determine if the PQL could be revised (i.e., analytical feasibility). Available PT data were not sufficient to support a revised PQL. However, EPA evaluated whether more sensitive analytical methods have been approved and put into use by a wide number of laboratories. There are newer methods with lower detection limits, but there is limited information on how the methods might affect the PQL (USEPA, 2016b). Thus, given the lack of PT data below the PQL, EPA determined that the review of new information does not support reduction of the PQL.

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDL for the approved method for the detection of cyanide (Method 335.4). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 56,219 samples. Fewer than 80 percent of these values are less than or equal the modal MRL: 23,865 (42.5 percent) equal the modal MRL of 0.01 mg/L and an additional 17,213 (30.6 percent) are lower than 0.01 mg/L. Therefore, EPA did not set the EQL equal to the modal MRL (USEPA, 2016d). The MDL of the approved method is 0.005 mg/L. Applying a multiplier of 10 would give a possible EQL of 0.05 mg/L, which exceeds the possible MCLG, but is lower than the current PQL. Therefore, EPA set the EQL equal 0.05 mg/L (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for cyanide to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-6 shows the results of the

occurrence and exposure analysis for the current MCL and the EQL. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for up to 8 of 36,907 systems (0.022 percent) serving 80,826 people (0.038 percent of 210.4 million people). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on annual average concentrations at entry points. Average concentrations exceed the EQL for up to 98 systems (0.266 percent) serving 574,038 people (0.273 percent).

Table 2-6. Number and Percent of Systems with Mean Concentrations Exceeding Cyanide Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.2 mg/L (MCL)	8	7	0.022%	0.019%
> 0.05 mg/L (EQL)	98	90	0.266%	0.244%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.2 mg/L (MCL)	80,826	80,592	0.038%	0.038%
> 0.05 mg/L (EQL)	574,038	571,684	0.273%	0.272%

Source: USEPA, 2016a

1. Percentages are based on the 36,907 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 210,427,981 people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for cyanide, EPA does not believe a revision to the NPDWR for cyanide is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for cyanide is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.17. 2,4-D (2,4-Dichlorophenoxyacetic acid)

a. *Background*. EPA published the current NPDWR for 2,4-D on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.07 mg/L. EPA based the MCLG on a reference dose of 0.01 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2013, the Agency updated its health effects assessment of 2,4-D (USEPA, 2013). The Agency identified a change in this assessment that could lead to a change in the MCLG. This assessment considered relevant studies on the toxicity of 2,4-D including developmental and reproductive toxicity. The assessment revised the RfD from 0.01 mg/kg-day to 0.21 mg/kg-day and concluded that 2,4-D is not classifiable as to its carcinogenicity (USEPA, 2013). Based on the new assessment and RfD of 0.21 mg/kg-day, and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 7.35 mg/L. An RSC of 20 percent results in a possible MCLG of 1.47 mg/L, rounded to 2 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor if EPA were to raise the MCLG. EPA evaluated the results of the occurrence and exposure analyses for 2,4-D to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to achieve cost savings for PWSs and their customers while maintaining, or improving, the level of public health protection (USEPA, 2016a). Although the Agency obtained and evaluated the finished water occurrence data for 2,4-D, its usefulness is limited for determining potential cost savings to PWSs and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency evaluated available data on source water quality and conducted a qualitative assessment of treatment cost savings.

Table 2-7 provides summary data for contaminant occurrence based on maximum sample values for the locations included in the NAWQA data. Although the degree to which these occurrence rates represent national drinking water source occurrence is uncertain, the information shows almost no occurrence at threshold levels of interest. This information indicates that any resulting NPDWR change would affect systems that rely on source water at less than 0.1 percent of the NAWQA locations.

Table 2-7. Summary of 2,4-D Occurrence for Locations in NAWQA

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Total locations	1,083 (100%)	5,729 (100%)	167 (100%)	6,979 (100%)
All samples are nondetects[1]	774 (71.5%)	5,707 (99.6%)	157 (94.0%)	6,638 (95.1%)
At least one detection	309 (28.5%)	22 (0.4%)	10 (6.0%)	341 (4.9%)

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Exceeds current MCLG (0.07 mg/L)	1 (0.1%)	0 (0%)	0 (0%)	1 (<0.1%)
Exceeds possible MCLG (2 mg/L)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Source: USEPA, 2016f (national data from 1991 to 2014; estimates based on maximum sample values at each location).
1. The detection limits range from 0.000013 to 0.00083 mg/L; the mode is 0.000035 mg/L.

The BAT and small system compliance technologies for 2,4-D have other beneficial effects, e.g., reduction of other co-occurring contaminants, precursors for DBPs, or other common impurities. Therefore, if EPA were to consider a higher level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 0.07 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. However, the Agency recognizes that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for 2,4-D, EPA does not believe a revision to the NPDWR for 2,4-D is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for 2,4-D is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.18. Dalapon (2,2-Dichloropropionic Acid)

a. *Background*. EPA published the current NPDWR for dalapon on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.2 mg/L. EPA based the MCLG on a reference dose of 0.03 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the toxicology of dalapon, including its potential developmental and reproductive toxicity. The literature search did not identify any studies that warrant a review of the RfD or the cancer classification (USEPA, 2016g).

A review of analytical or treatment feasibility is not necessary for dalapon because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA did not identify a health or technology basis for revising the dalapon NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* EPA's review shows that there are no data supporting a change to the dalapon NPDWR. As a result, a revision to the NPDWR would not be appropriate at this time.

2.19. Di(2-ethylhexyl)adipate (DEHA)

a. *Background*. EPA published the current NPDWR for DEHA on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.4 mg/L. EPA based the MCLG on a reference dose of 0.6 mg/kg-day and a cancer classification of C, possible human carcinogen.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the toxicology of DEHA, including its potential developmental and reproductive toxicity. The literature search did not identify any studies that warrant a review of the RfD or the cancer classification (USEPA, 2016g).

A review of analytical or treatment feasibility is not necessary for DEHA because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA did not identify a health or technology basis for revising the DEHA NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* EPA's review shows that there are no data supporting a change to the DEHA NPDWR. As a result, a revision to the NPDWR would not be appropriate at this time.

2.20. Di(2-ethylhexyl)phthalate (DEHP)

a. *Background*. EPA published the current NPDWR for DEHP on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.006 mg/L, based on analytical feasibility.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the carcinogenicity of DEHP as well as its potential developmental and reproductive toxicity. EPA has not identified any new information that indicates that it is appropriate to consider revisions to the cancer classification for DEHP at this time (USEPA, 2016g). Because the MCLG remains at zero, the Agency believes that a further review of the health effects of DEHP is not warranted at this time.

The current MCL for DEHP is based on a PQL of 0.006 mg/L. The Agency considered whether changes in the analytical feasibility of DEHP might lead to a lower MCL. EPA reviewed PT data from the third Six-Year Review cycle to determine if the PQL could be revised (i.e., analytical feasibility). Passing rates for several PT studies are below 75 percent, including two studies with sample concentrations below the PQL (USEPA, 2009a). Because of the low passing rates, EPA determined that the PT results do not support PQL reduction.

For SYR3, EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of DEHP (Methods 525.2 and 506). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 55,550 samples. Less than 80 percent of these values are less than or equal the modal MRL:

17,648 (31.8 percent) equal the modal MRL of 0.0006 mg/L and an additional 4,942 (8.9 percent) are lower than 0.0006 mg/L. Therefore, EPA did not set the EQL equal to the modal MRL (USEPA, 2016d). The MDLs of approved methods are 0.0013 and 0.00225 mg/L. Applying a multiplier of 10 would give a possible PQL range from 0.013 to 0.0225 mg/L. The range is higher than the current PQL and, therefore, EPA did not estimate an EQL (USEPA, 2016d). Based on these varied and unrelated approaches/sources of information, EPA believes that there is no potential to lower the PQL for DEHP. Since the MCL is constrained by the PQL, and the PQL is unchanged, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* EPA did not identify new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL). Therefore, EPA does not believe a revision to the NPDWR for DEHP is appropriate at this time.

2.21. 1,2-Dibromo-3-chloropropane (DBCP)

a. *Background*. EPA published the current NPDWR for DBCP on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.0002 mg/L, based on analytical feasibility.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the carcinogenicity of DBCP as well as its potential developmental and reproductive toxicity. EPA has not identified any new information that indicates that it is appropriate to consider revisions to the cancer classification for DBCP at this time (USEPA, 2016g). Because the MCLG remains at zero, the Agency believes that a further review of the health effects of DBCP is not warranted at this time.

The current MCL for DBCP is based on a PQL of 0.0002 mg/L. The Agency considered whether changes in the analytical feasibility of DBCP might lead to a lower MCL. EPA reviewed PT data from the third Six-Year Review cycle to determine if the PQL could be revised (i.e., analytical feasibility). Passing rates are greater than 80 percent passing rates for all studies in the PT data. There are, however, no studies with sample concentrations below the PQL (USEPA, 2016b). Because there are no studies below the PQL, EPA determined that PQL assessment does not support reduction of the PQL.

EPA examined two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of DBCP (Methods 504.1, 524.2, 524.3, and 551.1). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The modal MRL is 0.0005 mg/L, which is greater than the current PQL. Therefore, MRL data cannot support an EQL that is less than the PQL. The MDLs of approved methods are 0.000009, 0.00001, 0.000063, and 0.00026, mg/L. Applying a multiplier of 10 results in only two possible EQLs less than the PQL, 0.00009 and 0.0001 mg/L. Both of these values are less than the modal MRL, which means a large share of nondetection results have reporting limits that are greater than the possible EQLs. Therefore, EPA did not establish an EQL for the occurrence analysis (USEPA, 2016d). Based on these varied and unrelated approaches/sources of information, EPA believes that there is no potential

to lower the PQL for DBCP. Since the MCL is constrained by the PQL, and the PQL is unchanged, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* EPA did not identify new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL). Therefore, EPA does not believe a revision to the NPDWR for DBCP is appropriate at this time.

2.22. 1,2-Dichlorobenzene (o-Dichlorobenzene)

a. *Background*. EPA published the current NPDWR for 1,2-dichlorobenzene on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.6 mg/L. EPA based the MCLG on a reference dose of 0.09 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to 1,2-dichlorobenzene (USEPA, 2016g). The revised health effects assessment will consider relevant studies on the toxicity of 1,2-dichlorobenzene, including its potential developmental and reproductive toxicity. The new health effects assessment was not completed by the information cutoff date for SYR3.

c. *Review Result.* Since the MCL for 1,2-dichlorobenzene is set at its MCLG and a reassessment of the health risks resulting from exposure to 1,2-dichlorobenzene is in progress, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.23. 1,4-Dichlorobenzene (p-Dichlorobenzene)

a. *Background*. EPA published the current NPDWR for 1,4-dichlorobenzene on July 8, 1987 (52 FR 25690, USEPA, 1987). The NPDWR established an MCLG and an MCL of 0.075 mg/L. EPA based the MCLG on a reference dose of 0.1 mg/kg-day and a cancer classification of C, possible human carcinogen.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to 1,4-dichlorobenzene (USEPA, 2016g). The revised health effects assessment will consider relevant studies on the toxicity of 1,4-dichlorobenzene, including its potential developmental and reproductive toxicity. The new health effects assessment was not completed by the information cutoff date for SYR3.

c. *Review Result.* Since the MCL for 1,4-dichlorobenzene is set at its MCLG and a reassessment of the health risks resulting from exposure to 1,4-dichlorobenzene is in progress, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.24. 1,1-Dichloroethylene

a. *Background*. EPA published the current NPDWR for 1,1-dichloroethylene on July 8, 1987 (52 FR 25690, USEPA, 1987). The NPDWR established an MCLG and an MCL of 0.007 mg/L. EPA based the MCLG on a reference dose of 0.01 mg/kg-day and a cancer classification of C, possible human carcinogen.

b. *Technical Reviews.* In 2002, the Agency updated its health effects assessment of 1,1-dichloroethylene (USEPA, 2002b). The assessment considered relevant studies on the toxicity of

1,1-dichloroethylene including developmental and reproductive toxicity. The assessment revised the RfD from 0.01 mg/kg-day to 0.05 mg/kg-day and concluded that there is inadequate information to assess carcinogenic potential via the oral route, which means that the risk management factor of 10 applied to the current MCLG may no longer be needed (USEPA, 2002b). During the first and second Six-Year Reviews, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for cost savings to public water systems or their customers, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (68 FR 42908, USEPA, 2003c, 75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, EPA did not identify any changes in health effects information. Therefore, the RfD of 0.05 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on this RfD and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 1.75 mg/L. An RSC of 20 percent results in a possible MCLG of 0.35 mg/L, rounded to 0.4 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor if EPA were to raise the MCLG. EPA evaluated the results of the occurrence and exposure analyses for 1,1-dichloroethylene to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to achieve cost savings for PWSs and their customers while maintaining, or improving, the level of public health protection (USEPA, 2016f). Although the Agency obtained and evaluated the finished water occurrence data for 1,1-dichloroethylene, its usefulness is limited for potential cost savings to PWSs and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency evaluated available data on source water quality and conducted a qualitative assessment of treatment cost savings.

Table 2-8 provides summary data for contaminant occurrence based on maximum sample values for the locations included in the NAWQA data. Although the degree to which these occurrence rates represent national drinking water source occurrence is uncertain, the information shows almost no occurrence at threshold levels of interest. This information indicates that any resulting NPDWR change would affect systems that rely on source water at less than 0.01 percent of the NAWQA locations.

Table 2-8. Summary of 1,1-Dichloroethylene Occurrence for Locations in NAWQA

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Total locations	262 (100%)	7,523 (100%)	197 (100%)	7,982 (100%)
All samples are nondetects[1]	254 (96.9%)	7,450 (99.0%)	192 (97.5%)	7,896 (98.9%)
At least one detection	8 (3.1%)	73 (1.0%)	5 (2.5%)	86 (1.1%)
Exceeds current MCLG (0.007 mg/L)	1 (0.4%)	1 (<0.1%)	0 (0%)	2 (<0.1%)
Exceeds possible MCLG (0.4 mg/L)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Source: USEPA, 2016f (national data from 1991 to 2014; estimates based on maximum sample values at each location).
1. The detection limits range from 0.00002 to 0.1 mg/L; the mode is 0.00004 mg/L.

The BATs and small system compliance technologies for 1,1-dichloroethylene have other beneficial effects, e.g., reduction of other co-occurring contaminants, precursors for DBPs, or other common impurities. Therefore, if EPA were to consider a higher level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 0.007 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. However, the Agency recognizes that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for 1,1-dichloroethylene, EPA does not believe a revision to the NPDWR for 1,1-dichloroethylene is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for 1,1-dichloroethylene is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.25. cis-1,2-Dichloroethylene

a. *Background*. EPA published the current NPDWR for cis-1,2-dichloroethylene on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.07 mg/L. EPA based the MCLG on a reference dose of 0.01 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2010, the Agency updated its health effects assessment of cis-1,2-dichloroethylene. The Agency identified a change in this assessment that could lead to a change in the MCLG (USEPA, 2010a). This assessment considered relevant studies on the toxicity of cis-1,2-dichloroethylene including developmental and reproductive toxicity. The assessment revised the RfD from 0.01 mg/kg-day to 0.002 mg/kg-day and concluded that information was inadequate to assess carcinogenic potential (USEPA, 2010a). Based on the new IRIS assessment and RfD of 0.002 mg/kg-day, and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 0.07 mg/L. An RSC of 20 percent results in the possible MCLG of 0.014 mg/L, rounded to 0.01 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor for the possible MCLG decrease under consideration. EPA evaluated the results of the occurrence and exposure analyses for cis-1,2-dichloroethylene to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-9 shows the results of the occurrence and exposure analysis for the current MCL and the possible MCLG. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for no systems. Average

concentrations exceed the possible MCLG for 4 of 55,734 systems (0.007 percent) serving 5,569 people (0.002 percent of 263.3 million people).

Table 2-9. Number and Percent of Systems with Mean Concentrations Exceeding cis-1,2-Dichloroethylene Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.07 mg/L (MCL)	0	0	0.000%	0.000%
> 0.01 mg/L (possible MCLG)	4	4	0.007%	0.007%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.07 mg/L (MCL)	0	0	0.000%	0.000%
> 0.01 mg/L (possible MCLG)	5,569	5,569	0.002%	0.002%

Source: USEPA, 2016a

1. Percentages are based on the 55,734 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 263,344,982 people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for cis-1,2-dichloroethylene, EPA does not believe a revision to the NPDWR for cis-1,2-dichloroethylene is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for cis-1,2-dichloroethylene is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.26. trans-1,2-Dichloroethylene

a. *Background*. EPA published the current NPDWR for trans-1,2-dichloroethylene on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.1 mg/L. EPA based the MCLG on a reference dose of 0.02 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* The Agency updated the health effects assessment for trans-1,2-dichloroethylene in 2010 and retained the RfD and cancer classification on which the 1991 MCLG is based (USEPA, 2010a). As a part of the 2010 assessment, EPA considered relevant studies on the toxicity of trans-1,2-dichloroethylene, including its potential developmental and reproductive toxicity.

A review of analytical or treatment feasibility is not necessary for trans-1,2-dichloroethylene because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA did not identify a health or technology basis for revising the trans-1,2-dichloroethylene NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* EPA's review shows that there are no data supporting a change to the trans-1,2-dichloroethylene NPDWR. As a result, a revision to the NPDWR would not be appropriate at this time.

2.27. Dinoseb

a. *Background*. EPA published the current NPDWR for dinoseb on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.007 mg/L. EPA based the MCLG on a reference dose of 0.001 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the toxicology of dinoseb, including its potential developmental and reproductive toxicity. The literature search did not identify any studies that warrant a review of the RfD or the cancer classification (USEPA, 2016g).

A review of analytical or treatment feasibility is not necessary for dinoseb because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA did not identify a health or technology basis for revising the dinoseb NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* EPA's review shows that there are no data supporting a change to the dinoseb NPDWR. As a result, a revision to the NPDWR would not be appropriate at this time.

2.28. Diquat

a. *Background*. EPA published the current NPDWR for diquat on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.02 mg/L. EPA based the MCLG on a reference dose of 0.0022 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2002, the Agency updated its health effects assessment of diquat (USEPA, 2002a). A subsequent reassessment of tolerances for residues in or on raw agricultural products (USEPA, 2002d) did not identify any new health effects information and based the updated tolerances on health effects information in the 2002 assessment (USEPA, 2002a). The Agency identified a change in this assessment that could lead to a change in the MCLG. This assessment considered relevant studies on the toxicity of diquat including developmental and reproductive toxicity. The assessment revised the RfD from 0.002 mg/kg-day to 0.005 mg/kg-day and developed a cancer classification of E, evidence of noncarcinogenicity (USEPA, 2002a). During the first and second Six-Year Reviews, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for cost savings to public water systems or their customers, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (68 FR 42908, USEPA, 2003c, 75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, EPA did not identify any changes in health effects information. Therefore, the RfD of 0.005 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on this RfD and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 0.175 mg/L. An RSC of 20 percent results in a possible MCLG of 0.035 mg/L, rounded to 0.04 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor if EPA were to raise the MCLG. EPA evaluated the results of the occurrence and exposure analyses for diquat to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to achieve cost savings for PWSs and their customers while maintaining, or improving, the level of public health protection (USEPA, 2016f). Although the Agency obtained and evaluated the finished water occurrence data for diquat, its usefulness is limited for determining potential cost savings to PWS and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency sought data on source water quality to conduct an assessment of the potential for treatment cost savings. NAWQA does not contian monitoring results for diquat. Therefore, the Agency obtained available information on diquat use and fate and transport.

Diquat's primary uses are as an algaecide, defoliant, desiccant, and herbicide (USEPA, 1995a). The USGS estimated total diquat application to crops of approximately 300,000 pounds in 2012, with vegetables and fruit for almost all applications (USGS, 2015). Diquat use on crops occurred primarily in the upper Midwest and Great Lakes region, North Dakota, the Pacific Northwest, California, and Florida. In comparison to other commonly used pesticides (e.g., alachlor, glyphosate, and picloram), use estimates for diquat are very low (USEPA, 2016f).

The *Reregistration Eligibility Decision (RED) for Diquat Dibromide* (USEPA, 1995a) notes that although diquat is persistent (i.e., it does not hydrolyze and is resistant to degradation), it becomes immobile when it adsorbs to soil particles and, therefore, is not expected to contaminate ground water. Furthermore, diquat dissipates quickly from surface water because it adsorbs to soil sediments, vegetation, and organic matter; the estimated half-life is 1 to 2 days for diquat in surface water based on a study of two ponds in Florida (USEPA, 1995a). These factors indicate the possibility of low occurrence in drinking water sources.

The BAT and small system compliance technologies for diquat have other beneficial effects, e.g., removing other co-occurring contaminants. Therefore, if EPA were to consider a higher

level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 0.02 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. However, the Agency recognizes that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for diquat, EPA does not believe a revision to the NPDWR for diquat is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for diquat is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.29. Endothall

a. *Background*. EPA published the current NPDWR for endothall on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.1 mg/L. EPA based the MCLG on a reference dose of 0.02 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2005, the Agency updated its health effects assessment of endothall (USEPA, 2005d). The Agency identified a change in this assessment that could lead to a change in the MCLG. This assessment considered relevant studies on the toxicity of endothall including developmental and reproductive toxicity. The assessment revised the RfD from 0.02 mg/kg-day to 0.007 mg/kg-day and concluded that endothall is unlikely to be carcinogenic to humans (USEPA, 2005d). During the second Six-Year Review, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for health risk reduction, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, the Agency's literature search did not identify any additional new data that would supersede the findings of the 2003 assessment (USEPA, 2016g). Therefore, the RfD of 0.2 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on the new EPA Office of Pesticide Programs (OPP) assessment and RfD of 0.007 mg/kg-day, and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 0.245 mg/L. An RSC of 20 percent results in a possible MCLG of 0.049 mg/L, rounded to 0.05 mg/L (USEPA, 2016g).

Because of a possible change in the MCLG for endothall, EPA considered whether analytical feasibility is likely to be a limitation if the Agency were to consider lowering the MCL to 0.05

mg/L (the possible MCLG). EPA analyzed recent data to determine if the PQL could be revised (i.e., analytical feasibility). Available PT data were not sufficient to support a revised PQL. However, EPA evaluated whether more sensitive analytical methods have been approved and put into use by a wide number of laboratories. Passing rates for PT data show passing rates above 75 percent for most studies, but there are four studies with passing rates equal to or less than the 75 percent criterion, including two close to the current PQL. No PT studies had sample concentrations below the current PQL. Given the variable results from the PT studies and the lack of study results below the current PQL, PT data are insufficient to support a PQL reduction (USEPA, 2009a).

For SYR3, EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDL for the approved method for the detection of endothall (Method 548.1). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 19,895 samples. Fewer than 80 percent of these values are less than or equal the modal MRL: 6,833 (34.3 percent) equal the modal MRL of 0.01 mg/L and an additional 9,004 (45.3 percent) are lower than 0.01 mg/L. The mode is less than the possible MCLG, which supports using the possible MCLG for the occurrence analysis (USEPA, 2016d). The MDL of the approved method is 0.00179 mg/L. Applying a multiplier of 10 results in a possible EQL of 0.0179 mg/L, which is less than the possible MCLG. Therefore, EPA used the possible MCLG of 0.05 mg/L as a threshold for the occurrence analysis (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for endothall to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-10 shows the results of the occurrence and exposure analysis for the current MCL and the possible MCLG. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for 1 of 15,538 systems (0.006 percent) serving 993 people (0.001 percent of 136.8 million people served). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on running annual average concentrations at entry points; nevertheless. The average concentrations exceed the possible MCLG at the same system.

Table 2-10. Number and Percent of Systems with Mean Concentrations Exceeding Endothall Thresholds and Corresponding Estimates of Population Served

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.1 mg/L (MCL)	1	1	0.006%	0.006%
> 0.05 mg/L (possible MCLG)	1	1	0.006%	0.006%

Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.1 mg/L (MCL)	993	993	0.001%	0.001%
> 0.05 mg/L (possible MCLG)	993	993	0.001%	0.001%

Source: USEPA, 2016a

1. Percentages are based on the 15,538 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 136,801,729 people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for endothall, EPA does not believe a revision to the NPDWR for endothall is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for endothall is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.30. Endrin

a. *Background*. EPA published the current NPDWR for endrin on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.002 mg/L. EPA based the MCLG on a reference dose of 0.0003 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the toxicology of endrin, including its potential developmental and reproductive toxicity. The literature search did not identify any studies that warrant a review of the RfD or the cancer classification (USEPA, 2016g).

A review of analytical or treatment feasibility is not necessary for endrin because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA did not identify a health or technology basis for revising the endrin NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* EPA's review shows that there are no data supporting a change to the endrin NPDWR. As a result, a revision to the NPDWR would not be appropriate at this time.

2.31. Epichlorohydrin

a. *Background.* EPA published the current NPDWR for epichlorohydrin on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR imposes a treatment technique requirement that limits the allowable level of epichlorohydrin monomer in the polymer that is added to water as a flocculent to remove particulates. Each water system is required to certify, in writing, to the State (using third-party or manufacturer's certification) that the combination (or product) of dose and monomer level does not exceed the following level: 0.01 percent residual epichlorohydrin monomer in polymer products used during water treatment and dosed at 20 mg/L (ppm).

b. *Technical Reviews.* The NPDWR for epichlorohydrin was previously identified as a candidate for regulatory revision (75 FR 15500, USEPA, 2010e). The epichlorohydrin-based polymers available today for water treatment have lower residual monomer content than when EPA promulgated residual content as a treatment technique (USEPA, 2016). For example, manufacturer product certification tests conducted by the NSF International from 2013 to 2016 indicated that epichlorohydrin residual monomer levels could not be detected above a detection limit that is one-fifth the residual level listed in the current NPDWR (USEPA, 2016h).

The health benefits associated with the lower impurity levels are already being realized by communities throughout the country. Therefore, a regulatory revision will minimally affect health risk. Given resource limitations, competing workload priorities, and administrative costs and burden to states to adopt any regulatory changes associated with the rulemaking, the revisions to these NPDWRs are a low priority.

c. *Review Result.* Although there are data from the second Six-Year Review that support consideration of whether to revise the treatment technique for epichlorohydrin, EPA does not believe a revision to the NPDWR for epichlorohydrin is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for epichlorohydrin is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration that the health benefits of lower impurity levels are being realized, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.32. Ethylbenzene

a. *Background*. EPA published the current NPDWR for ethylbenzene on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.7 mg/L. EPA based the MCLG on a reference dose of 0.1 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to ethylbenzene (USEPA, 2016g). The revised health effects assessment will consider relevant studies on the toxicity of ethylbenzene, including reproductive and developmental effects. The new health effects assessment was not completed by the information cutoff date for SYR3.

c. *Review Result.* Since the MCL for ethylbenzene is set at its MCLG and a reassessment of the health risks resulting from exposure to ethylbenzene is in progress, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.33. Ethylene Dibromide (EDB; 1,2-Dibromoethane)

a. *Background*. EPA published the current NPDWR for EDB on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.00005 mg/L, based on analytical feasibility.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the carcinogenicity of EDB as well as its potential developmental and reproductive toxicity. EPA has not identified any new information that indicates that it is appropriate to consider revisions to the cancer classification for EDB at this time (USEPA, 2016g). Because the MCLG remains at zero, the Agency believes that a further review of the health effects of EDB is not warranted at this time.

The current MCL for EDB is based on a PQL of 0.00005 mg/L. The Agency considered whether changes in the analytical feasibility of EDB might lead to a lower MCL. EPA reviewed PT data from the third Six-Year Review cycle to determine if the PQL could be revised (i.e., analytical feasibility). There are no PT study results with sample concentrations below the PQL. The results for sample concentrations greater than the PQL are scattered throughout the range from 75 percent to 100 percent (USEPA, 2009a). Therefore, EPA determined that the PT data do not support PQL reduction.

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of EDB (Methods 504.1 and 551.1). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 88,891 samples. The modal MRL is 0.0005 mg/L, which is greater than the current PQL. Therefore, MRL data cannot support an EQL that is less than the PQL (USEPA, 2016d). The MDLs of approved methods are 0.00001 and 0.000032 mg/L. Applying a multiplier of 5, which was used to establish the PQL, would give a possible PQL range from 0.00005 to 0.00016 mg/L. The result is higher than or equal to the current PQL and, therefore, EPA did not estimate an EQL (USEPA, 2016d). Based on these varied and unrelated approaches/sources of information, EPA believes that there is no potential to lower the PQL. Since the MCL is constrained by the PQL, and the PQL is unchanged, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* EPA did not identify new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL). Therefore, EPA does not believe a revision to the NPDWR for EDB is appropriate at this time.

2.34. Glyphosate

a. *Background*. EPA published the current NPDWR for glyphosate on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.7 mg/L. EPA based the MCLG on a reference dose of 0.1 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to glyphosate (USEPA, 2016g). The revised health effects assessment will consider relevant studies on the toxicity of glyphosate, including its potential developmental and reproductive toxicity. The new health effects assessment was not completed by the information cutoff date for SYR3.

c. *Review Result.* Since the MCL for glyphosate is set at its MCLG and a reassessment of the health risks resulting from exposure to glyphosate is in progress, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.35. Heptachlor

a. *Background*. EPA published the current NPDWR for heptachlor on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.0004 mg/L, based on analytical feasibility.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the carcinogenicity of heptachlor as well as its potential developmental and reproductive toxicity. EPA has not identified any new information that indicates that it is appropriate to consider revisions to the cancer classification for heptachlor at this time (USEPA, 2016g). Because the MCLG remains at zero, the Agency believes that a further review of the health effects of heptachlor is not warranted at this time.

The current MCL for heptachlor is based on a PQL of 0.0004 mg/L. The Agency considered whether changes in the analytical feasibility of heptachlor might lead to a lower MCL. EPA analyzed recent data to determine if the PQL could be revised (i.e., analytical feasibility). Available PT data were not sufficient to support a revised PQL. However, EPA evaluated whether more sensitive analytical methods have been approved and put into use by a wide number of laboratories. One new method – EPA 525.3 – has been approved (USEPA, 2016b). The detection limit for the new method is comparable to the detection limits for previously approved methods, which does not support a reduction of the PQL.

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of heptachlor (Methods 505, 508, 508.1, 525.2, 525.3, and 551.1). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset

contains MRL values for 63,810 samples. Fewer than 80 percent of these values are less than or equal the modal MRL: 17,794 (27.9 percent) equal the modal MRL of 0.00004 mg/L and an additional 9,863 (15.5 percent) are lower than 0.00004 mg/L. Therefore, EPA did not set the EQL equal to the modal MRL (USEPA, 2016d). The MDLs of approved methods are 0.0000015, 0.000003, 0.000005, 0.000081, 0.00015, and 0.00034 mg/L. Applying a multiplier of 10 results in three possible EQLs that are less than the current PQL, the largest of which is 0.00005 mg/L. EPA rounded this value up to 0.0001 mg/L to obtain an EQL (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for heptachlor to determine whether a revised MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-11 shows the results of the occurrence and exposure analysis for the current MCL and the EQL. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for up to 3 of 38,691 systems (0.008 percent) serving 1,643 people (or 0.001 percent of 229.8 million people). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on annual average concentrations at entry points. Average concentrations exceed the EQL at 3 systems (0.008 percent), serving 1,643 people (or 0.001 percent).

Table 2-11. Number and Percent of Systems with Mean Concentrations Exceeding Heptachlor Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.0004 mg/L (MCL)	3	2	0.008%	0.005%
> 0.0001 mg/L (EQL)	3	3	0.008%	0.008%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.0004 mg/L (MCL)	1,643	1,543	0.001%	0.001%
> 0.0001 mg/L (EQL)	1,643	1,643	0.001%	0.001%

Source: USEPA, 2016a

1. Percentages are based on the 38,691 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 229,832,285 people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL), EPA does not believe a revision to the NPDWR for heptachlor is appropriate at this time. The occurrence and exposure analysis based on possible changes in analytical feasibility indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.36. Heptachlor Epoxide

a. *Background*. EPA published the current NPDWR for heptachlor epoxide on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.0002 mg/L, based on analytical feasibility.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the carcinogenicity of heptachlor epoxide as well as its potential developmental and reproductive toxicity. EPA has not identified any new information that indicates that it is appropriate to consider revisions to the cancer classification for heptachlor epoxide at this time (USEPA, 2016g). Because the MCLG remains at zero, the Agency believes that a further review of the health effects of heptachlor epoxide is not warranted at this time.

The current MCL for heptachlor epoxide is based on a PQL of 0.0002 mg/L. The Agency considered whether changes in the analytical feasibility of heptachlor epoxide might lead to a lower MCL. EPA analyzed recent data to determine if the PQL could be revised (i.e., analytical feasibility). Available PT data were not sufficient to support a revised PQL. However, EPA evaluated whether more sensitive analytical methods have been approved and put into use by a wide number of laboratories. Passing rates for several PT studies with sample concentrations below the current PQL exceed 75 percent. There are two PT studies with passing rates below 75 percent for sample concentrations above the PQL. Despite this variability, most of the laboratory passing rates exceeded the 75 percent criterion typically used to derive a PQL. Therefore, a lowering of the PQL for heptachlor epoxide might be possible (USEPA, 2009a). These results, however, are insufficient to recalculate a revised PQL for heptachlor epoxide because not enough data points are available below the current PQL to derive a value at the 75 percent passing rate.

For SYR3, EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of heptachlor epoxide (Methods 505, 508, 508.1, 525.2, 525.3, and 551.1). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 63,667 samples. Fewer than 80 percent of these values are less

than or equal the modal MRL: 18,370 (28.9 percent) equal the modal MRL of 0.00002 mg/L and an additional 7,184 (11.3 percent) are lower than 0.00002 mg/L. Therefore, EPA did not set the EQL equal to the modal MRL (USEPA, 2016d). The MDLs of approved methods are 0.0000001, 0.0000026, 0.000004, 0.000015, 0.00013, and 0.000202 mg/L. Applying a multiplier of 10 results in four possible EQL values that are less than the current PQL: 0.000001, 0.000026, 0.00004, and 0.00015 mg/L. The highest value rounds up to equal the PQL, so EPA used the second highest value to derive an EQL of 0.00004 mg/L (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for heptachlor epoxide to determine whether a revised MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-12 shows the results of the occurrence and exposure analysis for the current MCL and the EQL. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for 2 of 38,625 systems (0.005 percent) serving 1,543 people (0.001 percent of 229.8 million people). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on annual average concentrations at entry points. Average concentrations exceed the EQL for 14 systems (0.036 percent) serving 11,659 people (0.005 percent).

Table 2-12. Number and Percent of Systems with Mean Concentrations Exceeding Heptachlor Epoxide Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.0002 mg/L (MCL)	2	2	0.005%	0.005%
> 0.00004 mg/L (EQL)	14	14	0.036%	0.036%
Threshold	**Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold**		**Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold**	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.0002 mg/L (MCL)	1,543	1,543	0.001%	0.001%
> 0.00004 mg/L (EQL)	11,659	11,659	0.005%	0.005%

Source: USEPA, 2016a

1. Percentages are based on the 38,625 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 229,832,890 people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL), EPA does not believe a revision to the NPDWR for heptachlor epoxide is appropriate at this time. The occurrence and exposure analysis based on possible changes in analytical feasibility indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.37. Hexachlorobenzene

a. *Background*. EPA published the current NPDWR for hexachlorobenzene on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.001 mg/L, based on analytical feasibility.

b. *Technical Reviews.* The Agency updated the health effects assessment for hexachlorobenzene in 2008 and retained the cancer classification on which the 1992 MCLG is based (USEPA, 2008b). As a part of the 2008 assessment, EPA considered relevant studies on the toxicity of hexachlorobenzene, including its potential developmental and reproductive toxicity. EPA did not identify any additional information during the health effects literature review conducted during third Six-Year Review that potentially affects the MCLG (USEPA, 2016g).

The current MCL for hexachlorobenzene is based on a PQL of 0.001 mg/L. The Agency considered whether changes in the analytical feasibility of hexachlorobenzene might lead to a lower MCL. No data on analytical methods have become available in this round of the Six-Year Review. However, data from the second Six-Year Review cycle indicated that an improvement in analytical feasibility might exist (USEPA, 2009a). Passing rates for PT data are greater than 75 percent for most of the studies, including several with sample concentrations below the current PQL. Despite some variability, EPA determined that lowering of the PQL for hexachlorobenzene might be possible (USEPA, 2009a). These results, however, are insufficient to recalculate a revised PQL for hexachlorobenzene because there are insufficient data points below the current PQL to derive a value at the 75 percent passing rate.

For SYR3, EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of hexachlorobenzene (Methods 505, 508, 508.1, 525.2, and 551.1). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 62,752 samples. Less than 80 percent of these values are less

than or equal the modal MRL: 31,338 (49.9 percent) equal the modal MRL of 0.0001 mg/L and an additional 13,418 (21.4 percent) are lower than 0.0001 mg/L. Therefore, EPA did not select the modal MRL as the EQL (USEPA, 2016d). The MDLs of approved methods are 0.000001, 0.000002, 0.00003, 0.0000077, and 0.00013 mg/L. Applying a multiplier of 10 results in possible EQL values less than the current PQL that range from 0.00001 to 0.000077. EPA rounded the largest value up to 0.0001 mg/L for the EQL (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for hexachlorobenzene to determine whether a revised MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-13 shows the results of the occurrence and exposure analysis for the current MCL and the EQL. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for none of the systems in the SYR3 ICR dataset. Average concentrations exceed the EQL of 0.0001 mg/L for up to 6 of 38,498 systems (0.016 percent), serving approximately 8,703 people (0.004 percent of 230.2 million people).

Table 2-13. Number and Percent of Systems with Mean Concentrations Exceeding Hexachlorobenzene Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.001 mg/L (MCL)	0	0	0.000%	0.000%
> 0.0001 mg/L (EQL)	6	5	0.016%	0.013%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.001 mg/L (MCL)	0	0	0.000%	0.000%
> 0.0001 mg/L (EQL)	8,703	8,589	0.004%	0.004%

Source: USEPA, 2016a

1. Percentages are based on the 38,498 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 230,197,968 people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL), EPA does not believe a revision to the NPDWR for hexachlorobenzene is appropriate at this time. The occurrence and exposure analysis based on possible changes in analytical feasibility indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.38. Hexachlorocyclopentadiene

a. *Background*. EPA published the current NPDWR for hexachlorocyclopentadiene on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.05 mg/L. EPA based the MCLG on a reference dose of 0.007 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* in 2001, the Agency updated its health effects assessment for hexachlorocyclopentadiene (USEPA, 2001a). This assessment considered relevant studies on the toxicity including developmental and reproductive toxicity. The assessment revised the RfD from 0.007 mg/kg-day to 0.006 mg/kg-day (USEPA, 2001a). During the first and second Six-Year Reviews, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for health risk reduction, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (68 FR 42908, USEPA, 2003c, 75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, EPA identified new data that supported RfD of 0.0011 mg/kg-day (CalEPA, 2014a), the Agency determined that the 2001 IRIS assessment remained appropriate (USEPA, 2016g). Therefore, the RfD of 0.006 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on this RfD and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 0.21 mg/L. An RSC of 20 percent results in a possible MCLG of 0.042 mg/L, rounded to 0.04 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor for the possible MCLG decrease under consideration. EPA evaluated the results of the occurrence and exposure analyses for hexachlorocyclopentadiene to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-14 shows the results of the occurrence and exposure analysis for the current MCL and the possible MCLG. The occurrence and exposure analysis shows that average concentrations do not exceed the current MCL for any systems in the analysis. Similarly, the occurrence and exposure analysis shows that average concentrations do not exceed the possible MCLG of 0.04 mg/L.

Table 2-14. Number and Percent of Systems with Mean Concentrations Exceeding Hexachlorocyclopentadiene Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.05 mg/L (MCL)	0	0	0.000%	0.000%
> 0.04 mg/L (possible MCLG)	0	0	0.000%	0.000%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.05 mg/L (MCL)	0	0	0.000%	0.000%
> 0.04 mg/L (possible MCLG)	0	0	0.000%	0.000%

Source: USEPA, 2016a

1. Percentages are based on the 38,743 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 229.9 million people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for hexachlorocyclopentadiene, EPA does not believe a revision to the NPDWR for hexachlorocyclopentadiene is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for hexachlorocyclopentadiene is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.39. Lindane (gamma-Hexachlorocyclohexane)

a. *Background*. EPA published the current NPDWR for lindane on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.0002 mg/L. EPA based the MCLG on a reference dose of 0.0003 mg/kg-day and a cancer classification of C, possible human carcinogen.

b. *Technical Reviews.* In 2002, the Agency revised its health effects assessment for lindane (USEPA, 2002f, USEPA, 2006b). This assessment considered relevant studies on the toxicity of lindane including developmental and reproductive toxicity. The assessment revised the RfD from 0.0003 mg/kg-day to 0.0047 mg/kg-day and classified it as "Suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential" (USEPA, 2002f). During the first and second Six-Year Reviews, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for cost savings to public water systems or their customers, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (68 FR 42908, USEPA, 2003c, 75 FR 15500, USEPA, 2010e). Furthermore, during the second review cycle, all uses of lindane were cancelled voluntarily (71 FR 74905, USEPA, 2006c), effective July 1, 2007. During the third Six-Year Review cycle, EPA did not identify any changes in health effects information. Therefore, the RfD of 0.0047 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on this RfD and assuming 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 0.1645 mg/L. An RSC of 20 percent results in a possible MCLG of 0.0329 mg/L, rounded to 0.03 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor if EPA were to raise the MCLG. EPA evaluated the results of the occurrence and exposure analyses for lindane to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to achieve cost savings for PWSs and their customers while maintaining, or improving, the level of public health protection (USEPA, 2016f). Although the Agency obtained and evaluated the finished water occurrence data for lindane, its usefulness is limited for determining potential cost savings to PWSs and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency evaluated available data on source water quality and conducted a qualitative assessment of treatment cost savings.

Table 2-15 provides summary data for contaminant occurrence based on maximum sample values for the locations included in NAWQA data. Although the degree to which these occurrence rates represent national drinking water source occurrence is uncertain, the information shows almost no occurrence at threshold levels of interest. This information indicates that any resulting NPDWR change would affect systems that rely on source water at less than 0.1 percent of the NAWQA locations.

Table 2-15. Summary of Lindane Occurrence for Locations in NAWQA

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Total locations	1,994 (100%)	6,766 (100%)	6 (100%)	8,766 (100%)
All samples are nondetects[1]	1,891 (94.8%)	6,758 (99.9%)	6 (100%)	8,655 (98.7%)
At least one detection	103 (5.2%)	8 (0.1%)	0 (0%)	111 (1.3%)
Exceeds current MCLG (0.0002 mg/L)	1 (0.1%)	0 (0%)	0 (0%)	1 (<0.1%)
Exceeds possible MCLG (0.03 mg/L)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Source: USEPA, 2016f (national data from 1991 to 2014; estimates based on maximum sample values at each location).
1. The detection limits range from 0.000001 to 0.0939 mg/L; the mode is 0.000004 mg/L.

The BATs and small system compliance technologies for lindane have other beneficial effects, e.g., reduction of other co-occurring contaminants, precursors for DBPs, or other common impurities. Therefore, if EPA were to consider a higher level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 0.0002 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. However, the Agency recognizes that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for lindane, EPA does not believe a revision to the NPDWR for lindane is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for lindane is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.40. Mercury (Inorganic)

a. *Background*. EPA published the current NPDWR for inorganic mercury on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.002 mg/L. The Agency based the MCLG on a DWEL of 0.01 mg/L[5] and a cancer classification of D, not classifiable as to human carcinogenicity.

[5] The DWEL was recommended by a panel of experts on mercury, and was derived using the weight of evidence from the entire inorganic mercury database. The DWEL was later back-calculated to an RfD of 0.0003 mg/kg-day (USEPA, 2016g).

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to inorganic mercury (USEPA, 2016g). The revised health effects assessment will consider relevant studies on the toxicity of inorganic mercury, including its potential developmental and reproductive toxicity. The new health effects assessment was not completed by the information cutoff date for SYR3.

c. *Review Result.* Since the MCL for inorganic mercury is set at its MCLG and a reassessment of the health risks resulting from exposure to inorganic mercury is in progress, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.41. Methoxychlor

a. *Background*. EPA published the current NPDWR for methoxychlor on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.04 mg/L. EPA based the MCLG on a reference dose of 0.005 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2010, the California Environmental Protection Agency updated its health effects assessment of methoxychlor (CalEPA, 2010a). This assessment that could lead to a change in the MCLG. Based on new information provided by the California Environmental Protection Agency, EPA determined that it is possible to revise the RfD from 0.005 mg/kg-day to 0.00002 mg/kg-day. Based on the new assessment and RfD of 0.00002 mg/kg-day, and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 0.0007 mg/L. An RSC of 20 percent results in the possible MCLG of 0.0001 mg/L (USEPA, 2016g).

Because of a possible change in the MCLG for methoxychlor, EPA considered whether analytical feasibility is likely to be a limitation if the Agency were to consider lowering the MCL to 0.0001 mg/L (the possible MCLG). EPA analyzed recent data to determine if the PQL could be revised (i.e., analytical feasibility). Available PT data were not sufficient to support a revised PQL. However, EPA evaluated whether more sensitive analytical methods have been approved and put into use by a wide number of laboratories. Passing rates for PT data are greater than 75 percent for most of the studies, including several with sample concentrations below the current PQL. Despite some variability, EPA determined that lowering of the PQL for methoxychlor might be possible (USEPA, 2009a). These results, however, are insufficient to recalculate a revised PQL for methoxychlor because there are insufficient data points below the current PQL to derive a value at the 75 percent passing rate.

For SYR3, EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of methoxychlor (Methods 505, 508, 508.1, 525.2, and 551.1). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 70,142 samples. Less than 80 percent of these values are less than or equal the modal MRL: 31,060 (44.3 percent) equal the modal MRL of 0.0001 mg/L and an additional 10,788 (15.4 percent) are lower than 0.0001 mg/L. Therefore, EPA did not select the modal MRL as the EQL (USEPA, 2016d). The MDLs of approved methods are 0.000003, 0.000022, 0.000026, 0.00013, and 0.00096 mg/L. Applying a multiplier of 10 results in four

possible EQL values less than the current PQL that range from 0.00003 to 0.0013. EPA rounded the largest value to 0.001 mg/L for the EQL (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for methoxychlor to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-16 shows the results of the occurrence and exposure analysis for the current MCL and the EQL. The occurrence and exposure analysis shows that average concentrations do not exceed the current MCL. Average concentrations exceed the EQL for 1 of 39,187 systems (0.0003 percent) serving 993 people (<0.001 percent of 233.0 million people served).

Table 2-16. Number and Percent of Systems with Mean Concentrations Exceeding Methoxychlor Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.04 mg/L (MCL)	0	0	0.000%	0.000%
> 0.001 mg/L (EQL)	1	1	0.003%	0.003%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.04 mg/L (MCL)	0	0	0.000%	0.000%
> 0.001 mg/L (EQL)	993	993	<0.001%	<0.001%

Source: USEPA, 2016a

1. Percentages are based on the 39,187 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 233.0 million people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for methoxychlor, EPA does not believe a revision to the NPDWR for methoxychlor is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for methoxychlor is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of

this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.42. Monochlorobenzene (Chlorobenzene)

a. *Background*. EPA published the current NPDWR for monochlorobenzene on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.1 mg/L. EPA based the MCLG on a reference dose of 0.02 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2014, the California Environmental Protection Agency updated its health effects assessment of monochlorobenzene (CalEPA, 2014b). This assessment did not affect the RfD and cancer classification on which the 1991 MCLG is based. EPA did not identify any other information that might affect the MCLG (USEPA, 2016g).

A review of analytical or treatment feasibility is not necessary for monochlorobenzene because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA did not identify a health or technology basis for revising the monochlorobenzene NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* EPA's review shows that there are no data supporting a change to the monochlorobenzene NPDWR. As a result, a revision to the NPDWR would not be appropriate at this time.

2.43. Nitrate (as N)

a. *Background*. EPA published the current NPDWR for nitrate on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 10 mg/L (as N). EPA based the MCLG on a survey of epidemiologic studies of infant methemoglobinemia in populations exposed to nitrate contaminated water. No cancer classification is currently available for nitrate (USEPA, 2016g).

b. *Technical Reviews.* During the second Six-Year Review, EPA identified new health effects information that potentially affects the MCLG for nitrate. Therefore, EPA nominated nitrate for a new health effects assessment, including developmental and reproductive effects. Nitrate is listed in the IRIS Program Multiyear Agenda (USEPA, 2015), which is a list of chemicals for which assessments are either underway or to be initiated. The Agency does not expect the new health effects assessment to be completed in the time frame of the current Six-Year Review cycle (USEPA, 2016g).

c. *Review Result.* Because the MCL for nitrate is equal to its MCLG and a reassessment of the health risks resulting from exposure to nitrate has been scheduled as a result of its nomination during the second Six-Year Review cycle, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.44. Nitrite (as N)

a. *Background*. EPA published the current NPDWR for nitrite on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 1 mg/L (as N). EPA based the MCLG on extrapolation from nitrate, assuming the conversion of 10 percent of nitrate-nitrogen to nitrite-nitrogen. No cancer classification is currently available for nitrite (USEPA, 2016g).

b. *Technical Reviews.* During the second Six-Year Review, EPA identified new health effects information that potentially affects the MCLG for nitrite. Therefore, EPA nominated nitrite for a new health effects assessment, including developmental and reproductive effects. Nitrite is listed in the IRIS Program Multiyear Agenda (USEPA, 2015), which is a list of chemicals for which assessments are either underway or to be initiated. The Agency does not expect the new health effects assessment to be completed in the time frame of the current Six-Year Review cycle (USEPA, 2016g).

c. *Review Result.* Because the MCL for nitrite is equal to its MCLG and a reassessment of the health risks resulting from exposure to nitrite has been scheduled as a result of its nomination during the second Six-Year Review cycle, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.45. Oxamyl (Vydate)

a. *Background*. EPA published the current NPDWR for oxamyl on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.2 mg/L. EPA based the MCLG on a reference dose of 0.025 mg/kg-day and a cancer classification of E, evidence of non-carcinogenicity for humans.

b. *Technical Reviews.* In 2010, the Agency updated its health effects assessment of oxamyl (USEPA, 2010d). The Agency identified a change in this assessment that could lead to a change in the MCLG because it revised the RfD to an acute RfD of 0.0069 mg/kg-day (USEPA, 2016g). Based on the new OPP assessment and RfD of 0.0069 mg/kg-day, and assuming a 10-kg child body weight and 1 liter water intake per day, the DWEL could be 0.069 mg/L. [6] An RSC of 20 percent was selected based on the actual food dietary exposure (81 percent) for children who are 1 to 6 years old (USEPA, 2016g); this RSC results in a possible MCLG of 0.01 mg/L (USEPA, 2016g).

Because of a possible change in the MCLG for oxamyl, EPA considered whether analytical feasibility is likely to be a limitation if the Agency were to consider lowering the MCL to 0.01 mg/L (the possible MCLG). EPA analyzed recent data to determine if the PQL could be revised (i.e., analytical feasibility). Passing rates for PT data are greater than 75 percent for most of the studies and two studies with sample concentrations below the current PQL have passing rates close to 75 percent. Given the lack of high passing rates below the PQL, EPA determined that PT data do not support a reduction of the PQL (USEPA, 2016b).

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and

[6] A child's body weight and drinking water intake were used to calculate the DWEL because children are the population with the highest risk from dietary exposure.

the MDLs for approved methods for the detection of oxamyl (Methods 531.1 and 531.2). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 49,438 samples. More than 80 percent of these values are less than or equal the modal MRL: 17,818 (36.0 percent) equal the modal MRL of 0.002 mg/L and an additional 24,422 (49.4 percent) are lower than 0.002 mg/L. Thus, an EQL could be set lower than the possible MCLG (USEPA, 2016d). The MDLs of approved methods are 0.000065 and 0.00086 mg/L. Applying a multiplier of 10 results in a possible EQL range from 0.00065 to 0.0086 mg/L. The possible MCLG is in this range. Therefore, the MRL and MDL data support using the possible MCLG as an occurrence threshold (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for oxamyl to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-17 shows the results of the occurrence and exposure analysis for the current MCL and the possible MCLG. The analysis uses single sample or peak results instead of system average results because the health endpoint is associated with acute exposure. [7] The occurrence and exposure analysis shows that individual sample concentrations exceed the current MCL of 0.2 mg/L for one of 30,876 systems (0.003 percent) serving 200 people (or 0.000 percent of 167 million people). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on running annual average concentrations at entry points. Individual sample concentrations at 3 of 34,518 systems (0.009 percent), serving 28,146 people (0.012 percent of 227.5 million people), exceeded the possible MCLG of 0.01 mg/L at least one time between 2006 and 2011.

Table 2-17. Number and Percent of Systems with Peak Concentrations Exceeding Oxamyl Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Peak Concentrations That Are Greater Than The Threshold	Percent of Systems with Peak Concentrations That Are Greater Than The Threshold
> 0.2 mg/L (MCL)	0	0.000%
> 0.01 mg/L (possible MCLG)	3	0.009%

[7] The Six-Year Review ICR occurrence data are based on the Standardized Monitoring Framework for synthetic organic compounds, which is designed to evaluate long-term exposure to contaminants with chronic exposure health endpoints. As a result, EPA recognizes that short-term seasonal peaks, which correspond to oxamyl application as a pesticide, cannot be readily detected in this dataset. Nonetheless, the peak concentrations in the SYR3 ICR dataset are the best available data to evaluate potential occurrence for oxamyl because the health endpoint is associated with acute exposure.

Threshold	Population Served by Systems with Peak Concentrations That Are Greater Than The Threshold	Percent of Population Served by Systems with Peak Concentrations That Are Greater Than The Threshold
> 0.2 mg/L (MCL)	0	0.000%
> 0.01 mg/L (possible MCLG)	28,146	0.012%

Source: USEPA, 2016a

1. Percentages based on the 34,518 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 227.5 million people.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for oxamyl, EPA does not believe a revision to the NPDWR for oxamyl is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for oxamyl is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.46. Pentachlorophenol

a. *Background*. EPA published the current NPDWR for pentachlorophenol on July 1, 1991 (56 FR 30266, USEPA, 1991a). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.001 mg/L, based on analytical feasibility.

b. *Technical Reviews.* The Agency updated the health effects assessment for pentachlorophenol in 2010 and retained the cancer classification on which the 1991 MCLG is based (USEPA, 2010c). As a part of the 2010 assessment, EPA considered relevant studies on the toxicity of pentachlorophenol, including its potential developmental and reproductive toxicity.

The current MCL for pentachlorophenol is based on a PQL of 0.001 mg/L. The Agency considered whether changes in the analytical feasibility of pentachlorophenol might lead to a lower MCL. EPA reviewed PT data from the third Six-Year Review cycle to determine if the PQL could be revised (i.e., analytical feasibility). Passing rates for PT data ranged were at or below the 75 percent criterion for several studies with sample concentrations greater than the PQL. There are no studies with sample concentrations below the PQL. Because of the variability in passing rates and the lack of data points below the current PQL, a lowering of the PQL for pentachlorophenol is not appropriate at this time (USEPA, 2016b).

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of pentachlorophenol (Methods 515.1, 515.2, 515.3, 515.4, 525.2, 525.3, 528, and 555). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 63,532 samples. Fewer than 80 percent of these values are less than or equal the modal MRL: 21,012 (33.1 percent) equal the modal MRL of 0.00004 mg/L and an additional 3,649 (5.7 percent) are lower than 0.00004 mg/L. Therefore, EPA did not set the EQL equal to the modal MRL (USEPA, 2016d). The MDLs of approved methods range from 0.000032 to 0.0016 mg/L. Applying a multiplier of 10 results in a possible EQL range from 0.00032 to 0.0016 mg/L; seven of the eight values are greater than the current PQL. Therefore, EPA did not estimate an EQL (USEPA, 2016d). Based on these varied and unrelated approaches/sources of information, EPA believes that there is no potential to lower the PQL for pentachlorophenol. Since the MCL is constrained by the PQL, and the PQL is unchanged, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* EPA did not identify new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL). Therefore, EPA does not believe a revision to the NPDWR for pentachlorophenol is appropriate at this time.

2.47. Picloram

a. *Background*. EPA published the current NPDWR for picloram on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.5 mg/L. EPA based the MCLG on a reference dose of 0.07 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 1995, the Agency updated its health effects assessment of picloram (USEPA, 1995b). The Agency identified a change in this assessment that could lead to a change in the MCLG because it revised the RfD from 0.07 mg/kg-day to 0.2 mg/kg-day (USEPA, 2003d). During the first and second Six-Year Reviews, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for cost savings to public water systems or their customers, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (68 FR 42908, USEPA, 2003c, 75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, the Agency's literature search did not identify any additional new data that would supersede the findings of the 1995 assessment (USEPA, 2016g). Therefore, the RfD of 0.2 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on the RfD and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 7 mg/L. An RSC of 20 percent results in a possible MCLG of 1.4 mg/L, rounded to 1 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor if EPA were to raise the MCLG. EPA evaluated the results of the occurrence and exposure analyses for picloram to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to achieve cost savings for PWSs and their customers while maintaining, or improving, the level of public health protection (USEPA, 2016f). Although the

Agency obtained and evaluated the finished water occurrence data for picloram, its usefulness is limited for determining potential cost savings to PWSs and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency evaluated available data on source water quality and conducted a qualitative assessment of treatment cost savings.

Table 2-18 provides summary data for contaminant occurrence based on maximum sample values for the locations included in the NAWQA data. Although the degree to which these occurrence rates represent national drinking water source occurrence is uncertain, the information shows no occurrence at threshold levels of interest. This information indicates that any resulting NPDWR change would not affect systems that rely on source water at any of the NAWQA.

Table 2-18. Summary of Picloram Occurrence for Locations in NAWQA

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Total locations	1,081 (100%)	5,790 (100%)	174 (100%)	7,045 (100%)
All samples are nondetects[1]	1,065 (98.5%)	5,777 (99.8%)	174 (100%)	7,016 (99.6%)
At least one detection	16 (1.5%)	13 (0.2%)	0 (0%)	29 (0.4%)
Exceeds current MCLG (0.5 mg/L)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Exceeds possible MCLG (1.0 mg/L)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Source: USEPA, 2016f (national data from 1991 to 2014; estimates based on maximum sample values at each location).
1. The detection limits range from 0.0000198 to 0.00073 mg/L; the mode is 0.00005 mg/L.

The BATs and small system compliance technologies for picloram have other beneficial effects, e.g., reduction of other co-occurring contaminants, precursors for DBPs, or other common impurities. Therefore, if EPA were to consider a higher level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 0.5 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. However, the Agency recognizes that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for picloram, EPA does not believe a revision to the NPDWR for picloram is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for picloram is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.48. Polychlorinated Biphenyls (PCBs)

a. *Background*. EPA published the current NPDWR for PCBs on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.0005 mg/L, based on analytical feasibility.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to PCBs. The revised health effects assessment will consider relevant studies on the toxicity of PCBs, including reproductive and developmental effects. The new health effects assessment was not completed byDecember 2015 the review cutoff date for SYR3 (USEPA, 2016g).

Although a health effects assessment is in process for PCBs, the existing MCLG is zero and the current MCL of 0.0005 mg/L is based on the PQL. Therefore, EPA reviewed whether there is potential to revise the PQL. EPA reviewed PT data from the third Six-Year Review cycle to determine if the PQL could be revised (i.e., analytical feasibility). Passing rates for studies with sample concentrations above the PQL are above 75 percent. The passing rate for one study with a sample concentration below the PQL was less than 75 percent. Because there are no data points below the current PQL with passing rates above 75 percent, a lowering of the PQL for PCBs is not appropriate at this time (USEPA, 2009a).

For SYR3, EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDL for the approved method for the detection of PCBs (Method 508A). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 32,755 samples. More than 80 percent of these values are less than or equal the modal MRL: 10,478 (67.2 percent) equal the modal MRL of 0.0005 mg/L and an additional 21,999 (67.2 percent) are lower than 0.0001 mg/L. Therefore, EPA could set the EQL equal to the modal MRL (USEPA, 2016d). The MDL of approved method is 0.00008 mg/L. Applying a multiplier of 10 would give a possible EQL of 0.0008 mg/L. The result is higher than the current PQL, and therefore, EPA did not estimate an EQL (USEPA, 2016d). Based on these varied and unrelated approaches/sources of information, EPA believes that there is no potential to lower the PQL for PCBs. Since the MCL is constrained by the PQL, and the PQL is unchanged, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* The Agency does not believe a revision to the NPDWR for PCBs is appropriate at this time because a reassessment of the health risks resulting from exposure to PCBs is in progress (USEPA, 2016g). Furthermore, a review of analytical feasibility did not identify a potential to revise the MCL, which is limited by feasibility.

2.49. Combined Radiums (226 and 228)

a. *Background*. EPA published an interim NPDWR and set an MCL of 5 pCi/L for combined radium 226 and 228 on July 9, 1976 (41 FR 28402, USEPA, 1976). As noted in the August 14, 1975 proposal (40 FR 34324, USEPA, 1975) and a subsequent September 30, 1986 FR notice (51 FR 34836, USEPA 1986), EPA considered the feasibility of treatment techniques, analytical methods and monitoring when establishing the MCL of 5 pCi/L. EPA also considered the risks associated with exposure to radium 226 and 228, which generally fell within the Agency's acceptable risk range of 10^{-4} to 10^{-6} at the MCL of 5 pCi/L. On December 7, 2000 (65 FR 76708, USEPA, 2000), EPA established an MCLG of zero based on a cancer classification of A (known human carcinogen) and finalized the NPDWR by retaining the MCL of 5 pCi/L. EPA noted in the December 7, 2000 FR notice that new risk estimates from Federal Guidance Report 13 reaffirmed that the 5 pCi/L MCL was appropriate and protective. [8] EPA also tightened the monitoring requirements for combined radiums by requiring that systems monitor for radium 226 and 228 separately.

b. *Technical Reviews.* ORIA has initiated a reassessment of the health risks resulting from exposure to radium. The revised health effects assessment will consider relevant studies on the toxicity of alpha particle emitters. The new health effects assessment was not completed by December 2015, the cutoff date for the SYR3 cycle (USEPA, 2016g).

Although there is an ongoing health effects assessment, the MCLG is zero and the current MCL is higher than the MCLG. Therefore, EPA reviewed whether there is potential to revise the MCL based on new information regarding analytical and treatment feasibility for radiums. EPA did not identify new information that would lower the detection limits. In addition, since the December 7, 2000, regulation, there is no new information regarding treatment feasibility. Since there is no new information regarding analytical or treatment feasibility that suggests changes to the MCL, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* The Agency does not believe a revision to the NPDWR for combined radiums is appropriate at this time because a reassessment of the health risks resulting from exposure to radium is in progress (USEPA, 2016g). Furthermore, there is no new information regarding analytical or treatment feasibility that would warrant reconsideration of the MCL.

2.50. Selenium

a. *Background*. EPA published the current NPDWR for selenium on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.05 mg/L. EPA based the MCLG on a maximum safe intake[9] of 0.4 mg/person/day and a cancer classification of D, not classifiable as to human carcinogenicity.

[8] After the December 7, 2000 final regulation, two trade associations and several municipal water systems challenged EPA's standard for combined radiums by claiming that the Agency did not use the best available science when finalizing the standard. In February of 2003, the DC Circuit Court of Appeals upheld EPA's regulation for combined radiums (as well as beta and photon emitters and uranium).

[9] The 0.4 mg/day safe level was based on data (Yang et al., 1989a, 1989b) that extrapolated from blood selenium levels to estimated dietary intake in the studied population. As described in the January 30, 1991 FR (56 FR 3526, USEPA, 1991c), the Agency partially considered selenium's status as a nutrient and did not use the typical procedure for deriving the MCLG. Hence, there is no specific reference to an RfD for selenium in the 1991 FR

b. *Technical Reviews.* In 2014, Health Canada updated its health effects assessment of selenium (Health Canada, 2014). This assessment could lead to a change in the MCLG. The assessment reported an upper intake level of 0.4 mg/day based on a chronic selenosis health endpoint (Health Canada, 2014). Assuming 2 liters water intake per day, the intake equates to a DWEL concentration be 0.2 mg/L. An RSC of 20 percent results in a possible MCLG of 0.04 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor for the possible MCLG decrease under consideration. EPA evaluated the results of the occurrence and exposure analyses for selenium to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-19 shows the results of the occurrence and exposure analysis for the current MCL and the possible MCLG. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for 31 of 50,568 systems (0.061 percent) serving 21,489 people (0.008 percent of 254.4 million people). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on annual average concentrations at entry points. Average concentrations exceed the possible MCLG for 49 systems (0.097 percent) serving 135,685 people (0.053 percent).

Table 2-19. Number and Percent of Systems with Mean Concentrations Exceeding Selenium Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.05 mg/L (MCL)	31	31	0.61%	0.61%
> 0.04 mg/L (possible MCLG)	49	49	0.097%	0.097%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.05 mg/L (MCL)	21,489	21,489	0.008%	0.008%
> 0.04 mg/L (possible MCLG)	135,685	135,685	0.053%	0.053%

Source: USEPA, 2016a

1. Percentages are based on the 50,568 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 254.4 million people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

notice. After the publication of the regulation, IRIS (USEPA, 1991b) posted an RfD of 0.005 mg/kg-day for selenium using the same data that are the basis of the regulation.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for selenium, EPA does not believe a revision to the NPDWR for selenium is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for selenium is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.51. Simazine

a. *Background*. EPA published the current NPDWR for simazine on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.004 mg/L. EPA based the MCLG on a reference dose of 0.005 mg/kg-day and a cancer classification of C, possible human carcinogen.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to simazine (USEPA, 2016g). The revised health effects assessment will consider relevant studies on the toxicity of simazine, including reproductive and developmental effects. The new health effects assessment was not completed by the information cutoff date for SYR3.

c. *Review Result.* Since the MCL for simazine is set at its MCLG and a reassessment of the health risks resulting from exposure to simazine is in progress, the Agency does not believe a revision to the NPDWR is appropriate at this time.

2.52. Styrene

a. *Background*. EPA published the current NPDWR for styrene on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.1 mg/L. EPA based the MCLG on a reference dose of 0.2 mg/kg-day and a cancer classification of C, possible human carcinogen.

b. *Technical Reviews.* In 2010, the California Environmental Protection Agency (CalEPA) updated its health effects assessment of styrene (CalEPA, 2010b). This assessment could lead to a change in the MCLG. This assessment concluded that there is sufficient evidence that styrene causes cancer in animals and there is limited evidence that it causes cancer in humans (CalEPA, 2010b). More recent toxicological reviews have also characterized styrene as reasonably anticipated to be a human carcinogen (NAS, 2014; NIEHS, 2014). Based on the new CalEPA assessment, the possible MCLG could be zero (USEPA, 2016g).

Because of a possible change in the MCLG for styrene, EPA considered whether analytical feasibility is likely to be a limitation if the Agency were to consider lowering the MCL to zero (the possible MCLG). No data on analytical methods have become available in this round of the

Six-Year Review. However, data from the second Six-Year Review cycle indicated that an improvement in analytical feasibility might exist (USEPA, 2009a). Passing rates for PT data are greater than 75 percent for all studies, including several with sample concentrations below the current PQL. Therefore, EPA determined that lowering of the PQL for styrene might be possible (USEPA, 2009a). These results, however, are insufficient to recalculate a revised PQL for styrene because there are insufficient data points below the current PQL to derive a value at the 75 percent passing rate.

For SYR3, EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of styrene (Methods 502.2 and 524.2). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 145,902 samples. More than 80 percent of these values are less than or equal the modal MRL: 130,578 (89.5 percent) equal the modal MRL of 0.0005 mg/L and an additional 14,589 (10.0 percent) are lower than 0.0005 mg/L. Thus, an EQL could be set equal to the modal MRL (USEPA, 2016d). The MDLs of approved methods are 0.00006 and 0.0001 mg/L. Applying a multiplier of 10 results in a possible EQLs of 0.0006 and 0.001 mg/L. Although this range is greater than the modal MRL, the MRL data provides a strong indication that quantitation can achieve 0.0005 mg/L. Therefore, the EPA set the EQL equal to the MRL mode (USEPA, 2016d).

For SYR3, EPA evaluated the results of the occurrence and exposure analyses for styrene to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-20 shows the results of the occurrence and exposure analysis for the current MCL and the EQL. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for up to 1 of 55,731 systems (0.002 percent) serving 100 people (<0.001 percent of 263.4 million people). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on annual average concentrations at entry points. Average concentrations exceed the EQL for up to 117 systems (0.210 percent) serving 571,425 people (0.217 percent).

Table 2-20. Number and Percent of Systems with Mean Concentrations Exceeding Styrene Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.1 mg/L (MCL)	1	0	0.002%	0.000%
> 0.0005 mg/L (EQL)	117	84	0.210%	0.151%

Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.1 mg/L (MCL)	100	0	<0.001%	0.000%
> 0.0005 mg/L (EQL)	571,425	36,835	0.217%	0.014%

Source: USEPA, 2016a

1. Percentages are based on the 55,731 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 263.4 million people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for styrene, EPA does not believe a revision to the NPDWR for styrene is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for styrene is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.53. 2,3,7,8-TCDD (Dioxin)

a. *Background*. EPA published the current NPDWR for dioxin on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 3×10^{-8} mg/L, based on analytical feasibility.

b. *Technical Reviews.* EPA has initiated a reassessment of the health risks resulting from exposure to dioxin. The revised health effects assessment will consider relevant studies on the toxicity of dioxin, including reproductive and developmental effects. The new health effects assessment was not completed byDecember 2015 the review cutoff date for SYR3 (USEPA, 2016g).

Although a health effects assessment is in process for dioxin, the existing MCLG is still zero and the current MCL is based on a PQL of 3×10^{-8} mg/L. Therefore, EPA reviewed whether there is potential to revise the PQL. The PT study results are very limited. There are no studies with sample concentrations below the PQL and only a few with sample concentrations almost two

times the PQL. The passing rates are greater than 75 percent (USEPA, 2016b). Given the lack of data, EPA determined that the PT data do not support revision of the PQL.

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDL for the approved method for the detection of dioxin (Method 1613). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 2,620 samples. More than 80 percent of these values are less than or equal the modal MRL: 1,362 (52.0 percent) equal the modal MRL of 5×10^{-6} mg/L and an additional 1,082 (41.3 percent) are lower than 5×10^{-6} mg/L. Thus, an EQL could be set equal to the modal MRL (USEPA, 2016d). The MDL of the approved method is 4.4×10^{-6} mg/L. Applying a multiplier of 5 results in a possible EQL of 2.2×10^{-5} mg/L. Although this value is greater than the modal MRL, the MRL data provides a strong indication that quantitation can achieve 5×10^{-6} mg/L. Therefore, EPA set the EQL equal to the MRL mode (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for dioxin to determine whether a revised MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-21 shows the results of the occurrence and exposure analysis for the current MCL and the EQL. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for 1 of 3,216 systems (0.031 percent) serving 550 people (0.001 percent of 74.1 million people). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on annual average concentrations at entry points. Average concentrations exceed the EQL for up to 2 systems (0.062 percent) serving 1,450 people (0.002 percent).

Table 2-21. Number and Percent of Systems with Mean Concentrations Exceeding Dioxin Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 3×10^{-8} mg/L (MCL)	1	1	0.031%	0.031%
> 5×10^{-9} mg/L (EQL)	2	1	0.062%	0.031%

Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 3 x 10^{-8} mg/L (MCL)	550	550	0.001%	0.001%
> 5 x 10^{-9} mg/L (EQL)	1,450	550	0.002%	0.001%

Source: USEPA, 2016a

1. Percentages are based on the 3,216 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 74.1 million people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* The Agency does not believe a revision to the NPDWR for dioxin is appropriate at this time because a reassessment of the health risks resulting from exposure to dioxin is in progress (USEPA, 2016g). Furthermore, a review of analytical feasibility did not identify a potential to revise the MCL, which is limited by feasibility.

2.54. Thallium

a. *Background*. EPA published the current NPDWR for thallium on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG of 0.0005 mg/L. EPA based the MCLG on a reference dose of 0.00007 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity. The NPDWR also established an MCL of 0.002 mg/L, based on analytical feasibility.

b. *Technical Reviews.* The Agency updated the health effects assessment for thallium in 2009 and retained the RfD and cancer classification on which the 1992 MCLG is based (USEPA, 2009d). As a part of the 2009 assessment, EPA considered relevant studies on the toxicity of thallium, including its potential developmental and reproductive toxicity.

Although there is no change in the MCLG, the current MCL is based on a PQL of 0.002 mg/L. Therefore, EPA reviewed whether there is potential to revise the PQL. EPA reviewed PT data from the third Six-Year Review cycle to determine if the PQL could be revised (i.e., analytical feasibility). Passing rates for PT data are above 75 percent, but there were studies with sample concentrations below the current PQL. Given the lack of data points below the current PQL, a lowering of the PQL for thallium is not appropriate at this time (USEPA, 2016b).

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the available MDLs for approved methods for the detection of thallium (Methods 200.8 and 200.9). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to

quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 75,776 samples. Fewer than 80 percent of these values are less than or equal the modal MRL: 36,589 (48.3 percent) equal the modal MRL of 0.001 mg/L and an additional 19,855 (26.2 percent) are lower than 0.001 mg/L. Therefore, EPA did not set the EQL equal to the modal MRL (USEPA, 2016d). The MDLs of approved methods are 0.0003 and 0.001 mg/L. Applying a multiplier of 10 would give a possible EQLs of 0.003 and 0.01 mg/L. Both results are higher than the current PQL and, therefore, EPA did not estimate an EQL (USEPA, 2016d). Based on these varied and unrelated approaches/sources of information, EPA believes that there is no potential to lower the PQL for thallium. Since the MCL is constrained by the PQL, and the PQL is unchanged, EPA does not believe it is necessary to conduct an occurrence analysis at this time.

c. *Review Result.* EPA did not identify new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL). Therefore, EPA does not believe a revision to the NPDWR for thallium is appropriate at this time.

2.55. Toluene

a. *Background*. EPA published the current NPDWR for toluene on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 1 mg/L. EPA based the MCLG on a reference dose of 0.2 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2005, the Agency updated its health effects assessment of toluene (USEPA, 2005c). The change in this assessment could lead to a change in the MCLG. This assessment considered relevant studies on the toxicity of toluene including developmental and reproductive toxicity. The assessment revised the RfD from 0.2 mg/kg-day to 0.08 mg/kg-day and concluded that there is inadequate information to assess the carcinogenic potential of toluene (USEPA, 2005c). Although there were no changes in the critical study or effect, there were changes in the toxicity database that increase concern for immunotoxicity and neurotoxicity via the oral exposure route and justified the higher uncertainty factor for the revised RfD (USEPA, 2005c). During the second Six-Year Review, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for health risk reduction, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, the Agency's literature search did not identify any additional new data that would supersede the findings of the 2005 assessment (USEPA, 2016g). Therefore, the RfD of 0.2 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on the RfD and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 2.8 mg/L. An RSC of 20 percent results in a possible MCLG of 0.56 mg/L, rounded to 0.6 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor for the possible MCLG decrease under consideration. EPA evaluated the results of the occurrence and exposure analyses for toluene to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-22 shows the results of the occurrence and exposure analysis for the current MCL and the possible MCLG set equal to 0.6 mg/L based on the new

health effects information. The occurrence and exposure analysis shows that average concentrations do not exceed the current MCL for any of 55,748 systems serving approximately 263.5 million people. Furthermore, average concentrations do not exceed the possible MCLG at any systems in the SYR3 ICR dataset.

Table 2-22. Number and Percent of Systems with Mean Concentrations Exceeding Toluene Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 1 mg/L (MCL)	0	0	0.000%	0.000%
> 0.6 mg/L (possible MCLG)	0	0	0.000%	0.000%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 1 mg/L (MCL)	0	0	0.000%	0.000%
> 0.6 mg/L (possible MCLG)	0	0	0.000%	0.000%

Source: USEPA, 2016a

1. Percentages are based on the 55,748 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 263.5 million people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for toluene, EPA does not believe a revision to the NPDWR for toluene is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for toluene is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.56. Toxaphene

a. *Background*. EPA published the current NPDWR for toxaphene on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG of zero based on a cancer classification of B2, probable human carcinogen. The NPDWR also established an MCL of 0.003 mg/L, based on analytical feasibility.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the carcinogenicity of toxaphene as well as its potential developmental and reproductive toxicity. EPA has not identified any new information that indicates that it is appropriate to consider revisions to the cancer classification for toxaphene at this time (USEPA, 2016g). Because the MCLG remains at zero, the Agency believes that a further review of the health effects of toxaphene is not warranted at this time.

The current MCL for toxaphene is based on a PQL of 0.003 mg/L. The Agency considered whether changes in the analytical feasibility of toxaphene might lead to a lower MCL. EPA analyzed recent data to determine if the PQL could be revised (i.e., analytical feasibility). Available PT data were not sufficient to support a revised PQL. However, EPA evaluated whether more sensitive analytical methods have been approved and put into use by a wide number of laboratories. Passing rates for most PT studies are above 75 percent, including one study with a sample concentration below the current PQL. Because of the variability in passing rates and the lack of data points below the current PQL, a lowering of the PQL for pentachlorophenol is not appropriate at this time (USEPA, 2016b).

EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the available MDLs for approved methods for the detection of toxaphene (Methods 505, 508.1, and 525.2, and 525.3). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 57,208 samples. Less than 80 percent of these values are less than or equal the modal MRL: 23,918 (41.8 percent) equal the modal MRL of 0.001 mg/L and an additional 14,117 (24.7 percent) are lower than 0.001 mg/L. Therefore, EPA did not selected the modal MRL as the EQL (USEPA, 2016d). The MDLs of approved methods are 0.00013, 0.00032, 0.001, and 0.0017 mg/L. Applying a multiplier of 10 results in one possible EQL value, 0.0013 mg/L, that is less than the current PQL. EPA set the EQL equal to 0.001 mg/L, rounded to one significant digit (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for toxaphene to determine whether a revised MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-23 shows the results of the occurrence and exposure analysis for the current MCL and the EQL. The occurrence and exposure analysis shows that average concentrations exceed the current MCL for 2 of 37,043 systems (0.005 percent) serving 233,219 people (0.104 percent of 223.9 million people). Note that these results are based on the subset of monitoring data provided in response to the Six-Year Review ICR and do not necessarily reflect MCL violations, which are based on annual average concentrations at entry points. Average concentrations exceed the EQL of 0.001 mg/L for up to 6 systems (0.016 percent), serving 715,106 people (0.319 percent).

Table 2-23. Number and Percent of Systems with Mean Concentrations Exceeding Toxaphene Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.003 mg/L (MCL)	2	2	0.005%	0.005%
> 0.001 mg/L (EQL)	6	4	0.016%	0.011%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.003 mg/L (MCL)	233,219	233,219	0.104%	0.104%
> 0.001 mg/L (EQL)	715,106	707,665	0.319%	0.316%

Source: USEPA, 2016a

1. Percentages are based on the 37,043 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 223.9 million people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL), EPA does not believe a revision to the NPDWR for toxaphene is appropriate at this time. The occurrence and exposure analysis based on possible changes in analytical feasibility indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and

The burden on States and the regulated community to implement any regulatory change that resulted.

2.57. 2,4,5-TP (Silvex; 2,4,5-Trichlorophenoxypropionic Acid)

a. *Background*. EPA published the current NPDWR for 2,4,5-TP on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 0.05 mg/L. EPA based the MCLG on a reference dose of 0.008 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the toxicology of 2,4,5-TP, including its potential developmental and reproductive toxicity. The literature search did not identify any studies that warrant a review of the RfD or the cancer classification (USEPA, 2016g).

A review of analytical or treatment feasibility is not necessary for 2,4,5-TP because changes to the MCLG are not warranted at this time and the current MCL is set at the MCLG. Since EPA did not identify a health or technology basis for revising the 2,4,5-TP NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* EPA's review shows that there are no data supporting a change to the 2,4,5-TP NPDWR. As a result, a revision to the NPDWR would not be appropriate at this time.

2.58. 1,2,4-Trichlorobenzene

a. *Background*. EPA published the current NPDWR for 1,2,4-trichlorobenzene on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG and an MCL of 0.07 mg/L. EPA based the MCLG on a reference dose of 0.01 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2010, ATSDR published revised health effects information for 1,2,4-trichlorobenzene (ATSDR, 2010). The new information could lead to a change in the MCLG. The assessment could revise the RfD from 0.01 mg/kg-day to 0.1 mg/kg-day although the study also concluded that 1,2,4-trichlorobenzene is 'Likely to be carcinogenic to humans,' which could result in the MCLG not being based on an RfD. Based on the ATSDR assessment and RfD of 0.1 mg/kg-day, and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 3.5 mg/L. An RSC of 20 percent results in a possible MCLG of 0.7 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor if EPA were to raise the MCLG. EPA evaluated the results of the occurrence and exposure analyses for 1,2,4-trichlorobenzene to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to achieve cost savings for PWSs and their customers while maintaining, or improving, the level of public health protection (USEPA, 2016f). Although the Agency obtained and evaluated the finished water occurrence data for 1,2,4-trichlorobenzene, its usefulness is limited for determining potential cost savings to PWSs and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency evaluated available data on source water quality and conducted a qualitative assessment of treatment cost savings.

Table 2-24 provides summary data for contaminant occurrence based on maximum sample values for the locations included in the NAWQA data. Although the degree to which these occurrence rates represent national drinking water source occurrence is uncertain, the information shows no occurrence at threshold levels of interest. This information indicates that

any resulting NPDWR change would affect systems that rely on source water at none of the NAWQA locations.

Table 2-24. Summary of 1,2,4-Trichlorobenzene Occurrence for Locations in NAWQA

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Total locations	253 (100.0%)	7,558 (100.0%)	197 (100.0%)	8,008 (100.0%)
All samples are nondetects[1]	252 (99.6%)	7,557 (100.0%)	197 (100.0%)	8,006 (100.0%)
At least one detection	1 (0.4%)	1 (0.0%)	0 (0.0%)	2 (0.0%)
Maximum concentration exceeds current MCL (0.07 mg/L)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Maximum concentration exceeds possible MCLG (0.7 mg/L)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Source: USEPA, 2016f (national data from 1991 to 2014; estimates based on maximum sample values at each location).
1. The detection limits range from 0.04 to 12.0 mg/L; the mode is 0.12 mg/L.

The BATs and small system compliance technologies for 1,2,4-trichlorobenzene have other beneficial effects, e.g., reduction of other co-occurring contaminants, precursors for DBPs, or other common impurities. Therefore, if EPA were to consider a higher level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 0.07 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. However, the Agency recognizes that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for 1,2,4-trichlorobenzene, EPA does not believe a revision to the NPDWR for 1,2,4-trichlorobenzene is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for 1,2,4-trichlorobenzene is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.59. 1,1,1-Trichloroethane

a. *Background*. EPA published the current NPDWR for 1,1,1-trichloroethane on July 8, 1987 (52 FR 25690, USEPA, 1987). The NPDWR established an MCLG and an MCL of 0.20 mg/L. EPA based the MCLG on a reference dose of 0.035 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2007, the Agency updated its health effects assessment of 1,1,1-trichloroethane (USEPA, 2007b). The Agency identified a change in this assessment that could lead to a change in the MCLG. This assessment considered relevant studies on the toxicity of 1,1,1-trichloroethane including developmental and reproductive toxicity. The assessment revised the RfD from 0.035 mg/kg-day to 2 mg/kg-day and concluded that there is inadequate information to assess the carcinogenic potential of 1,1,1-trichloroethane (USEPA, 2007b). During the second Six-Year Review, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for cost savings to public water systems or their customers, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (75 FR 15500, USEPA, 2010e). During the third Six-Year Review cycle, the Agency's literature search did not identify any additional new data that would supersede the findings of the 2003 assessment (USEPA, 2016g). Therefore, the RfD of 2 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on the RfD and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 70 mg/L. An RSC of 20 percent results in a possible MCLG of 14 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor if EPA were to raise the MCLG. EPA evaluated the results of the occurrence and exposure analyses for 1,1,1-trichloroethane to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to achieve cost savings for PWSs and their customers while maintaining, or improving, the level of public health protection (USEPA, 2016f). Although the Agency obtained and evaluated the finished water occurrence data for 1,1,1-trichloroethane, its usefulness is limited for determining potential cost savings to PWSs and their customers because the Agency does not know which systems are treating for this contaminant. As an alternative, the Agency evaluated available data on source water quality and conducted a qualitative assessment of treatment cost savings.

Table 2-25 provides summary data for contaminant occurrence based on maximum sample values for the locations included in the NAWQA data. Although the degree to which these occurrence rates represent national drinking water source occurrence is uncertain, the information shows no occurrence at threshold levels of interest. This information indicates that any resulting NPDWR change would affect systems that rely on source water at none of the NAWQA locations.

Table 2-25. Summary of 1,1,1-Trichloroethane Occurrence for Locations in NAWQA

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
Total locations	261 (100%)	7,522 (100%)	197 (100%)	7,980 (100%)
All samples are nondetects1	247 (94.6%)	7,350 (97.7%)	194 (98.5%)	7,791 (97.6%)

Occurrence Result	Number of Locations (% of locations)			
	Surface Water	Ground Water	Other	Total
At least one detection	14 (5.4%)	172 (2.3%)	3 (1.5%)	189 (2.4%)
Exceeds current MCLG (0.2 mg/L)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Exceeds possible MCLG (14 mg/L)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Source: USEPA, 2016f (national data from 1991 to 2014; estimates based on maximum sample values at each location).
1. The detection limits range from 0.00002 to 0.1 mg/L; the mode is 0.000032 mg/L.

The BATs and small system compliance technologies for 1,1,1-trichloroethane have other beneficial effects, e.g., reduction of other co-occurring contaminants, precursors for DBPs, or other common impurities. Therefore, if EPA were to consider a higher level, the Agency does not know how many PWSs that are currently treating to comply with the existing MCL of 0.2 mg/L would be likely to discontinue treatment that is already in place (USEPA, 2016f). Also, the Agency does not know to what extent affected systems might be able to reduce costs given that capital costs are not recoverable. However, the Agency recognizes that there may be opportunities to achieve operational cost savings if these systems are able to re-optimize current treatment.

Given these considerations, the Agency believes that any resulting revision is not likely to provide a meaningful opportunity for cost savings.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for 1,1,1-trichloroethane, EPA does not believe a revision to the NPDWR for 1,1,1-trichloroethane is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for 1,1,1-trichloroethane is likely to provide a meaningful opportunity for cost savings to public water systems and their customers. Taking into consideration the low occurrence of this contaminant in source waters, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.60. 1,1,2-Trichloroethane

a. *Background*. EPA published the current NPDWR for 1,1,2-trichloroethane on July 17, 1992 (57 FR 31776, USEPA, 1992). The NPDWR established an MCLG of 0.003 mg/L. EPA based the MCLG on a reference dose of 0.004 mg/kg-day and a cancer classification of C, possible human carcinogen. The NPDWR also established an MCL of 0.005 mg/L, based on analytical feasibility.

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the toxicology of 1,1,2-trichloroethane, including its potential developmental and reproductive toxicity. The literature search did not identify any studies that warrant a review of the RfD or the cancer classification (USEPA, 2016g).

The current MCL for 1,1,2-trichloroethane is based on a PQL of 0.005 mg/L. The Agency considered whether changes in the analytical feasibility of 1,1,2-trichloroethane might lead to a lower MCL. EPA reviewed PT data from the third Six-Year Review cycle to determine if the PQL could be revised (i.e., analytical feasibility). Passing rates for the PT studies – including several with sample concentrations below the PQL – exceed 75 percent. Therefore, a lower PQL might be possible. These results, however, are insufficient to recalculate a revised PQL for 1,1,2-trichloroethane because not enough data points are available below the current PQL to derive a value at the 75 percent passing rate (USEPA, 2009a).

For SYR3, EPA evaluated two alternative sources of information to determine whether an EQL below the current PQL could be estimated: laboratory MRLs in the Six-Year Review ICR dataset, and the MDLs for approved methods for the detection of 1,1,2-trichloroethane (Methods 502.2 , 524.2, and 551.1). While EPA prefers to use laboratory performance data to calculate the PQL, the MRL and MDL information can be valuable for this review to indicate whether it is possible to quantitate at levels below the current PQL. The Six-Year Review ICR dataset contains MRL values for 137,544 samples. More than 80 percent of these values are less than or equal to the modal MRL: 117,947 (85.8 percent) equal the modal MRL of 0.0005 mg/L. An additional 18,378 (13.4 percent) are lower than 0.0005 mg/L. Thus, an EQL could be set lower than the current MCLG, which is less than the current PQL. EPA selected the current MCLG as the the occurrence analysis threshold (USEPA, 2016d). The MDLs of approved methods are 0.000017, 0.00004, and 0.0001 mg/L. Applying a multiplier of 10 results in three possible EQL values that are less than the the current MCLG, further supporting use of the MCLG as the occurrence threshold (USEPA, 2016d).

EPA evaluated the results of the occurrence and exposure analyses for 1,1,2-trichloroethane to determine whether a revised MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-26 shows the results of the occurrence and exposure analysis for the current MCL and the current MCLG of 0.003 mg/L. The occurrence and exposure analysis shows that no average concentrations exceed the current MCL for any of the 55,733 systems serving 263.4 million people in the SYR3 ICR dataset. Furthermore, the average concentrations do not exceeds the current MCLG of 0.003 mg/L at any system in the dataset.

Table 2-26. Number and Percent of Systems with Mean Concentrations Exceeding 1,1,2-Trichloroethane Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.005 mg/L (MCL)	0	0	0.000%	0.000%
> 0.003 mg/L (PQL)	0	0	0.000%	0.000%

Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 0.005 mg/L (MCL)	0	0	0.000%	0.000%
> 0.003 mg/L (PQL)	0	0	0.000%	0.000%

Source: USEPA, 2016a

1. Percentages are based on the 55,733 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 263.4 million people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of a possibly lower PQL (and therefore a possibly lower MCL), EPA does not believe a revision to the NPDWR for 1,1,2-trichloroethane is appropriate at this time. The occurrence and exposure analysis based on possible changes in analytical feasibility indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

2.61. Uranium

a. *Background*. EPA published the current NPDWR for uranium on December 7, 2000 (65 FR 76708, USEPA, 2000). The NPDWR established an MCLG of zero based on a cancer classification of A, known human carcinogen. As noted in the December 2000 FR, uranium has also been identified as a nephrotoxic metal (kidney toxicant) and EPA derived a drinking water equivalent level of 20 µg/L as a noncancer health endpoint for kidney toxicity. The NPDWR also established an MCL of 30 µg/L, which is higher than the feasible level of 20 µg/L and the level associated with kidney toxicity. In December 2000, EPA exercised its discretionary authority to set an MCL at a level higher than feasible (SDWA Section 1412(b)(6)), based on the finding that "benefits do not justify the costs at the feasible level (20 µg/L) and that the net benefits are

maximized at a level (30 μg/L) that is still protective of health with an adequate margin of safety" (65 FR 76708, USEPA, 2000). [10]

b. *Technical Reviews.* As part of the Six-Year Review process, EPA conducted a literature search for relevant data on the toxicology of uranium, including reproductive and developmental effects. The Agency has identified data that indicate it may be appropriate to update the health effects assessment for uranium. During the health effects literature review for this Six-Year Review cycle, the Agency identified new information that indicates it may be appropriate to update the health effects assessment for uranium. Three recent assessments (IARC, 2012; ATSDR, 2013; and WHO, 2012) and a number of peer reviewed studies provide new data on the health effects of soluble uranium from oral exposure. Some of the non-cancer endpoints (e.g., bone effects) identified could affect the MCL, which was based on benefit-cost analysis, by affecting the health risk reduction benefits. Therefore, EPA nominated uranium for a new health effects assessment. Because the new assessment will not be completed during the SYR3 cycle, the MCLG remains zero.

Although the current MCL is higher than the MCLG, EPA did not evaluate whether there is new information indicating that it is feasible to revise the MCL. The MCL is based on benefit-cost analysis, which could be affected by the outcome of a health effects assessment. Since EPA did not identify a health or technology basis for revising the uranium NPDWR, the Agency did not conduct a detailed occurrence and exposure analysis.

c. *Review Result.* The Agency does not believe a revision to the NPDWR for uranium is appropriate at this time because uranium has been nominated for a new assessment of the health risks resulting from exposure to uranium (USEPA, 2016g). As noted previously, the uranium MCL is based on the SDWA benefit-cost analysis provision (Section 1412(b)(6)) and the health effects assessment is important for reviewing the benefits associated with the basis of the MCL.

2.62. Xylenes (Total)

a. *Background*. EPA published the current NPDWR for total xylenes on January 30, 1991 (56 FR 3526, USEPA, 1991c). The NPDWR established an MCLG and an MCL of 10 mg/L. EPA based the MCLG on a reference dose of 2 mg/kg-day and a cancer classification of D, not classifiable as to human carcinogenicity.

b. *Technical Reviews.* In 2003, the Agency updated its health effects assessment of xylenes (USEPA, 2003b). The change in this assessment could lead to a change in the MCLG. This assessment considered relevant studies on the toxicity of xylenes including developmental and reproductive toxicity. The assessment revised the RfD from 2 mg/kg-day to 0.2 mg/kg-day and concluded that there is inadequate information to assess the carcinogenic potential of xylenes (USEPA, 2003b). During the second Six-Year Review, the Agency could not determine that a revision to the NPDWR would provide a meaningful opportunity for health risk reduction, and decided that any revision would be a low priority activity for the Agency because of competing workload priorities, the administrative costs associated with rulemaking, and the burden on States and the regulated community to implement any regulatory change (75 FR 15500, USEPA,

[10] After the December 7, 2000 final regulation, two trade associations and several municipal water systems challenged EPA's standard for uranium by claiming that the Agency did not use the best available science when finalizing the standard. In February of 2003, the DC Circuit Court of Appeals upheld EPA's regulation for uranium (as well as combined radiums, and beta particle and photon emitters).

2010e). During the third Six-Year Review cycle, the Agency's literature search did not identify any additional new data that would supersede the findings of the 2003 assessment (USEPA, 2016g). Therefore, the RfD of 0.2 mg/kg-day remains the appropriate basis for health protection and the current review of whether the possible MCLG remains a low priority activity. Based on the RfD and assuming a 70-kg adult body weight and 2 liters water intake per day, the DWEL could be 7 mg/L. An RSC of 20 percent results in a possible MCLG of 1.4 mg/L, rounded to 1 mg/L (USEPA, 2016g).

Analytical feasibility does not pose any limitations for the current MCL and would not be a limiting factor for the possible MCLG decrease under consideration. EPA evaluated the results of the occurrence and exposure analyses for total xylenes to determine whether a revised MCLG/MCL would be likely to result in a meaningful opportunity to improve the level of public health protection (USEPA, 2016a). Table 2-27 shows the results of the occurrence and exposure analysis for the current MCL and the possible MCLG set equal to 1 mg/L based on the new health effects information. The occurrence and exposure analysis shows that average concentrations do not exceed the current MCL for any system in the SYR3 ICR dataset. Average concentrations exceed the possible MCLG of 1 mg/L at 2 of 51,074 systems (0.004 percent) serving 825 people (<0.001 percent of 248.9 million people served).

Table 2-27. Number and Percent of Systems with Mean Concentrations Exceeding Xylene Thresholds and Corresponding Estimates of Population Served[1]

Threshold	Number of Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 10 mg/L (MCL)	0	0	0.000%	0.000%
> 1 mg/L (possible MCLG)	2	2	0.004%	0.004%
Threshold	Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold		Percent of Population Served by Systems with Mean Concentrations That Are Greater Than The Threshold	
	Non-detect values **= 1/2 MRL**	Non-detect values = 0	Non-detect values **= 1/2 MRL**	Non-detect values = 0
> 10 mg/L (MCL)	0	0	0.000%	0.000%
> 1 mg/L (possible MCLG)	825	825	<0.001%	<0.001%

Source: USEPA, 2016a

1. Percentages are based on the 51,074 systems in the SYR3 ICR dataset that reported results for this contaminant. These systems serve 248.9 million people. Non-detection results, i.e., MRL values, were replaced with either ½ x MRL or zero before calculating system mean concentrations.

Since the occurrence analysis indicates that any revision to the MCL is unlikely to provide a meaningful opportunity to improve the level of public health protection, it was not necessary to perform any additional reviews on treatment feasibility or economic considerations.

c. *Review Result.* Although there are new data that support consideration of whether to revise the MCLG/MCL for xylenes, EPA does not believe a revision to the NPDWR for xylenes is appropriate at this time. In making this decision, the Agency considered whether any possible revision to the NPDWR for xylenes is likely to provide a meaningful opportunity to improve public health protection. Taking into consideration the low occurrence of this contaminant, EPA has decided that any revision to the NPDWR would be a low priority activity for the Agency, and, thus, is not appropriate to revise at this time because of:

- Competing workload priorities;
- The administrative costs associated with rulemaking; and
- The burden on States and the regulated community to implement any regulatory change that resulted.

3 References

Agency for Toxic Substances and Disease Registry (ATSDR). 2010. Draft Toxicological Profile for Trichlorobenzenes. U.S. Department of Health and Human Services: Atlanta, GA.

Agency for Toxic Substances and Disease Registry (ATSDR). 2012 Toxicological Profile for Cadmium and Cadmium Compounds. U.S. Department of Health and Human Services: Atlanta, GA.

Agency for Toxic Substances and Disease Registry (ATSDR). 2013. Toxicological Profile for Uranium. U.S. Department of Health and Human Services: Atlanta, GA.

Åkesson, A; L Barregard; IA Bergdahl; GF Nordberg; M Nordberg; and S Skerfving. 2014. Non-renal effects and the risk assessment of environmental cadmium exposure. Environ Health Perspect. 122(5):431-8.

California Environmental Protection Agency (CalEPA). 2010a. Public Health Goal for Methoxychlor in Drinking Water. Office of Environmental Health Hazard Assessment: Sacramento, CA. http://oehha.ca.gov/water/phg/pdf/091610MXC.pdf.

California Environmental Protection Agency (CalEPA). 2010b. Public Health Goal for Styrene in Drinking Water. Office of Environmental Health Hazard Assessment: Sacramento, CA. http://oehha.ca.gov/water/phg/pdf/122810styrene.pdf.

California Environmental Protection Agency (CalEPA). 2014. Updated Public Health Goals for Chemicals in California Drinking Water, Chlorobenzene, Endothall, Hexachlorocyclopentadiene, Silvex, Trichlorofluoromethane. Office of Environmental Health Hazard Assessment: Sacramento, CA. http://oehha.ca.gov/water/phg/pdf/042414PHGTechFinal.pdf.

Ciesielski, T; J Weuve; DC Bellinger; J Schwartz; B Lanphear; and RO Wright. Cadmium exposure and neurodevelopmental outcomes in U.S. children. Environ Health Perspect. 2012 May;120(5):758-63.

Health Canada. 2014. Guidelines for Canadian Drinking Water Quality: Selenium. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch. Health Canada: Ottawa, Ontario.

International Agency for Research on Cancer (IARC). 2012. A Review of Human Carcinogens: Radiation. Volume 100 D. http://monographs.iarc.fr/ENG/Monographs/vol100D/mono100D.pdf.

Larsson, SC; and A Wolk. 2015a. Urinary cadmium and mortality from all causes, cancer and cardiovascular disease in the general population: systematic review and meta-analysis of cohort studies. Int J Epidemiol. Published online May 20, 2015. http://ije.oxfordjournals.org/content/early/2015/05/20/ije.dyv086.full.

Larsson, SC; N Orsini; and A Wolk. 2015b. Urinary cadmium concentration and risk of breast cancer: a systematic review and dose-response meta-analysis. Am J Epidemiol. 182(5):375-80.

National Academy of Sciences (NAS). 2014. Review of the Styrene Assessment in the National Toxicology Program 12th Report on Carcinogens. Committee to Review the Styrene

Assessment in the National Toxicology Program 12th Report on Carcinogens, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council. National Academy Press: Washington, DC. http://www.nap.edu/catalog/18725/review-of-the-styrene-assessment-in-the-national-toxicology-program-12th-report-on-carcinogens

National Institute of Environmental Health Sciences (NIEHS). 2014. 13th Report on Carcinogens. National Toxicology Program, U.S. Department of Health and Human Services: Research Triangle Park, NC. http://ntp.niehs.nih.gov/pubhealth/roc/roc13/index.html.

Nawrot, TS; DS Martens; A Hara; M Plusquin; J Vangronsveld; HA Roels; and JA Staessen. 2015. Association of total cancer and lung cancer with environmental exposure to cadmium: the meta-analytical evidence. Cancer Causes Control. 26(9):1281-8.

Rybert, K.R. and R. J. Gilliom. 2015. Trends in pesticide concentrations and use for major rivers of the United States. Science of the Total Environment 538: 431-444.

Tellez-Plaza, M; A Navas-Acien; A Menke; CM Crainiceanu; R Pastor-Barriuso; and E Guallar. 2012. Cadmium exposure and all-cause and cardiovascular mortality in the U.S. general population. Environ Health Perspect. 120(7):1017-22.

U.S. Geological Survey (USGS). 2015. Pesticide National Synthesis Project. Online at http://water.usgs.gov/nawqa/pnsp/usage/maps/compound_listing.php.

USEPA (U.S. Environmental Protection Agency). 1975. Interim Primary Drinking water Regulations; Radionuclides; Proposed Rule. Federal Register. Vol. 40. No. 158. p. 34324, August 14, 1975.

USEPA. 1976. Interim Primary Drinking Water Regulations; Radionuclides; Final Rule. Federal Register. Vol. 41. No. 133. p. 28402, July 9, 1976.

USEPA. 1986. National Primary Drinking Water Regulations; Radionuclides. Federal Register. Vol. 51, No. 189. p. 34836, September 30, 1986.

USEPA. 1987. National Primary Drinking Water Regulations—Synthetic Organic Chemicals; Monitoring for Unregulated Contaminants; Final Rule. Federal Register. Vol. 52, No. 130. p. 25690, July 8, 1987.

USEPA. 1991a. Drinking Water; National Primary Drinking Water Regulations; Monitoring for Volatile Organic Chemicals; MCLGs and MCLs for Aldicarb, Aldicarb Sulfoxide, Aldicarb Sulfone, Pentachlorophenol, and Barium; Final Rule. Federal Register. Vol. 56, No. 126. p. 30266, July 1, 1991.

USEPA. 1991b. Selenium (CASRN 7782-49-2). Integrated Risk Information System. Carcinogenicity Assessment, verification date March 7, 1990. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0472_summary.pdf.

USEPA. 1991c. National Primary Drinking Water Regulations—Synthetic Organic Chemicals and Inorganic Chemicals; Monitoring for Unregulated Contaminants; National Primary Drinking Water Regulations Implementation; National Secondary Drinking Water Regulations; Final Rule. Federal Register. Vol. 56, No. 30. p. 3526, January 30, 1991.

USEPA. 1992. Drinking Water; National Primary Drinking Water Regulations—Synthetic Organic Chemicals and Inorganic Chemicals; National Primary Drinking Water Regulations Implementation; Final Rule. Federal Register. Vol. 57, No. 138. p. 31776, July 17, 1992.

USEPA. 1995a. Reregistration Eligibility Decision (RED)--Diquat Dibromide. EPA Report 738-R-95-016. Washington, D.C.: Office of Prevention, Pesticides and Toxic Substances. July 1995. Available on the Internet at: http://www.epa.gov/oppsrrd1/REDs/0288.pdf.

USEPA. 1995b. Reregistration Eligibility Decision (RED)--Picloram. EPA Report 738-R95-019. Washington, DC: Office of Prevention, Pesticides, and Toxic Substances. August 1995. Available on the Internet at: http://www.epa.gov/oppsrrd1/REDs/0096.pdf.

USEPA. 1998. Toxicological review of Beryllium and Compounds. Integrated Risk Information System (IRIS): Washington, DC: Office of Research and Development, National Center for Environmental Assessment. http://www.epa.gov/iris/subst/0012.htm.

USEPA. 2000. National Primary Drinking Water Regulations; Radionuclides; Final Rule. Federal Register. Vol. 65, No. 236. p. 76707, December 7, 2000.

USEPA. 2001a. Hexachlorocyclopentadiene (CASRN 77-47-4). Integrated Risk Information System. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0059_summary.pdf.

USEPA. 2001b. National Primary Drinking Water Regulation; Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring; Final Rule. Federal Register. Vol. 66, No. 14. p. 6975, January 22, 2001.

USEPA. 2001c. Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV; Final Rule. Federal Register. Volume 66, Number 114. p. 32073, June 13, 2001.

USEPA. 2002a. Diquat Dibromide HED Risk Assessment for Tolerance Reassessment Eligibility Document (TRED). EPA-HQ-OPP-2009-0920-0007.

USEPA. 2002b. Integrated Risk Information System (IRIS): Toxicological Review of 1,1-Dichloroethylene in Support of Summary Information. National Center for Environmental Assessment, Office of Research and Development: Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0039tr.pdf.

USEPA. 2002c. National Primary Drinking Water Regulations—Announcement of the Results of EPA's Review of Existing Drinking Water Standards and Request for Public Comment; Proposed Rule. Federal Register. Vol. 67, No. 74. p. 19030, April 17, 2002.

USEPA. 2002d. Report of the Food Quality Protection Act (FQPA) Tolerance Reassessment Progress and Risk Management Decision (TRED): Diquat Dibromide. Washington, D.C.: Office of Prevention, Pesticides and Toxic Substances. April 2002. Available on the Internet at: http://www.epa.gov/oppsrrd1/REDs/diquat_tred.pdf.

USEPA. 2002f. Reregistration Eligibility Decision (RED) for Lindane. Office of Prevention, Pesticides and Toxic Substances: Washington, DC. http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2002-0202-0027.

USEPA. 2003a. EPA Protocol for Review of Existing National Primary Drinking Water Regulations. EPA Report 815-R-03-002. Washington, DC: Office of Ground Water and Drinking Water. June 2003.

USEPA. 2003b. Integrated Risk Information System (IRIS): Toxicological Review of Xylenes in Support of Summary Information. National Center for Environmental Assessment, Office of Research and Development: Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0270tr.pdf.

USEPA. 2003c. National Primary Drinking Water Regulations; Announcement of Completion of EPA's Review of Existing Drinking Water Standards; Notice. Federal Register. Vol. 68, No. 138. p. 42908, July 18, 2003.

USEPA. 2003d. Six-Year Review - Chemical Contaminants - Health Effects Technical Support Document. EPA Report 822-R-03-008.

USEPA. 2004. National Primary Drinking Water Regulations: Minor Corrections and Clarification to Drinking Water Regulations; National Primary Drinking Water Regulations for Lead and Copper. Federal Register. Volume 69, Number 124. p. 38850, June 29, 2004.

USEPA. 2005a. Guidelines for Carcinogen Risk Assessment. EPA Report 630/P-03/001B. Washington, DC: Risk Assessment Forum. March 2005. Available on the Internet at: http://www.epa.gov/IRIS/cancer032505.pdf.

USEPA. 2005b. Integrated Risk Information System (IRIS): Toxicological Review of Barium and Compounds. Noncancer Assessment. National Center for Environmental Assessment, Office of Research and Development: Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0010tr.pdf.

USEPA. 2005c. Integrated Risk Information System (IRIS): Toxicological Review of Toluene in Support of Summary Information. National Center for Environmental Assessment, Office of Research and Development: Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0118tr.pdf.

USEPA. 2005d. Reregistration Eligibility Decision (RED) for Endothall. EPA Report 738-R-05-008. Office of Prevention, Pesticides and Toxic Substances. September 2005. Available on the Internet at: http://www.epa.gov/oppsrrd1/reregistration/REDs/endothall_red.pdf.

USEPA. 2006a. Acetochlor/Alachlor: Cumulative Risk Assessment for the Chloroacetanilides. Washington, DC: Office of Pesticide Programs. March 8, 2006. Available on the Internet at: http://www.epa.gov/oppsrrd1/cumulative/chloro_cumulative_risk.pdf.

USEPA. 2006b. Addendum to the 2002 Lindane Reregistration Eligibility Decision (RED). EPA Report 738-R-06-028. Washington, DC: Office of Prevention, Pesticides, and Toxic Substances. July 2006. Available on the Internet at: https://archive.epa.gov/pesticides/reregistration/web/pdf/lindane_red_addendum.pdf.

USEPA. 2006c. Lindane; Cancellation Order. Federal Register. Vol. 71, No. 239. p. 74905, December 13, 2006.

USEPA. 2007a. Advisory on EPA's Assessments of Carcinogenic Effects of Organic and Inorganic Arsenic: A Report of the US EPA Science Advisory Board (SAB). EPA-SAB-07-008. June 2007. Available on the Internet at:

http://yosemite.epa.gov/sab/sabproduct.nsf/EADABBF40DED2A0885257308006741EF/$File/sab-07-008.pdf.

USEPA. 2007b. Integrated Risk Information System (IRIS): Toxicological Review of 1,1,1-Trichloroethane. National Center for Environmental Assessment, Office of Research and Development: Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0197tr.pdf.

USEPA. 2008a. HED Revised Risk Assessment for the Notice of Intent to Cancel (NOIC). PC 090601. DP# 347038. http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2007-1088-0034.

USEPA. 2008b. Reregistration Eligibility Decision for Pentachlorophenol. Office of Prevention, Pesticides and Toxic Substances: Washington, DC. http://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/red_PC-063001_25-Sep-08.pdf.

USEPA. 2009a. Analytical Feasibility Support Document for the Second Six-Year Review of Existing National Primary Drinking Water Regulations. EPA Report 815-B-09-003.

USEPA. 2009b. Carbofuran; Product Cancellation Order; Notice. Federal Register. Vol. 74, No. 51. p. 11551, March 18, 2009.

USEPA. 2009c. EPA Protocol for the Second Review of Existing National Primary Drinking Water Regulations (Updated). EPA Report 815-B-09-002. 2009.

USEPA. 2009d. Toxicological Review of Thallium and Compounds. In Support of Summary Information on the Integrated Risk Information System (IRIS). September 30, 2009. Available at http://www.epa.gov/ncea/iris/toxreviews/1012-tr.pdf.

USEPA. 2010a. Integrated Risk Information System (IRIS): Toxicological Review of cis-1,2-Dichloroethylene and trans-1,2-Dichloroethylene in Support of Summary Information. National Center for Environmental Assessment, Office of Research and Development: Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0418tr.pdf.

USEPA. 2010b. Integrated Risk Information System (IRIS): Toxicological Review of Hydrogen Cyanide and Cyanide Salts in Support of Summary Information. National Center for Environmental Assessment, Office of Research and Development: Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0060tr.pdf.

USEPA. 2010c. Integrated Risk Information System (IRIS): Toxicological Review of Pentachlorophenol in Support of Summary Information. National Center for Environmental Assessment, Office of Research and Development: Washington, DC. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0086tr.pdf.

USEPA. 2010d. Memorandum: Updated toxicity endpoints for oxamyl. Office of Chemical Safety and Pollution Prevention, Washington, DC.

USEPA. 2010e. National Primary Drinking Water Regulations; Announcement of the Results of EPA's Review of Existing Drinking Water Standards and Request for Public Comment and/or Information on Related Issues; Notice. Federal Register. Vol. 75, No. 59. p. 15500, March 29, 2010.

USEPA. 2013. Human Health Risk Assessment for a Proposed Use of 2,4-D Choline on Herbicide-Tolerant Corn and Soybean. Office of Chemical Safety and Pollution Prevention. http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2014-0195-0007.

USEPA. 2014. Integrated Risk Information System (IRIS). Toxicological Review of Libby Amphibole Asbestos in Support of Summary Information. National Center for Environmental Assessment, Office of Research and Development: Washington, DC. December 2014. http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/1026tr.pdf.

USEPA. 2015. IRIS Agenda. https://www.epa.gov/iris/iris-agenda.

USEPA. 2016a. Analysis of Regulated Contaminant Occurrence Data from Public Water Systems in Support of the Third Six-Year Review of National Primary Drinking Water Regulations: Chemical Phase Rules and Radionuclides Rules. EPA 810-R-16-014.

USEPA. 2016b. Analytical Feasibility Support Document for the Third Six-Year Review of National Primary Drinking Water Regulations: Chemical Phase Rules and Radionuclides Rules. EPA 810-R-16-005.

USEPA. 2016c. Consideration of Other Regulatory Revisions in Support of the Third Six-Year Review of the National Primary Drinking Water Regulations: Chemical Phase Rules and Radionuclides Rules. EPA 810-R-16-003.

USEPA. 2016d. Development of Estimated Quantitation Levels for the Third Six-Year Review of National Primary Drinking Water Regulations (Chemical Phase Rules). EPA 810-E-16-002.

USEPA. 2016e. EPA Protocol for the Third Review of Existing National Primary Drinking Water Regulations. EPA 810-R-16-007.

USEPA. 2016f. Occurrence Analysis for Potential Source Waters for the Third Six-Year Review of National Primary Drinking Water Regulations. EPA. 810-R-16-008.

USEPA. 2016g. Six-Year Review 3 – Health Effects Assessment for Existing Chemical and Radionuclide National Primary Drinking Water Regulations – Summary Report. EPA 822-R-16-008.

USEPA. 2016h. Support Document for Third Six Year Review of Drinking Water Regulations for Acrylamide and Epichlorohydrin. EPA 810-R-16-019.

World Health Organization (WHO). 2012. Uranium in Drinking-water: Background Document for Development of WHO Guidelines for Drinking-water Quality. World Health Organization: Geneva, Switzerland. http://www.who.int/water_sanitation_health/publications/2012/background_uranium.pdf?ua=1.

Yang, G., et al. 1989a. Studies of safe maximal daily selenium intake in a seleniferous area in China. Part I. Journal of Trace Elements and Electrolytes in Health and Disease. v. 3, pp. 77-87.

Yang, G.Q., et al. 1989b. Studies of safe maximal daily selenium intake in a seleniferous area in China. Part II. Journal of Trace Elements and Electrolytes in Health and Disease. v. 3, pp. 123-130.