Idaho Fish Consumption Rate and Human Health Water Quality Criteria Discussion Paper #8: Implementation Tools

State of Idaho
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Introduction

Human health ambient water quality criteria are developed to protect human health. The process of revising human health criteria (HHC) and associated fish consumption rates (FCR) within Idaho's water quality standards (WQS) will likely result in more protective water quality criteria, which would reduce the allowed concentration of pollutants in regulated discharges. If the revised HHC becomes rule, dischargers will be required to meet the new criteria. We anticipate that in some cases lower, more protective criteria will be difficult to meet.

The vision of the Idaho Department of Environmental Quality (DEQ) is to not only ensure clean water and "protect Idaho citizens from the adverse health impacts of pollution" (IDEQ 2015a) but also to work "in partnership with local communities, businesses, and citizens to identify and implement cost-effective environmental solutions"(IDEQ 2015a). To ensure adequate provisions in the new WQS to address difficulties in meeting more protective criteria, we propose using implementation tools. This paper discusses implementation tools DEQ is aware of; some tools are already in our WQS but need revision (e.g., compliance schedules and variances), while other tools may need to be added (e.g., intake credits).

Barriers to Achieving More Protective FCR and HHC

Several factors may limit the ability of a permitted discharger to meet WQS. Changes to criteria may require a facility to improve their waste water treatment. To comply with the changes, dischargers will need time to bring improved treatment online. Technology needed to reduce some pollutants in effluent may be either cost prohibitive or unavailable. Natural conditions existing in a water body, such as high levels of arsenic, may result in intake water with high concentrations of a pollutant, which in some cases, may exceed criteria deemed safe. This scenario could result in discharge with high pollutant concentrations without any additional contribution by the water user. Likewise, legacy pollutants from previous activities or atmospheric deposition from airborne toxics, such as mercury and polychlorinated biphenyls (PCBs), may be present in the water taken in before it is subsequently discharged. Each challenge to WQS attainment is unique and should be addressed with the appropriate methods. A bridge to attaining more stringent water quality to protect human health could include a specific set of implementation tools.

Background Pollutants

In Idaho, naturally occurring toxics or background pollutants considered harmful to humans include some metals and other elements present in the earth's crust (e.g., arsenic, mercury, selenium, and zinc) (Mebane and Essig 2003; IDEQ 2015b). Other background pollutants in Idaho surface waters occur as a result of human activities. For example, historic mining and ore-processing activities in the Spokane and Coeur d'Alene river basins have resulted in water contaminated by the metallic toxics, cadmium and zinc (Clark and Mebane 2014). These metals have made their way into ground water and through interception and infiltration have also made their way into publically owned treatment works. In southeastern Idaho, selenium-rich waste

shale removed for phosphate mining resulted in selenium-rich water runoff from mine dumps (Mebane et al. 2014). Although mercury hotspots in surface water can be a result of mining and industrial activities, the release of mercury into the atmosphere (largely from coal burning) has contributed to a general increase in mercury levels in surface water as well (Wentz et al. 2014).

Implementation Tools

"Section 131.13 of the Water Quality Standards Regulation authorizes States to have policies… in their water quality standards that generally affect the application and implementation of State standards" (EPA 1990). While there are instances where WQS are not immediately attainable, states are charged with making *reasonable progress* towards meeting the standards. Section 301(b)(1)(C) of the Clean Water Act (CWA) identifies "schedules of compliance" as a way for states to meet effluent limitations. Other methods, or implementation tools, for meeting WQS are not explicitly identified in the CWA or Code of Federal Regulations.

A variety of methods and tools exists that DEQ could use to aid permitted dischargers in achieving standards or limits set by the HHC. In the mid-1990s, the US Environmental Protection Agency (EPA) published guidance supporting the Great Lakes Initiative, now the Great Lakes Restoration Initiative (GLRI). The GLRI is a multistate endeavor to accelerate conservation and restoration efforts within the Great Lakes region. EPA identified procedures for addressing HHC within the GLRI, including site-specific modifications, variances, an intake pollutant provision, and compliance schedules (EPA 1995).

In 2011, Oregon approved a rulemaking, "Water Quality Standards – Human Health Toxic Pollutants," similar to the effort Idaho is engaged in today. Oregon's new HHC is based on revised FCRs and uses five implementation tools for attaining the new criteria. An issue paper developed in support of the new rule identified eight potential implementation tools: (1) general permits, (2) intake credits, (3) site-specific background pollutant criterion provision, (4) variances with pollutant reduction plans, (5) compliance schedules, (6) restoration WQS, (7) multiple discharger variance, and (8) delayed implementation of rulemaking components. Use of the first five tools listed were recommended and eventually included in the rule, but the last three tools: restoration WQS, multiple discharger variance, and delayed implementation of rulemaking components were not recommended (Bohaboy et al. 2011). Additional tools that could potentially be used for implementing HHC are trading and offset of pollutants or water quality credits (Pennsylvania Code §96.8; Borisova and Roka 2013).

Jurisdiction over the use of the implementation tools varies slightly from state to state, but most commonly, the tools are subject to a rulemaking, public notice and comment period, and EPA approval. Most states apply these tools in a National Pollutant Discharge Elimination System (NPDES) permit, but language for some states suggests that these tools may be employed using alternative methods such as department director's orders. For the purposes of this paper, the focus is on three of the five tools that Oregon implemented: (1) compliance schedules, (2) intake credits, and (3) variances. These tools also appear to be the most widely used and most readily applied in Idaho. A short discussion of other tools is also included.

Compliance Schedules

The CWA requires effluent limits in NPDES permits meet the more stringent of either technology based effluent limits (TBELs) or water quality based effluent limits (WQBELs). At times, the limits, particularly WQBELs are too stringent for a permittee to meet immediately. A compliance schedule provides a framework for meeting effluent limits. In Idaho, compliance schedules are issued only when new effluent limits are in a permit for the first time (IDAPA 58.01.02.400.03). For a compliance schedule to be implemented, the following conditions should be met: the discharger is unable to immediately comply with new WQBELs; a compliance schedule is the most appropriate course of action (i.e., treatment is known, but time is needed to finance, design, and build new treatment capability); and a compliance schedule will lead to compliance with WQS (Hanlon 2007; Bohaboy et al. 2011; WDOE 2014). Compliance schedules should be used to meet water quality criteria as soon as possible (40 CFR 122.47.a.1; 18 AAC 70.910; WDOE 2014). Within the CWA framework, states are given flexibility to determine appropriate time periods. In Idaho, compliance schedules range from 6 months to 20 years.

If a compliance schedule exceeds 1 year, interim milestones with dates for their achievement must be included in the schedule documentation (40 CFR 122.47.a.3; Hanlon 2007; WDOE 2014). EPA guidance suggests that compliance schedules include “an ‘enforceable sequence of actions or operations leading to compliance with a [water quality-based] effluent limitation [“WQBEL”]’,” interim effluent limits, and consideration of all the efforts necessary to attain compliance, such as modifying or installing treatment facilities (Hanlon 2007; WDOE 2014). EPA requires permittees in Idaho, and elsewhere, to submit annual progress reports detailing compliance measures, assessment of effluent data, comparisons of the effluent data to final permit limits, any exceedances of permit limits, anticipated challenges to reaching compliance, and actions and milestones for the upcoming year.

Intake Credits

An intake credit is “a permitting tool that allows a discharge to be calculated in a way that does not require the discharger to ‘clean up’ pollutants in the discharge beyond the level or the intake water” (WDOE 2014). In other words, it does not hold a discharger responsible for pollutants already present in the water they use. Intake credits were originally developed for TBELs within the NPDES program, but many states are using intake credits for WQBELs as well. Several states, including Ohio, Oregon, and Illinois, currently have provisions for intake credits in their WQS (Table 1) (Ohio EPA 1998; Illinois Code 35(C)(II) Part 352 §425; Bohaboy et al. 2011). Washington has proposed incorporating intake credits into their rules under a new section, WAC 173-210A-460 (Table 1). Alaska is also considering the use of intake credits within the revision of their HHC (B. Tabor, Environmental Program Specialist, Alaska Department of Environmental Conservation, personal communication).

Table 1. Four EPA Region 10 states use water quality standards implementation tools to address human health criteria.

WQS Implementation Tools	Alaska	Idaho	Oregon	Washington
Variance rule	Alaska Code 18 AAC 70 WQS Article 2: Exceptions to Statewide Standards Section 200.	IDAPA 58.01.02.260	OAR 340-041-0061, OAR 340-041-0059	Currently in rule WAS 173-201A-420 with proposed revisions; and a proposal to add definition language to WAC 173-210A-020
Variance duration		Generally 5 years, same as NPDES permit; may be renewed		
Compliance schedule rule	18 AAC 70.910	IDAPA 58.01.02.400.03. While EPA currently issues NPDES permits; Idaho develops and includes compliance schedule particulars within its 401 certifications.	40 CFR 122.47 and OAR 340-041-0061 (16)	Currently in rule WAS 173-201A-510(4) with proposed revisions; and a proposal to add definition language to WAC 173-210A-020; use and limits "of compliance schedules for NPDES permits" "are described at WAC 173-220-140"
Compliance schedule duration	3 years (draft language)	6 months to 20 years (no finite limit established)	As soon as possible or duration of NPDES permit	10 years; proposed legislation would remove time limit
Intake credits rule	None in place	None in place	OAR 340-045-0105	Proposed as a new section to WQS rule WAC 173-201A-460
Intake credit duration	Not applicable	Not applicable	Duration of NPDES permit, renewable	Duration of NPDES permit, renewable

Generally, intake credit language stipulates that the water taken into and used by a facility must be discharged to the same water body it was taken from. Oregon extends the scope of the tool to allow for intake ground water to be discharged to a water body if it can be proved that the ground water would have ended up at the same location about the same time. Other common requirements or conditions that must be met for an intake credit to be issued include no additional mass or *no net addition* of the intake pollutant may be contributed to wastewater/discharge, the intake pollutant concentration in the discharge must not be increased, the facility must not alter the intake pollutant chemically or physically in an way different than would naturally occur if the water was left in the stream, and the timing and location of the discharge cannot cause negative impacts on water quality that would not otherwise occur (Bohaboy et al. 2011; WDOE 2014).

A potential issue with the use of intake credits is the limited applicability of the tool; Washington noted "the requirement that pollution essentially pass through the facility unaltered" (WDOE 2014) would restrict its application. Additionally, Oregon indicated that the primary use of intake credits would be by "major industrial permittees, possibly in conjunction with other identified implementation options" (Bohaboy et al. 2011). Given that Idaho does have some toxins that naturally occur (arsenic) as well as pollution (mercury) from historic activities, especially mining, the opportunity exists to use this tool.

Variances

A variance is a WQS implementation tool already used in Idaho (IDAPA 58.01.02.260) and in many other states. A variance is "a temporary relaxation of water quality standards" (IDEQ 2015b). The federal definition states "variance is a time limited designated use and criterion (i.e., interim requirements) that is targeted to a specific pollutant(s), source(s) and/or water body segment(s) that reflects the highest attainable condition during the specified time period" (EPA 2013a). EPA does not currently have its own variance rules within its national regulations for WQS; however, revisions to these regulations proposed in 2013 include a variance provision. EPA's proposed revisions are now under review by the US Office of Management and Budget, and EPA expects to issue the revisions by May 15, 2015.

For an individual state to adopt a variance for a discharger, EPA must first approve the variance. Each variance is reviewed for approval on an individual basis; an exception to this condition is a multiple discharger variance which is discussed below. It must be demonstrated that at least one of the following factors limits the feasibility of attaining a WQS criterion in order for a variance to be approved (IDAPA 58.01.02.260.01.b; EPA 1994; ODEQ 2011):

1. Naturally occurring pollutant concentrations prevent the attainment of the standard; or
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the standard; or
3. Human caused conditions or sources of pollution prevent the attainment of the standard and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the standard, and it is not feasible to restore the water body to its original condition

or to operate such modification in a way that would result in the attainment of the standard; or

5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of the standard; or
6. Controls more stringent than technology-based effluent limitations would result in substantial and widespread economic and social impact.

In Idaho, variances have been approved without the individual variance becoming part of WQS. Variances are essentially a temporary change and can be approved through administrative process rather than a rulemaking. Historically, in Idaho, variances have been approved by EPA Region 10 WQS Program and included in an NPDES permit.

In Region 5 states (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin), variances are widely used (ODEQ 2011) and preferred in some cases to other tools such as compliance schedules. Variances to WQS are renewable and are typically issued for 5 years to coincide with the term of a NPDES permit but may be shorter as the goal of any implementation tool, including variances, is to achieve WQS *as soon as possible*. Allowance for longer term variances is increasing to deal with difficult pollutants such as legacy pollution or pollution that is not corrected with only point source effluent limitation. Washington is proposing the term of a variance should not be limited to a uniform duration but rather be "the minimum time estimated to meet the original standard" and determined on a discharger-by-discharger basis (WSR 2011). Washington's proposal does say "if during the period of the variance it is determined that a designated use cannot be attained, then a use attainability analysis will be initiated" (WSR 2011).

Other Options

As mentioned above, other implementation tools could be used for HHC, including restoration WQS, multiple discharger variance, delayed implementation of rulemaking components, site-specific background pollutant criterion provision, and pollution credit offsets and trading. These tools have been used with success in other states and regions. Some of the tools have only been applied for certain types of pollutants in certain types of situations.

Restoration Water Quality Standards

Restoration WQS have been proposed, but not approved, for Florida only. This WQS could be adopted for an impaired water that is not expected to meet WQS "for a long period of time due to the magnitude of the exceedance, the source of the pollutants, or the availability of treatment technologies to consistently remove very low level of contaminants" (EPA 2010; Bohaboy et al. 2011). A restoration WQS would serve as an alternative to a variance; proposed language applies this tool for nutrients, but the tool could be used for HHC. Using this tool, a state would adopt lesser designated uses in the interim determined by a use attainability analysis (Bohaboy et al. 2011). This approach would last a long time, allowing for restoration activities to be implemented with the intention that more stringent water quality criteria would be applied to the water body in the future. According to EPA, using this approach would allow a state to demonstrate how it expects existing poor water quality "to incrementally improve to achieve

longer-term water quality standards goals" creating "the flexibility to explore more innovative ways to reach the requirements of the next phase, thus possibly reducing costs or allowing new approaches to resolve complex technological issues, and maximizing transparency with the public during each phase" (2010). Oregon advised against adopting this rule because of the time needed to collect and evaluate the necessary data, the regulation applies to only a specific water body, but data from a much larger area are needed, and "enforceable interim designated uses and criteria must be determined and approved through rulemaking"; determining the criteria levels in the future could be challenging (Bohaboy et al. 2011).

Although this tool is not recommended, other recommended tools can work in a similar way. For example, three facilities in Idaho located on the South Fork Coeur d'Alene River were issued variances for heavy metals. These variances were not renewed when the NPDES permits for these dischargers were renewed; rather 20-year compliance schedules were established. These compliance schedules aligned with an upstream remediation project, allowing time to develop effluent treatment technology (EPA 2013b).

Multiple Discharger Variance

A multiple discharger variance has many of the same conditions of an individual variance, except that it can be applied to more than one discharger. Historically, this type of variance has been used for a particular class of dischargers and a particular pollutant (Bohaboy et al. 2011). The groups of permittees covered by a multiple discharger variance do not have to be located in the same water bodies (EPA 2013a). The duration of multiple discharger variances issued thus far is 5 years (Bohaboy et al. 2011). Oregon considered using this tool "to address facilities with non-contact cooling water that cannot meet specific human health criteria for toxic pollutants due to concentration of those pollutants" (Bohaboy et al. 2011).

Oregon decided against using multiple discharger variances for several reasons, including the lack of identification of a single pollutant and a single class of discharger to be covered, the multiple discharger variances would be subject to an EPA approval process, and to date EPA has only approved multiple discharger variances for states within the GLRI (Indiana, Michigan [statewide], and Ohio) for mercury discharges (MDEQ 2009; Bohaboy et al. 2011). The applicability of multiple discharger variances, especially for mercury dischargers, has some potential in Idaho.

Delayed Implementation of Rulemaking Components

The delayed implementation of rulemaking components tool was proposed by HHC work group members in Oregon. Oregon members were concerned that permittees would be unable to reach compliance specifically for "very low toxics criteria for human health" (Bohaboy et al. 2011). This tool entailed delaying the effective date of rulemaking to develop variance and multiple discharger variance language and to determine where pollutants naturally occur that might pose a threat to human health. Oregon chose not to use this tool as it was unlikely to be approved by EPA based on previous disapproval actions. Additionally, instituting two different effective dates could be confusing for stakeholders and Oregon Department of Environmental Quality personnel. Idaho would likely have the same complications with such a tool.

Site-Specific Background Pollutant Criterion Provision

The site-specific background pollutant criterion provision (SSBPC) is described as "a new performance based water quality standard that results in site-specific background pollutant criteria for human health" (Bohaboy et al. 2011). This tool was designed to remove the responsibility of treating background pollutants in effluent from the discharger. Because this is a "performance-based standard provision (i.e., predictable, repeatable, and transparent)… individual approval from the EPA when developing and implementing the SSBPC provisions for each discharger" (Bohaboy and Matzke 2012) is not required. Region 10 EPA approved this tool as a performance based standard, thus use of the tool is not subject to EPA approval and is to be implemented through Oregon's NPDES permitting process.

The SSCPC tool is similar to intake credits in that it does not hold dischargers responsible for pollutants already present in intake water. Additionally, the pollutant must be discharged to the same water body from which it came, and the discharge timing and location may not cause adverse impacts that would not have already occurred if the intake water and pollutant had remained instream. Furthermore, the mass of the pollutant discharged may not be increased. Although intake credits and SSBPC share important characteristics, important differences exist. In Oregon, this tool's use is restricted to human health toxics that are carcinogens. Also "a slight increase in effluent concentration may be permitted so long as the designated uses of the water body are protected and the increase in the final in-stream concentration is less than or equal to 3% and the cancer risk of 10^{-4} is not exceeded" (Bohaboy and Matzke 2012). Idaho may have dischargers who could use this tool, but it may not need to be *stand-alone*. Some SSBPC language could be incorporated into intake credit rule language as the tools share many characteristics.

Pollution Credit Trading

Pollution credit trading, also referred to as water quality trading, "allows one point source to over control for a pollutant at a low cost, selling the over control as 'credits' to another source that is not able to reduce pollutants as cost-effectively" (EPA 2008). One element of this tool is that it allows for, but also requires, a high degree of customization. Pollution credit trading can be used to find solutions on a relatively large scale and can address both point and nonpoint source pollution.

Idaho has already incorporated pollutant trading into its WQS (IDAPA 58.01.02.055.06) for use with total maximum daily loads (TMDLs); the tool has only been used on two occasions and is not currently intended for toxics. Oregon has authorized three water quality trading programs in NPDES permits, and all three programs will address temperature issues, rather than toxics (ODEQ 2012). Currently, Oregon is developing a comprehensive water quality trading policy to clarify existing language.

Pollution credit trading is most often used for addressing nitrogen, phosphorus, and sediment pollution. Nationally, programs have been developed for the following types of pollution: ammonia, biological oxygen demand, dissolved oxygen, mercury, nitrogen, phosphorus, sediment, selenium, and temperature (ODEQ 2012). Given that aquatic organisms are mobile, are exposed to chemicals through both their habitat and diet, and may experience

bioaccumulation of chemicals (Arnot and Gobas 2006), future use of this tool for HHC is feasible.

Measures of Progress

For implementation tools to be regarded as a success, it might be appropriate to develop *measures of progress*. Guidance in this is limited, and fellow Region 10 states, Oregon and Washington, have not addressed a way to measure progress in their rulemakings on HHC, but progress milestones are incorporated into NPDES permits. Outside of a NPDES permit, other ways are available to track HHC achievement. In GLRI, comprehensive measures of progress are being used. GLRI keeps cumulative lists of waters where pollution reduction measures have been implemented and waters where beneficial use impairments have been removed. Also GLRI quantifies the beneficial use impairment delisting statistics, the cumulative number of yards (in millions) of contaminated sediment remediated in the Great Lakes, the cumulative number (in pounds) collected through prevention and waste minimization projects in the Great Lakes Basin, and a "cumulative percentage decline for the long term trend in average concentrations of PCBs in Great Lakes fish" (GLRI 2010). The measures used in the Great Lakes region are not necessarily appropriate for use in Idaho but can serve as a starting point for developing Idaho's own measures of progress.

Conclusions

Many different options are available for determining which WQS implementation tools are best for Idaho to use in the transition to meet more stringent HHC. Pros and cons exist for each of the tools available; some tools are more appropriate for certain pollutants and some have long durations while others have short ones. Quantification levels and detection limits of certain pollutants could be an issue for implementing certain tools. In some cases, the detection limit may not be sufficient to detect change or to detect the amount of pollutants with the potential to compromise human health. Also, these tools have limited potential to address toxics entering waters from nonpoint sources, especially since most of these tools are implemented through the NPDES permit process (GAO 2005).

In Idaho, variances have already been used; although as of 2014, those variances expired and were replaced by compliance schedules to coincide with upstream remediation deadlines. This demonstrates that the use and application of tools will change over time. To effectively adapt to change, a variety of appropriate tools must be available for use.

References

Alaska Department of Environmental Conservation. 2012. "Water Quality Standards." 18 AAC 70.910. Accessed February 4, 2015. *http://dec.alaska.gov/commish/regulations/pdfs/18%20AAC%2070.pdf*

Arnot, J.A. and F.A.P.C. Gobas. 2006. "A Review of Bioconcentration Factor (BCF) and Bioaccumulation Factor (BAF) Assessments for Organic Chemicals in Aquatic Organisms." *Environmental Reviews* 14: 257–297. Accessed February 13, 2015. *http://research.rem.sfu.ca/papers/gobas/A%20Review%20of%20Bioconcentration%20factor%20(BCF)%20and.pdf*

Bohaboy, S., A. Liege, A. Maze, D. Sturdivant, and J. Wigfall. 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits.* Portland, OR: Oregon Department of Environmental Quality. Accessed February 3, 2015. *http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf*

Bohaboy, S and A. Matzke. 2012. *Implementing Site-Specific Background Pollutant Criteria for NPDES Permit Holders Revision 1.0.* Portland, OR: State of Oregon Department of Environmental Quality, Water Quality Division, Surface Water Management. Internal Management Directive: DEQ12-WQ-0016-IMB, Web Pub #12-WQ-039. Accessed February 5, 2015. *http://www.deq.state.or.us/wq/pubs/imds/12WQ039.pdf*

Borisova, T. and F. Roka. 2013. *Water Quality Credit Trading: General Principles.* Gainesville, FL: University of Florida, Food and Resource Economics Department. FE824. Accessed February 4, 2015. *http://edis.ifas.ufl.edu/fe824*

CFR (Code of Federal Regulations). 2013. "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System, Schedules of Compliance." 40 CFR 122.47.a.l.and 40 CFR 122.47.a.3.

CFR (Code of Federal Regulations). 2013. "Designation of Uses." 40 CFR 131.10.g.

Clark, G.M. and C.A. Mebane. 2014. *Sources, Transport, and Trends for Selected Trace Metals and Nutrients in the Coeur d'Alene and Spokane River Basins. Northern Idaho, 1990-2013.* Reston, VA: US Department of the Interior, US Geological Survey. Scientific Investigations Report 2014-5204. Accessed February 11, 2015. *http://pubs.usgs.gov/sir/2014/5204/pdf/sir2014-5204.pdf*

EPA (US Environmental Protection Agency). 1990. *National Assessment of State Variance Procedures.* Washington, DC: EPA Office of Water Regulations and Standards. Accessed February 3, 2015. *http://water.epa.gov/scitech/swguidance/standards/upload/1999_11_03_standards_variancereport.pdf*

EPA (US Environmental Protection Agency). 1994. *Water Quality Standards Handbook: Second Edition.* Washington, DC: EPA Office of Water. EPA 823-B-94-005a.

EPA (US Environmental Protection Agency). 1995. "Final Water Quality Guidance for the Great Lakes Ecosystem: Final Rule." *Federal Register* 60(56): 15365–15425. Chicago, IL: EPA Region 5. Accessed January 30, 2015. *http://www.epa.gov/owow/tmdl/glsprohibit.pdf*

EPA (US Environmental Protection Agency). 2008. *EPA Water Quality Trading Evaluation Final Report*. Washington, DC: EPA Office of Water. Accessed February 6, 2015. *http://water.epa.gov/type/watersheds/trading/upload/wqt.pdf*

EPA (US Environmental Protection Agency). 2010. "Water Quality Standards for the State of Florida's Lakes and Flowing Waters." *Federal Register* 75(16): 4174–4226. Proposed Rule 40 CFR 131. Washington, DC: EPA. Accessed February 4, 2015. *http://www.gpo.gov/fdsys/pkg/FR-2010-01-26/pdf/2010-1220.pdf*

EPA (US Environmental Protection Agency). 2013a. *Discharger-specific Variances on a Broader Scale: Developing Credible Rationales for Variances that Apply to Multiple Dischargers.* Washington, DC: EPA Office of Water. EPA 820-F-12-012. Accessed February 3, 2015. *http://water.epa.gov/scitech/swguidance/standards/upload/Discharger-specific-Variances-on-a-Broader-Scale-Developing-Credible-Rationales-for-Variances-that-Apply-to-Multiple-Dischargers-Frequently-Asked-Questions.pdf*

EPA (US Environmental Protection Agency). 2013b. *South Fork Coeur d'Alene River Sewer District Mullan Wastewater Treatment Plant (WWTP).* Seattle, WA: EPA Region 10. NPDES Permit ID0021296 Fact Sheet. Accessed February 12, 2015. *http://www.epa.gov/region10/pdf/permits/npdes/id/mullan_id0021296_fs_061213.pdf*

GAO (US Government Accountability Office). 2005. *Great Lakes Initiative: EPA Needs to Better Ensure the Complete and Consistent Implementation of Water Quality Standards.*, Washington D.C.: GAO. GAO-05-829. Accessed February 6, 2015. *http://www.gao.gov/assets/250/247244.pdf*

GLRI (Great Lakes Restoration Initiative). 2010. *Great Lakes Restoration Initiative Action Plan.* Accessed February 4, 2015. *http://greatlakesrestoration.us/pdfs/glri_actionplan.pdf*

Hanlon, J.A. 2007. *Compliance Schedules for Water Quality-Based Effluent Limitations in NPDES Permits*. Washington, D.C.: US Environmental Protection Agency, Office of Wastewater Management. Memorandum: May 10, 2007, US EPA Office of Wastewater Management and EPA Region 9 Water Division. Accessed February 4, 2015. *http://water.epa.gov/lawsregs/guidance/wetlands/upload/signed-hanlon-memo.pdf*

IDAPA. 2011. "Pollutant Trading." Idaho Administrative Code. IDAPA 58.01.02.055.06.

IDAPA. 2002. "Variances from Water Quality Standards." Idaho Administrative Code. IDAPA 58.01.02.260.

IDAPA. 2011. "Compliance Schedules for Water Quality-Based Effluent Limitations." Idaho Administrative Code. IDAPA 58.01.02.400.03.

IDEQ (Idaho Department of Environmental Quality). 2015. "Natural Background Conditions." Accessed February 6, 2015. *https://www.deq.idaho.gov/water-quality/surface-water/standards/natural-background-conditions.aspx*

IDEQ (Idaho Department of Environmental Quality). 2015a. "DEQ's Mission." Idaho Department of Environmental Quality. Accessed March 6, 2015. *http://www.deq.idaho.gov/*

IDEQ (Idaho Department of Environmental Quality). 2015b. "Variances from Idaho Water Quality Standards." Accessed February 3, 2015. *http://www.deq.idaho.gov/water-quality/surface-water/standards/variances.aspx*

Illinois Code. 2005. "Intake Credits." Illinois Administrative Code, Title 35 (C)(II), Part 352 §425. Accessed February 4, 2015. *http://www.ilga.gov/commission/jcar/admincode/035/035003520D04250R.html*

MDEQ (Michigan Department of Environmental Quality). 2009. *Multiple Discharger Variance for Mercury: Fiscal Years 2010-2014.* Lansing, MI: Michigan Department of Environmental Quality. Accessed March 3, 2015. *http://www.michigan.gov/documents/deq/wb-npdes-rules-Mercury_2010_312383_7.pdf*

Mebane, C. and D. Essig. 2003. *Concepts and Recommendations for Using the "Natural Conditions" Provisions of the Idaho Water Quality Standards.* Boise, ID: Idaho Department of Environmental Quality.

Mebane, C.A., G.C. Mladenka, L. Van Every, M.L. Williams, and M.A. Hardy. 2014. *Selenium in the Upper Blackfoot River Watershed, Southeastern Idaho, 2001-12.* Reston, VA: US Department of the Interior, US Geological Survey. Scientific Investigations Report 2014-5203. Accessed February 11, 2015. *http://pubs.usgs.gov/sir/2014/5203/pdf/sir2014-5203.pdf*

ODEQ (Oregon Department of Environmental Quality). 2011. *Variance Compendium*. Portland, OR: ODEQ. Accessed February 3, 2015. *http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/VarianceCompendium110124.pdf*

ODEQ (Oregon Department of Environmental Quality). 2012. *Water Quality Trading in NPDES Permits Internal Management Directive December 2009 (updated August 2012).* Portland, OR: ODEQ. Accessed February 6, 2015. *http://www.deq.state.or.us/wq/pubs/imds/wqtrading.pdf*

Ohio EPA (Ohio Environmental Protection Agency). 1998. *Intake Credits/Non-contact Cooling Water.* Columbus, OH: Division of Surface Water. Permit Guidance 6. Accessed February 4, 2015. *http://www.epa.state.oh.us/portals/35/guidance/permit6.pdf*

Pennsylvania Code. 2010. "Use of Offsets and Tradable Credits from Pollutant Reduction Activities in the Chesapeake Bay Watershed." Pennsylvania Code 1 Pa. Code §96.8. Accessed February 4, 2015. *http://www.pacode.com/secure/data/025/chapter96/s96.8.html*

US Congress. 2002. "Title III—Standards and Enforcement, Effluent Limitations." Clean Water Act §301.b.1.C.

WDOE (Washington Department of Ecology). 2014. *Washington Water Quality Standards: Human Health Criteria and Implementation Tools*. Preliminary Draft. Olympia, WA: WDOE. Accessed February 4, 2015. *http://www.ecy.wa.gov/programs/wq/swqs/Decisionmemos923.pdf*

Wentz, D.A., M.E. Brigham, L.C. Chasar, M.A. Lutz, and D.P. Krabbenhoft. 2014. *Mercury in the Nation's Streams—Levels, Trends, and Implications.* Reston, VA: US Department of the Interior, US Geological Survey. Circular 1395. Accessed February 11, 2015. *http://pubs.usgs.gov/circ/1395/*

WSR (Washington State Register). 2011. "Amendatory Section." Washington Code Reviser. WSR 11-09-090. Accessed February 12, 2015. *http://www.ecy.wa.gov/laws-rules/wac173201a/p1203.pdf*