



**Interim Policy on Establishing Effluent Limits for
Permitted Point Source Discharges to Class 1 Water
Tributaries**

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INTERIM POLICY ON ESTABLISHING EFFLUENT LIMITS FOR PERMITTED POINT SOURCE DISCHARGES TO CLASS I WATER TRIBUTARIES

I. Purpose:

The purpose of this document is to describe the process for establishment of permit limits for point source discharges to tributaries of Class 1 waters granted under the Wyoming Pollutant Discharge Elimination System (WYPDES) Program. The Wyoming Department of Environmental Quality Water Quality Division adopted, effective April 25, 2007, surface water quality standards (Water Quality Division Rules and Regulations, Chapter 1) which established a category of Class 1 waters. A description of Class 1 waters is contained in Section 4(a) of Chapter 1 which states:

- (a) Class 1, Outstanding Waters. Class 1 waters are those surface waters in which no further water quality degradation by point source discharges other than from dams will be allowed. Nonpoint sources of pollution shall be controlled through implementation of appropriate best management practices. Pursuant to Section 7 of these regulations, the water quality and physical and biological integrity which existed on the water at the time of designation will be maintained and protected. In designating Class 1 waters, the Environmental Quality Council shall consider water quality, aesthetic, scenic, recreational, ecological, agricultural, botanical, zoological, municipal, industrial, historical, geological, cultural, archaeological, fish and wildlife, the presence of significant quantities of developable water and other values of present and future benefit to the people.*

Specific waters designated as Class 1 are listed in Appendix A of Chapter 1. Designation of these waters was approved on June 27, 1979 with the exception of the North Platte River between Alcova Reservoir and Natrona County Road 309 bridge which was approved on November 29, 1990.

Class 1 waters are specially designated waters on which the existing water quality is protected regardless of the uses supported by the water. The protection afforded by these rules is intended to go beyond the normal protection from pollutants provided by the Department's numeric and narrative water quality standards in Chapter 1. Upon regulatory designation of a surface water as a Class 1 water, the quality of the water shall be maintained and protected pursuant to Chapter 1, Section 7 which states:

Section 7. Class 1 Waters

- (a) Except as authorized in paragraph (b), no new point sources other than dams, may discharge, and no existing point sources, other than dams, may increase their quantity of pollution discharge, to any water designated as Class 1.*
- (b) Storm water and construction-related discharges of pollution to Class 1 waters may be authorized and shall be controlled through applicable water quality permits, Section 401 certifications and/or by the application of best management practices. Such discharges shall not degrade the quality of any Class 1 water below its existing quality or adversely affect any existing use of the water. Temporary increases in turbidity that are within the limits established in Section 23 of these regulations and that do not negatively affect existing uses can be permitted. For purposes of this section, temporary increases in turbidity shall not exceed the actual construction period. The department shall impose whatever controls and monitoring are necessary on point source discharges to Class 1 waters and their tributaries to ensure that the existing quality and uses of the Class 1 water are protected and maintained.*
- (c) Nonpoint source discharges of pollution to Class 1 waters or tributaries of Class 1 waters shall be controlled by application of best management practices adopted in accordance with the Wyoming Continuing Planning Process. For Class 1 waters, best management practices will maintain existing quality and water uses.*

Included with the adoption of Chapter 1 is a revision of the antidegradation provisions which established antidegradation protections for Class 1 waters. The federal regulations (40 CFR 131.12) require state standards programs to address 3 "tiers" of antidegradation protection. Antidegradation protection afforded to Class 1 waters is described in Section II of the "Wyoming Surface Water Quality Standards Implementation Policy for Antidegradation, February 2007" which states:

"Tier 3" protections apply to waters that constitute "outstanding national resource waters" (ONRWs)¹. Tier 3 requires maintenance of existing quality with no consideration of assimilative capacity or economic or social development. In certain circumstances, temporary lowering of water quality is allowable, however the general rule is that no new point sources or increased pollutant loading from existing point sources is allowable.

¹*The Wyoming water quality protection program has no provision for designating waters that have "national" significance, however, waters designated as Class 1 under the surface water standards are considered to be outstanding resources. Though not designated as ONRWs, Class 1 waters are afforded a level of antidegradation protection which is a functional equivalent of EPA's tier 3 concept.*

Restriction of new or expanded point source discharges to Class 1 waters is further explained in Section III(A) of the "Wyoming Surface Water Quality Standards Implementation Policy for Antidegradation, February 2007" which states:

The Wyoming surface water quality standards prohibit new or increased "end-of-the-pipe" effluent discharges of pollution into Class 1 waters but allow limited discharges associated with stormwater runoff and construction activities. Permits issued by the Department of Environmental Quality (DEQ) for stormwater and construction-related discharges will contain the following safeguards: (1) changes in water quality will be limited to temporary increases in turbidity; (2) turbidity increases will be limited to those allowed in Section 23 of Chapter 1; and (3) necessary controls and monitoring will be required to ensure existing water quality and uses are maintained and protected. Furthermore, the Department will impose whatever controls are necessary on regulated point source discharges to tributaries of Class 1 waters to the extent that the existing quality and uses of the downstream Class 1 segment will be protected and maintained. It is the Department's interpretation that "tributary" means any waters feeding the mainstem and any upstream mainstem segments.

This requirement restricts most new or expanded point source discharges to a Class 1 water. However, the Department can authorize new or expansions of pre-existing point source discharges to tributaries of Class 1 waters provided the existing quality of the Class 1 water is protected and maintained. Chapter 1 of Wyoming Water Quality Division Rules and Regulations (April 25, 2007) defines tributary as *those streams or stream segments which flow into or contribute water to another stream, stream segment, downstream reach of the same stream, or other water body*. Permit effluent limits for discharges to tributaries of Class 1 waters will be set to the average background conditions of the Class 1 water and once implemented will not result in a measurable lowering of the existing Class 1 water quality. It is the Department's interpretation that "measurable lowering" constitutes no more than a 10% or 1 standard deviation (whichever is appropriate) adverse departure from the average background conditions of the Class 1 water to ensure protection and maintenance of the existing Class 1 water quality. For highly variable datasets where the 1 standard

deviation is greater than or equal to 50% of the average background condition, the 10% value can be used to assess departure from average background condition. In circumstances where the 1 standard deviation and 10% values are similar, then the lesser of the two will be used to assess departure from average background conditions. In general, the determination of whether to use the 10% or 1 standard deviation departure will be case-specific and largely dependent on the quantity, variability and representativeness of the dataset.

This concept of measurable lowering will only apply when the Department conducts evaluations to ensure there has not been more than a 10% or 1 standard deviation adverse departure from the average background conditions on the Class 1 water after the approval date of this policy. Under no circumstances does measurable lowering constitute a 10% or 1 standard deviation allowable degradation to the average background conditions of the Class 1 water. Rather, 10% or 1 standard deviation is considered the trigger level at which a real adverse departure (and not a departure due to natural variability) is detectable. Minimum data requirements to determine a measurable lowering from average background conditions of the Class 1 water will vary with each Class 1 water. The choice of minimum data requirements will be driven by the quantity, variability and representativeness of samples within the dataset, the natural variability in constituent concentrations of the Class 1 water in addition to a reasonable level of statistical confidence needed to show a measurable lowering from the average background conditions of the Class 1 water. If it is determined that a 10% or 1 standard deviation adverse departure from the average background conditions has occurred on a Class 1 water, the Department will evaluate whether the exceedence is caused by permitted activities. If the Department determines permitted activities are the cause of the exceedence, appropriate corrective actions will be implemented.

II. Process

Because of local and regional differences in water quality, the scarcity of water quality data on tributaries to Class 1 waters, and the complex mixing scenarios of tributaries to Class 1 waters, development of an extensive list of tributary-specific permit limits that protect and maintain a Class 1 segment is impractical. Therefore, it is the Department's opinion that developing effluent limits for point source discharges on tributaries to Class 1 waters set equal to the average background quality of the Class 1 water, provides the most effective means of ensuring the existing Class 1 water quality is protected and maintained. These effluent limits will be applied on permits for new point source discharges or expansions of pre-existing point source discharges to tributaries of Class 1 waters authorized after the approval date of this policy. An expansion of a pre-existing point source discharge is defined as any increase in pollutant load or concentration. All point source discharge permits issued prior to the approval

date of this policy that discharge to a tributary of a Class 1 water, are allowed to continue to discharge under their pre-existing "end-of-pipe" effluent limits.

Effluent limits protective of existing Class 1 water quality are applied at the "end-of-pipe" and are applicable only to persistent constituents. Persistent constituents are defined as those constituents that could negatively impact Class 1 water quality, are persistent in the water column and can be traced from the point of discharge to the Class 1 water. A list of persistent constituents can be found in Appendix A. Effluent limits for non-persistent constituents that rapidly decay, oxidize, chemically bind, disperse, dissociate or biologically assimilate within a short distance from the point of discharge and have a negligible influence on the existing quality of the Class 1 water are based on applicable rules, regulations and provisions on the tributary.

III. Establishing Effluent Limits

Establishing effluent limits for point source discharges equal to the average background quality of the Class 1 water, should ensure that the existing quality of the Class 1 water is not degraded by point source discharges to tributaries of Class 1 waters. When developing effluent limits set equal to the average background quality of the Class 1 water, it's important to account for variations in constituent concentrations with changes in streamflow. To ensure the effluent limits adequately reflect this variation in concentration with streamflow, an average flow-weighted (AFW) method will be used to calculate the effluent limits. The AFW method is preferable to calculating a straight average of constituent concentration data since it provides a result that is closer to the true average concentration across all streamflows. Because this approach is Class 1 water-specific, each Class 1 water will have a unique set of effluent limits for persistent constituents. The calculation of effluent limits that protect and maintain the existing quality of Class 1 waters shall be conducted as follows:

- 1 Effluent limits that protect and maintain existing Class 1 water quality will be set equal to the average background water quality which will be based on available measured data collected on the Class 1 water of interest. Data used to calculate the average background quality will consist of measured daily mean streamflow and daily constituent concentration data collected on the Class 1 water from the date the Class 1 water was designated to the approval date of this policy. This period of record will be considered "baseline" and will represent natural variation in existing water quality. USGS gage stations will be the primary source of measured data on Class 1 waters. If more than one USGS gage station is located on the Class 1 water, a decision will be made to use measured data from either one or all gage stations depending on the quantity and quality of the measured data and the location(s) of the USGS gage

stations. In the case where measured data on a Class 1 water is minimal or unavailable, the Department will consider appropriate alternate sources of scientifically valid measured data to establish average background quality. Alternate sources of scientifically valid measured data may include but are not limited to other local, state and federal agencies and private entities. Average background quality will be determined using the AFW method for each persistent constituent that can reasonably be expected to occur in effluent from the proposed point source discharge (See Appendix B for an example calculation of an effluent limit). Effluent limits for point source discharges on tributaries to a Class 1 water will then be set equal to the average background quality of the Class 1 water.

2 The Department will use discretion, appropriate methods and professional judgment on a case-by-case basis when evaluating the representativeness of the average background quality when other information suggests the established average background quality may not adequately represent and maintain existing Class 1 water quality. The Department may approve an adjustment to the average background quality if it determines that the other information reasonably demonstrates the average background quality should be altered from that calculated under Section III (1) of this policy. Average background quality may also be adjusted to reflect seasonal or reach-specific conditions when sufficient data for developing such criteria is available and appropriate. Any data collected on a Class 1 water that receives discharges from new or expansions of existing point sources on its tributaries shall not be used in any adjustment to the average background quality of the Class 1 water.

3 In cases where the average background quality is below the analytical detection limit, the lowest attainable analytical detection limit will be used as the effluent limit.

4 All effluent limits must be achieved at the "end-of-pipe" prior to mixing with the tributary. Effluent limits will normally be applied year-long, though may be applied on a seasonal basis pursuant to Section III (2).

5 All effluent limits will comply with applicable rules, regulations and provisions to ensure protection of the designated uses on tributaries to Class 1 waters. These rules, regulations and provisions are contained in Chapters 1 and 2 of the Wyoming Water Quality Division Rules and Regulations and include requirements such as the antidegradation, antibacksliding and reopener provisions.

6 The Department may also include any additional monitoring and reporting requirements or other special conditions in the point source

discharge permit as may be necessary to achieve and demonstrate that the existing Class 1 water quality will be maintained and protected and applicable rules, regulations and provisions on tributaries to the Class 1 water will not be violated. Additional requirements may include but are not limited to periodic monitoring of tributaries that receive effluent in addition to the downstream Class 1 water.

IV. Alternative Approaches

In circumstances where there cannot be reasonable compliance with the effluent limits established under Section III or in cases where there is available information sufficient to conclude that the discharge of a water quality poorer than that set by the effluent limits will maintain and protect the existing Class 1 water quality, appropriate alternatives to revise the Section III effluent limits may be considered. When selecting any of the alternative approaches however, the discharge of poorer quality water must maintain and protect the existing Class 1 water quality, protect designated uses on tributaries to Class 1 waters and will be subject to all applicable Wyoming Water Quality Division rules, regulations, provisions and sections of this policy. Evaluations of adverse departure from average background conditions of the Class 1 water and associated corrective actions described under Section I of this policy will apply to all alternative approaches. For each alternative, a reasonable margin of safety must be included to account for uncertainties in data and methods. Each alternative approach is explained as follows:

1 Water Quality Models

If sufficient information exists, a water quality model is one tool for simulating the effects of pollutants from tributary point source discharges on existing Class 1 water quality. The Department may authorize an increase in the discharge of pollutants above the effluent limits established under Section III based on the results of a water quality model.

A. Every application for a point source discharge permit to a tributary of a Class 1 water that includes the use of a water quality model to justify an increase in the discharge of pollutants above the effluent limits established under Section III shall include all of the following:

(a) The water quality model must account for the fate and transport of constituents under various hydrologic conditions and mixing scenarios for both the Class 1 water and tributary.

- (b) The water quality model must account for the cumulative effects of all pre-existing point source discharges in the tributary watershed.
 - (c) The water quality model must reasonably demonstrate that the proposed point source discharge(s) will maintain and protect the existing Class 1 quality and not violate applicable rules, regulations and provisions on the tributaries to Class 1 waters under all normal hydrologic conditions.
 - (d) A final report on the model must include, but is not limited to:
 - 1. A description on how the proposed point source discharge(s) will maintain and protect the existing Class 1 quality.
 - 2. A description that ensures the proposed point source discharge(s) will not violate applicable rules, regulations and provisions on tributaries to Class 1 waters.
 - 3. A description of how the model framework was selected and applied, including the calibration and validation process. Also required will be a technical description of model error, precision and accuracy for both the calibration and validation processes, the full range of model predictions in addition to the average model output. A discussion on whether the model is overfit is also required. Overfitting refers to a situation where a model may well describe the relationship between predictors and outcome in data used to develop the model, but may subsequently fail to provide valid predictions with an independent dataset.
 - 4. A description of all data used, site selection and location and an assessment of the credibility of all data and their sources used in the modeling.
 - 5. Assumptions used to build the model and a description of model limitations.
 - 6. An electronic copy of the model and all data used to build and test the model.
- B. If the Department approves of the approach, "end-of-pipe" effluent limits for the applicable point source discharge permit(s) will be adjusted accordingly. In addition, the Department may also include in the permit any additional monitoring and reporting requirements or other special

conditions as may be necessary to achieve and demonstrate that the existing Class 1 water quality will be protected and maintained and applicable rules, regulations and provisions on tributaries to the Class 1 water will not be violated. Additional requirements may include but are not limited to periodic monitoring of tributaries that receive effluent in addition to the downstream Class 1 water.

2 Discharge to Ephemeral or Intermittent Waters

Where the proposed point source discharge is to a natural ephemeral or intermittent water, the possibility of the discharge reaching the Class 1 water may be minimal. The Department may authorize a point source discharge to a tributary of a Class 1 water with effluent limits protective only of the tributary, if there is reasonable assurance that under normal hydrologic conditions, the discharge will not reach a Class 1 water.

- A. Every application for a point source discharge permit to a tributary of a Class 1 water that references this alternative to justify an increase in the discharge of pollutants above the effluent limits established under Section III shall include, but not limited to:
 - (a) A demonstration, with reasonable assurances, that the proposed point source discharge will not reach a Class 1 water. Each demonstration will include, but is not limited to:
 - 1. An electronic copy and description of all data used, including but not limited to site selection and location.
 - 2. A description of data analysis, assumptions used in the analysis and method limitations.
 - (b) A demonstration that the proposed point source discharge(s) will not violate applicable rules, regulations and provisions on tributaries to the Class 1 water.
 - (c) Included within the demonstration is a consideration of the cumulative effects of all pre-existing point source discharges in the tributary watershed.
- B. If the Department approves of the approach, "end-of-pipe" effluent limits for the applicable point source discharge permit(s) will be adjusted accordingly. In addition, the Department may also include in the permit any additional monitoring and reporting requirements or other special conditions as may be necessary to achieve and demonstrate

that the point source discharges do not reach the Class 1 water and that applicable rules, regulations and provisions on tributaries to the Class 1 water will not be violated. Additional requirements may include but are not limited to periodic monitoring of tributaries that receive effluent in addition to the downstream Class 1 water.

3 Pollution Offset Credits

Increased pollution from proposed point source discharges on tributaries to Class 1 waters could potentially be offset through removal of other pre-existing sources of pollution. In certain circumstances, the Department may consider the use of pollution offset credits that would allow an increase in the discharge of pollutants above the effluent limits established under Section III for a proposed point source discharge provided there is an equal or greater offset of the increased pollution by pollution reductions from existing source(s) in the same project area. Because the Department currently has no official guidelines or policies on the use of pollution offset credits for point source discharges, inquiries into this approach will be considered on a case-by-case basis.

- A. At a minimum, every application for a point source discharge permit to a tributary of a Class 1 water that uses this alternative must address key components that include but are not limited to:
 - (a) The application must demonstrate that the total load of each individual pollutant allowed from the proposed point source discharge shall be offset by an equal or greater reduction in the actual discharge of such pollutant(s) from the same or similar sources in the project area.
 - (b) The proposed increase in pollutants will maintain and protect the existing Class 1 water quality and not violate applicable rules, regulations and provisions on tributaries to the Class 1 water.
 - (c) The proposed increase in pollutants and the reduction from existing sources must involve the same pollutant(s).
 - (d) In no circumstance can there be a net increase in pollutant loading from the project area to the Class 1 water.
 - (e) The project area is defined as the watershed or portion of a watershed that is tributary to a Class 1 water and contains the locations of both the proposed point

source discharge and the existing sources whereby reductions in pollutants will take place.

- B. If the Department approves of the approach, “end-of-pipe” effluent limits for the applicable point source discharge permits(s) will be adjusted accordingly. In addition the Department may also include in the permit any additional monitoring and reporting requirements or other special conditions as may be necessary to achieve and demonstrate that the existing Class 1 water quality will be protected and maintained and applicable rules, regulations and provisions on tributaries to the Class 1 water will not be violated. Additional requirements may include but are not limited to periodic monitoring of tributaries that receive effluent in addition to the downstream Class 1 water.

4 Other Considerations

- A. All submitted proposals pursuant to Section IV (1), (2), and (3) are subject to reviews, revisions and applicable rules and regulations along with all other aspects of a point source discharge permit by the Department to ensure compliance with all existing requirements and provisions for point source discharges and that the existing Class 1 water quality will be protected and maintained and applicable rules, regulations and provisions on tributaries to the Class 1 water will not be violated.

Appendix A: Persistent Constituents

Persistent constituents considered in this policy include but are not limited to:

Aluminum
Arsenic
Beryllium
Cadmium
Chloride
Chromium
Copper
Fluoride
Lead
Manganese
Mercury
Nickel
Selenium
Silver
Sodium
Sulfate
Thallium
Total Dissolved Solids
Zinc

Appendix B: Establishing Average Background Water Quality on a Class 1 Water using the AFW method

When establishing the average background quality of a Class 1 water, it is important to account for the relationship between changes in concentration of a constituent with changes in streamflow. The average flow-weighted method (AFW) accounts for these changes and will provide a measure of the average background concentration for a given constituent that is closer to the true average concentration across all streamflows than what would be calculated using another approach such as the straight average. The steps for calculating the average background quality for a given constituent using the AFW method are presented in Table 1 using sulfate as an example (Note – circled numbers tie each step to Table 1).

- ① Gather all daily mean streamflow and measured daily sulfate concentration data for the period of record on the Class 1 water. Check the data for outliers and remove where appropriate.
- ② Missing daily sulfate concentration data is inferred using an appropriate interpolation method based on known data points. In some circumstances, large data gaps may be removed from the record and not considered in the calculations.
- ③ All daily mean streamflows for the period of record are summed.
- ④ Each daily mean streamflow for the period of record is divided by the sum of the daily mean streamflows and then multiplied by the corresponding daily sulfate concentration (measured and interpolated) to develop an incremental value.
- ⑤ Each incremental value for the period of record is summed to arrive at an average flow-weighted concentration for sulfate.
- ⑥ To account for any uncertainties in the daily sulfate concentrations due to sample or laboratory error, the standard deviation of all the measured daily sulfate concentrations is calculated and subtracted from the average flow-weighted concentration for sulfate. The effluent limit for sulfate will then be set equal to this value.

Table 1. Fictitious data used to calculate an average flow-weighted concentration for sulfate.

Date	① Daily Mean Streamflow (cfs)	① Measured Daily Sulfate Conc. (mg/L)	② Interpolated Daily Sulfate Conc. (mg/L)	④ Incremental Value [Daily Sulfate Conc.*(daily mean streamflow/sum of daily mean streamflows)]
9/9/1982	1810	150.0		13.9
9/10/1982	1980		155.0	15.7
9/11/1982	2110		156.6	16.9
9/12/1982	2100		158.2	17.0
9/13/1982	2100		159.8	17.2
9/14/1982	2000		161.4	16.5
9/15/1982	1900	165.0		16.0
9/16/1982	1800	175.0		16.1
9/17/1982	1850	170.0		16.1
9/18/1982	1900	155.0		15.1
Sum of Daily Mean Streamflows	③ 19550			
Average Flow-Weighted Concentration				⑤ 160.5 mg/L
Standard Deviation		⑥ 10.4		
Average Flow-Weighted Concentration – Standard Deviation				⑥ 150.1 mg/L