



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10

1200 Sixth Avenue
Seattle, Washington 98101

APR 07 1997

REPLY TO
ATTN OF:

OW-134

Michele Brown, Commissioner
Alaska Department of Environmental Conservation
410 Willoughby Ave., Suite 105
Juneau, AK 99801-1795

Dear Ms. Brown:

The Environmental Protection Agency (EPA) has completed its review of the Alaska Water Quality Standards (WQS) adopted December 4, 1994, and submitted to EPA for approval on January 26, 1995, and WQS adopted February 14, 1996, which were subsequently submitted to EPA for approval on September 26, 1996. In response to a petition filed in the State, by the Sierra Club Legal Defense Fund (SCLDF petition), on January 12, 1995, Alaska solicited comments on five portions of the newly adopted December 1994 WQS. At the same time, Alaska conducted a public review of proposed revisions to the antidegradation policy in the WQS regulations. As a result of the public review of the five petition issues and the antidegradation policy, several changes were made to these earlier December 1994 WQS and are reflected in the WQS adopted in February 1996. We have conducted our review of both WQS packages together, using the most recent adopted version where it replaces an earlier provision.

EPA approval of Alaska WQS is considered a Federal action and EPA must comply with the Section 7 consultation requirements of the Endangered Species Act (ESA). Section 7 states that "all federal agencies shall utilize their authorities on furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species" and "each federal agency shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species." EPA has initiated discussions with the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) about the need for informal or formal consultation on EPA's approval action. Our efforts will include identification of any potential effects to endangered or threatened species from the new and revised WQS regulations. Completion of the consultation process is a high priority for EPA Region 10.

EPA has reviewed the new and revised elements of the December 1994 WQS regulations, as amended by the February 1996 WQS regulations pursuant to Section 303(c) of the Clean Water Act and the implementing regulations at 40 CFR Part 131. This letter constitutes our formal notification of the results of this review.

EPA approves all of the new and revised elements in Alaska's 1994 WQS as amended in 1996, subject to successful conclusion of ESA consultation, with the exception of the 3Q2 design flow for conventional and nontoxic substances. EPA disapproves Alaska's 3Q2 design flow mixing zones for conventional and non-toxic substances. A more detailed discussion of the basis for our approval and disapproval is enclosed.

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EPA's regulations require States and Tribes to adopt criteria based on EPA's criteria, EPA's criteria modified to reflect local conditions, or criteria established using scientifically defensible methods. Design flows for ambient water quality criteria (AWQC) are an integral component of criteria. Criteria are deemed to be protective based on certain duration and frequency assumptions. EPA's criteria rely on a 1B3 or 1Q10 for protection of aquatic life from acute effects and a 4B3 or 7Q10 for protection of aquatic life from chronic effects. Because a 3Q2 appears to be less protective than EPA's criteria, Alaska is required to submit an analysis demonstrating that a 3Q2 is sufficient to protect aquatic life in Alaska. EPA cannot approve a 3Q2 for conventional and non-toxic substances without a scientifically defensible analysis.

Alaska has 90 days to correct this deficiency to avoid a federal promulgation as required by section 303(c) of the Clean Water Act. One way Alaska could correct the deficiency is to provide EPA with a scientifically defensible analysis demonstrating that a 3Q2 is sufficient to protect aquatic life in Alaska. Suggestions for an approach are included in the enclosure. Alternatively, Alaska could modify the mixing zone regulations in Chapter 70 which specify design flows to be consistent with EPA's criteria.

One further point, as part of a triennial review package States are supposed to re-examine any water body that does not include the uses specified in section 101(a)(2) of the Clean Water Act (CWA) (40 CFR 131.6). This section establishes an interim water quality goal which provides for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the water (fishable/swimmable uses). The Alaska WQS regulations at 18 AAC 70.050(b) contain a number of waterbodies that do not have fishable/swimmable designated uses. Alaska initially performed use attainability analyses, consistent with 40 CFR 131.10(j), to determine appropriate designated uses for these waterbodies. 40 CFR § 131.20 indicates that any waterbody segment that does not include fishable/swimmable uses should be re-examined every three years to determine if new information is available indicating that fishable/swimmable uses are now attainable. This is a reminder that Alaska needs to confirm whether any new information exists that would necessitate a reexamination of the less than fishable/swimmable uses found in 18 AAC 70.050(b). This confirmation is needed, because without it Region 10 may consider a recommendation to the EPA Administrator to propose fishable/swimmable uses.

The review and revision of WQS is an iterative process depending on the foundation that has been laid during the previous triennial reviews. Based on our review of the 1994 and 1996 WQS regulations, EPA has identified a number of areas to be addressed during the next triennial review cycle. These areas for future refinement are discussed in more detail in the attached comments. The following paragraphs summarize the subject areas that EPA believes are important for Alaska to consider during the next triennial review cycle.

Alaska needs to identify implementation procedures for its antidegradation and mixing zone policies. This is particularly important for State issued permits and NPDES permits issued by EPA. In order for EPA to successfully implement the intent of Alaska's WQS, and to avoid confusion during the § 401 certification process, EPA needs additional clarification as to how Alaska intends to implement these State policies. Implementation procedures do not have to be adopted in regulation, they can be adequately addressed in State policy or guidance.

Alaska has added new narrative criteria for toxic substances to the 1994 and 1996 WQS regulations. Alaska needs to adopt or identify procedures for implementing the new and previously

adopted narrative criteria. The WQS Handbook contains general guidance for narrative criteria implementation procedures.

EPA applauds Alaska for addressing the potentially unique needs of threatened and endangered species in the State's mixing zone policy. However, EPA strongly encourages Alaska to adopt similar considerations for threatened and endangered species in the State's antidegradation policy. In particular, the presence of threatened and endangered species should be considered when determining whether or not to lower water quality.

EPA is initiating a national program to protect public health at our nation's beaches. EPA recently sent a letter to Alaska expressing concern with public health risks posed by contaminated bathing beaches. EPA strongly encourages Alaska to move to adopt EPA's 1986 updated bacteriological ambient water quality criteria during the next triennial review period.

Alaska should also consider more refined, biologically-based, aquatic life uses in future revisions. More precisely defined uses allow WQS to be implemented more effectively on a watershed basis, and provide a stronger scientific basis on which to select the most appropriate criteria.

A detailed summary of the rationale for our approval and disapproval is enclosed. If you have any questions concerning this letter and enclosure please contact me at (206) 553-0422 or have your staff contact Sally Brough, Water Quality Standards Coordinator, at (206) 553-1295.

Sincerely,



Philip G. Millam
Director
Office of Water

Enclosures

cc: Mike Conway, ADEC
Susan Braley, ADEC
Teresa Woods, FWS
Brad Smith, NMFS

DETAILED DISCUSSION OF APPROVAL & DISAPPROVAL ISSUES

18 AAC 70.010 - General

EPA approves the wording changes found in the February 1996 version of 18 AAC 70.010(b) and (f). Section (b) has added references to the revised antidegradation policy and the new whole effluent toxicity limit provision. The changes in this section clarify how these provisions will be applied. The basis for our approval of these new and/or revised provisions are found in the following pages.

18 AAC 70.010(f) contains an exemption from WQS for treatment works and a definition for treatment works has been added at 18 AAC 70.990(55). The February 1996 WQS repealed major portions of the December 1994 WQS treatment works exemption. As a result, the exemption now applies only within the boundaries of treatment works authorized by the Department. Such treatment works, defined at 18 AAC 70.990(55), are excluded from the definition of waters of the United States at 40 CFR 122.2. EPA approves the treatment works provision found at 18 AAC 70.010(f) and the treatment works definition found at 18 AAC 70.990(55) in the February 1996 WQS.

18 AAC 70.011 - Antidegradation Policy

EPA's regulations require states to adopt an antidegradation policy consistent with 40 CFR § 131.12. The December 1994 WQS regulations did not contain a provision for Tier 1 waters [40 CFR 131.12(a)(1)] or Tier 3 - outstanding national resource waters [40 CFR 131.12(a)(3)]. The 1994 WQS regulations did contain a process for lowering water quality for high quality, tier 2, waterbodies but it was inconsistent with 40 CFR 131.12(a)(2). The 1996 WQS regulations have added Tier 1, Tier 3, additional provisions for lowering the water quality in tier 2 waters, and definitions for existing use and highest statutory and regulatory treatment requirements. EPA approves all new and revised regulatory language found in the February 1996 version of 18 AAC 70.011(a)(1), (a)(2), (a)(3), and (a)(4); 18 AAC 70.011(b) and (c); 18 AAC 70.015(a); and 18 AAC 70.990(20) and (25). Definition 18 AAC 70.990(20) has been adopted from 40 CFR 131.3 and definition 18 AAC 70.990(25) complies with the EPA interpretation of this phrase. With these revisions, the policy complies with the requirements of 40 CFR 131.12.

With the revisions EPA is approving, Alaska's antidegradation policy now meets the requirements of 40 CFR 131.12(a). Section 131.12(a) also requires States to identify implementation methods for their antidegradation policies. The reason for this is two-fold. First, such implementation methods encourage consistent application of the antidegradation policy and provide guidance to EPA where, as in Alaska, EPA issues NPDES permits. Second, by requiring States to identify implementation methods, section 131.12(a) deters States from adopting implementation methods which undercut or reinterpret the State's antidegradation policy so as to render it, in practice, inconsistent with the requirements of section 131.12(a). Were a State to do so, EPA has the authority to promulgate a federal antidegradation policy for waters in the State with sufficient detail to supersede the State's policy as implemented by the State.

Alaska has not yet adopted implementation methods for its revised antidegradation policy. EPA expects Alaska to do so during the next triennial review. In the meanwhile, EPA will, as needed, follow the antidegradation guidance in its 1993 WQS Handbook (Second Edition, 1993) in interpreting Alaska's antidegradation policy, and recommends that Alaska do the same.

As Alaska begins to work on antidegradation implementation methods we would like to reiterate EPA's position on existing use protection requirements. In EPA guidance, Questions and Answers on Antidegradation, August, 1985 (50 FR 34546) question 7 asks about the proper interpretation of the term "an existing use". The answer to question 7 states:

An existing use can be established by demonstrating that fishing, swimming, or other uses have actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur (unless there are physical problems which prevent the use regardless of water quality). An example of the latter is an area where shellfish are propagating and surviving in a biologically suitable habitat and are available and suitable for harvesting. Such facts clearly establish that shellfish harvesting is an "existing" use, not one dependent on improvements in water quality.

In other words, establishing an existing use (past or present) is not dependent solely upon a demonstration that the use is being satisfied in a functional sense. As illustrated in this example, the existing use question should address both the functional use and the water quality. The intent of the regulation is to ensure the existing use and water quality necessary to support that use are maintained and protected.

18 AAC 70.020 - Protected Water Use Classes; Water Quality Criteria; and Water Quality Standards Table

At 18 AAC 70.020(b), minor wording changes have been incorporated to reflect the ability of the State to develop site-specific criteria. Revised 18 AAC 70.020(b) clarifies that water quality criteria apply except "as modified" under the site-specific criteria provision and the thermal discharge provision. Throughout 18 AAC 70.020(b)(1) and (2) WQS Table, the wording has been changed from "shall not" to "may not" to reflect the ability of the State to approve site-specific criteria (18 AAC 70.025 and 18 AAC 70.034). EPA approves these clarifications. EPA previously approved 18 AAC 70.025 and 18 AAC 70.034; 18 AAC 70.025 has been revised and the basis for our approval of the revision is found below.

Fecal Coliform Bacteria

Alaska revised its freshwater and marine contact recreation fecal coliform criteria from a 20 FC/100 ml (in the 1989 WQS) to 100 FC/100 ml in the 1994 and 1996 WQS. While less stringent than the 1989 WQS, the 100 FC/100 ml criterion is still more stringent than the fecal coliform criteria recommendation of 200 FC/100 ml recommended by EPA in its section 304(a)(1) bacteriological criteria documents prior to 1986.

Historically, fecal coliform bacteria were used as an indicator species for bacteria likely to cause gastroenteritis in humans. In 1986, EPA issued a revised bacteriological criteria document which recommended use of Escherichia coli and enterococci as indicator species for swimming uses, because statistics showed they better correlated with gastroenteritis rates from contact recreation (51 FR 8012 March 7, 1986). EPA's 1986 recommendation provided the same level of protection for contact recreation as intended by the previous fecal coliform criteria. EPA's Federal Register (FR) notice announcing the availability of the new bacteriological criteria document stated that, "EPA expects a gradual transition from the fecal coliform criteria to the new indicator bacteria by the States." (51 FR 8013)

Alaska's response to public comments, submitted to EPA as part of the review package for the Dec. 1994 WQS, states that it "will consider such criteria in the next Triennial Review." Given the stringency of the revised fecal coliform criteria and EPA's expectation that there could be a gradual transition, balanced against the length of time that has elapsed since issuance of the revised 304(a) criteria document, EPA approves Alaska's revised criteria, with the EPA recommendation that Alaska should adopt the more precise E. coli/enterococci indicators during its next triennial review.

EPA recently sent a letter to Alaska expressing agency concern with public health risks posed by contaminated bathing beaches (see enclosed letter from Robert Perciasepe to Michele Brown). EPA is initiating a national program to protect public health at our nation's beaches and a cornerstone of that effort is State adoption of EPA's 1986 updated bacteriological ambient water quality criteria.

Settleable Solids/Sediment

Alaska WQS have previously established "sediment" as a pollution category. The 1996 WQS revisions to this category deal with settleable solids, a component of sediment. The corresponding EPA guidance for sediment and settleable solids is found under the heading Solids (Suspended, Settleable) and Turbidity. EPA addresses the issue by defining several fractions. Alaska's revisions to this pollutant category only address one of the fractions but the Alaska regulations in total are equally protective as Federal criteria.

EPA criteria for Solids (Suspended, Settleable) and Turbidity do not specify a single analytical methodology for measuring the inorganic and organic particulate matter found and transported in the aquatic environment. The EPA criterion for this pollutant category references several definitions and methods; total suspended matter (suspended solids), settleable matter (settleable solids), fixed suspended matter (fixed suspended solids), and volatile suspended matter (volatile solids) found in the 1971 *Standard Methods for the Examination of Water and Wastewater*. The Federal criterion for "solids (suspended, settleable) and turbidity" states that for the protection of freshwater fish and other aquatic life "settleable and suspended solids should not reduce the depth of the compensation point for photosynthetic activity by more than 10 percent from the seasonally established norm for aquatic life."

Freshwater Uses

The 1989 Alaska WQS for this pollutant category for freshwater (FW) uses (water supply, (i) drinking culinary and food processing, and contact recreation) stated "no increase in concentration of sediment, including settleable solids, above natural conditions. (See Note 15)" Note 15 described, in detail, the volumetric Imhoff cone method for measuring settleable solids. Now the Alaska standard for these two FW use categories states, "no measurable increase in concentration of settleable solids above natural condition as measured by the volumetric Imhoff cone method (see note 15)." In the 1996 WQS the word "measurable" has been added before increase, sediment has been dropped, the reference to the Imhoff cone method has been added to the narrative statement, Note 15 remains the same, and a definition for settleable solids has been added to the definition section. The definition specifies that "solid material of organic or mineral origin that is transported or deposited from water" should be measured by the Imhoff cone method, method 2540(B) in *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992). The sediment standard for the FW uses described above has always specified the volumetric Imhoff cone method which measures settleable solids. Although the term "sediment" has been removed in the 1996 WQS, it makes no substantive difference because the method to measure settleable solids was previously specified for these use

categories. Therefore, the only change to the FW uses in this pollutant category is the new definition which now specifies the laboratory method.

Marine Uses

The 1989 Alaska WQS for this pollutant category for marine uses (contact recreation and growth and propagation of fish) stated "no measurable increase in concentration above natural conditions". Unlike the FW sediment standard, the marine narrative criterion did not reference Note 15 and Note 15 did not specify to which use categories the Imhoff cone method should apply. In other words, the 1989 Alaska WQS marine standard for sediment did not specify settleable solids or the Imhoff cone method.

In the 1996 WQS, Alaska has changed the marine criteria for sediment by adding two phrases ("of settleable solids" and "as measured by the Imhoff cone method") and adding a new definition for settleable solids that specifies the method to be used to measure settleable solids. These revisions apply to the following marine use categories: contact recreation - 18 AAC 70.020(b)(2)(B)(i) and growth and propagation of fish, shellfish, other aquatic life, and wildlife - 18 AAC 70.020(b)(2)(C). The sediment criteria for the other freshwater and marine use categories have been previously approved.

The State's new definition of settleable solids now includes only settleable solids and excludes suspended sediment or nonsettleable solids. However, there are a number of other provisions within the Alaska WQS regulations and National Pollutant Discharge Elimination System (NPDES) permitting requirements that deal with suspended sediment. These revisions in combination with the following provisions found elsewhere in the Alaska 1996 WQS provide adequate protection of all uses with regard to sediment. Guidance in the WQS Handbook acknowledges that a combination of independent approaches may be required to support designated uses (p. 3-24). For the following reasons, we find the Alaska revisions to this pollution category to be equally stringent to the Federal criteria.

The volumetric Imhoff cone method is an EPA approved method for the analysis of "settleable residue" (EPA-600/4-79-020, 160.5-1).

Settleable solids will be limited by the new definition for natural condition which prohibits any increases in settleable solids loading from human sources or causes.

Alaska has separate marine turbidity criteria that measure suspended sediment that are as stringent as Federal criteria. EPA has previously approved the turbidity criteria and determined that they are protective of designated uses. For the marine growth and propagation use category, Alaska has adopted the Federal criterion for solids (suspended, settleable) and turbidity (described above).

All waters are designated for all uses and the most stringent water quality criteria for all the included use classes will apply [18 AAC 70.030(1)]. For example, the marine turbidity criterion for water supply-aquaculture states that turbidity "may not exceed 25 nephelometric turbidity units (NTU)". The marine turbidity criterion for growth and propagation may not reduce the depth of the photosynthetic compensation point by 10 percent. On a site-specific basis, the most stringent of the two, would apply in marine waters.

EPA and Alaska, if it assumes primacy of the NPDES program, have an independent regulatory responsibility to include Total Suspended Solids (TSS) in NPDES permits for those industrial categories where TSS is an effluent guideline/limit. TSS measures all solids that do not pass through a 0.0015 mm standard glass fiber filter. The pore size in this filter would remove a major proportion of the suspended solids as well as settleable solids:

EPA approves the revisions found in the marine use categories 18 AAC 70.020(b)(2)(B)(i) and 18 AAC 70.020(b)(2)(C) for this pollutant category. EPA approves the definition at 18 AAC 70.990(45) for this pollutant category. It includes a narrative description and the EPA approved laboratory method to be used to measure this parameter (EPA-600/4-79-020, 160.5-1). These revisions comply with the requirements of 40 CFR § 131.11.

Toxics and Other Deleterious Organic and Inorganic Substances

Under the "Toxics and Other Deleterious Organic and Inorganic Substances" pollutant category, the 1994 and 1996 WQS contain four changes. One revision applies to the freshwater (FW) water supply (i) drinking, culinary, and food processing use category [18 AAC 70.020 (b)(1)(A)(i)]. The other three revisions apply to the FW aquaculture [18 AAC 70.020 (b)(1)(A)(iii)], FW growth and propagation [18 AAC 70.020 (b)(1)(C)], marine aquaculture [18 AAC 70.020 (b)(2)(A)], marine growth and propagation [18 AAC 70.020 (b)(2)(C)], and marine harvesting and consumption [18 AAC 70.020 (b)(2)(D)] uses..

FW - water supply; drinking, culinary, and food processing [18 AAC 70.020 (b)(1)(A)(i)] use

Alaska revised this use category to clarify those instances when criteria based on standards from the Safe Drinking Water Act [drinking water standards (DWS)] should be used as the applicable criteria rather than the criteria included in EPA *Quality Criteria for Water* (water quality criteria) to protect this use category. The 1989 Alaska WQS applied both water quality criteria and DWS to this use category. The revised 1996 WQS clarify that when both a DWS and water quality criteria exist for a particular toxic substance, DWS should be used as the applicable criteria for this use category. This revision complies with EPA guidance found at 45 FR 79356 that indicates that DWS are appropriate for protection of human health from exposure to toxic substances from ingestion of contaminated drinking water. DWS are derived to protect human health from consumption of toxicants found in finished (at-the-tap) drinking water. Alaska has adopted EPA DWS and applies them to ambient surface water. The use of DWS instead of water quality criteria, also complies with guidance found in the WQS Handbook that indicates that States have the option of applying DWS, human health water quality criteria, modified human health criteria, or controls more stringent than these three to protect against the effects of ingesting contaminated drinking water (p.3-12).

When no DWS exist, Alaska has chosen to apply EPA water quality criteria. Water quality criteria include acute and chronic aquatic life criteria as well as human health criteria. The human health criteria provide pollutant concentrations protective of human health and include fish bioaccumulation and consumption factors in addition to direct human drinking water intake (WQS Handbook p.3-12). Alaska has previously adopted EPA water quality criteria, by reference, and EPA has promulgated, for Alaska, water quality criteria for priority pollutants where gaps existed in Alaska's coverage for toxic substances [40 CFR 131.36(d)(12)]. Using water quality criteria where there are no DWS complies with guidance found in the WQS Handbook on page 3-12 discussed above. EPA approves the revisions to this use category. These revision comply with 40 CFR 131.11(a)(1).

FW aquaculture [18 AAC 70.020 (b)(1)(A)(iii)], FW growth and propagation [18 AAC 70.020 (b)(1)(C)], marine aquaculture [18 AAC 70.020 (b)(2)(A)], marine growth and propagation [18 AAC 70.020 (b)(2)(C)], and marine harvesting and consumption [18 AAC 70.020 (b)(2)(D)] uses

The first revision to these use categories clarifies when to use drinking water standards (DWS) as criteria and when to use EPA *Quality Criteria for Water* (water quality criteria). In the 1989 Alaska WQS, water quality criteria and DWS were applied on the basis of "whichever is less" (more stringent). In the 1994 and 1996 WQS, the revision establishes that when both a DWS and water quality criteria exist for a particular toxic substance, the EPA CWA water quality criteria will be used, instead of the DWS, in these use categories.

Both aquatic life and human health criteria are relevant to these uses. The following paragraphs lay out the basis for our approval of this first revision for each criteria type.

Alaska has previously adopted EPA aquatic life criteria, by reference, and EPA has promulgated, for Alaska, water quality criteria for priority pollutants where gaps existed in Alaska's coverage for toxic substances 40 CFR 131.36(d)(12). The WQS Handbook clearly states that section 304(a)(1) criteria for aquatic life should be used to support these designated uses (p.3-11). This revision complies with 40 CFR 131.11(b)(1)(i).

The human health criteria are protective of human health because they incorporate fish bioaccumulation, fish consumption factors, and direct intake of drinking water into the calculations to derive these criteria (WQS Handbook p.3-12). Human health water quality criteria would apply to the freshwater and marine aquaculture uses and the marine harvesting for consumption of raw mollusks or other raw aquatic life use since these uses involve human consumption of aquatic life. However, EPA's policy is to apply human health criteria to all waters designated for aquatic life (57 FR 60860), therefore, human health criteria would also apply to the FW and marine growth and propagation of fish, shellfish, other aquatic life, and wildlife uses. Alaska has previously adopted EPA water quality criteria, by reference, and EPA has promulgated, for Alaska, water quality criteria for priority pollutants where gaps existed in Alaska's coverage for toxic substances. EPA aquatic life and human health criteria will protect these uses. This revision is consistent with 40 CFR 131.11(b)(1)(i).

Finally, when no water quality criteria exist the State has chosen to apply DWS as criteria. This will protect those who drink the water and it complies with the flexibility given to States to apply DWS or human health water quality criteria to protect against the effects of contaminants by ingestion from drinking water (WQS Handbook p.3-12).

EPA approves the first revision to these use categories. This revision complies with 40 CFR 131.11(a)(1) and 40 CFR 131.11(b)(1)(i). EPA is approving this revision because, as discussed above, the particular water quality criteria in effect in Alaska are scientifically based and protective of the use whether or not they are more stringent than DWS.

The second revision applicable to these use categories is a new provision that allows Alaska to develop acute and chronic aquatic life criteria, in regulation, for sensitive resident Alaskan species. This revision provides the State a mechanism to revise toxics criteria based on the sensitivity of resident Alaskan species. This revision is in accordance with 40 CFR 131.11(b)(iii). Any new Alaska specific toxic criteria must be submitted to EPA for review and approval or disapproval in accordance with 40 CFR 131.20 and 131.21.

The third revision applicable to these use categories involves new wording for a narrative criterion for toxic substances. Such narrative criteria are statements that describe the desired water quality goal. As stated in the WQS Handbook (p. 3-24), narrative criteria can supplement numeric criteria for toxicants or they can be the basis for establishing controls when the State has not adopted chemical-specific numeric criteria. EPA considers narrative criteria for toxic substances to apply to all designated uses at all flows and are necessary to meet the statutory requirements of section 303(c)(2)(A) of the CWA.

Specifically, the narrative criterion language in the 1989 Alaska WQS regulations focused on undesirable odor or taste to fish. The 1996 Alaska WQS now include the phrase "no concentration of toxic substances in water or in shoreline or bottom sediments, that, singly or in combination, cause or reasonably can be expected to cause toxic effects on aquatic life, except as authorized in this chapter". This new narrative criterion addresses: the water column, sediment, and the shoreline; cumulative effects of more than one toxic substance; and potential toxic effects, not just demonstrated toxic effects. Compared to the 1989 narrative criterion, this revision provides a clear goal statement and provides additional protection to aquatic resources from exposure to toxic substances. This revision complies with section 303(c)(2)(A) of the CWA, the guidance in the WQS Handbook, and the requirement at 40 CFR 131.11(a)(2), and 40 CFR 131.11(b)(2). EPA approves this third revision applicable to these use categories.

Color

Alaska has adopted new numeric color criteria for the following freshwater use categories: FW drinking water - 18 AAC 70.020(b)(1)(A)(i), FW aquaculture - 18 AAC 70.020(b)(1)(A)(iii), FW growth and propagation - 18 AAC 70.020(b)(1)(C), marine aquaculture - 18 AAC 70.020(b)(2)(A)(i), marine seafood processing - 18 AAC 70.020(b)(2)(A)(ii) and marine growth and propagation - 18 AAC 70.020(b)(2)(C). The 1996 WQS for color are a combination of numeric and narrative criteria. The numeric revisions to the color criteria for these uses are no less stringent than Federal criteria.

The narrative revisions to the color criterion for the use categories identified above adds the phrase "or the natural condition whichever is greater". This phrase could result in an adjustment to the numeric criterion (15 color units) based on the natural condition. While natural conditions may not automatically be protective of the uses in question, such protection can be assured by using the site-specific criteria provisions of 18 AAC 70.025(b) before substituting natural conditions for the numeric criterion. Read together, these provisions meet the requirements of 40 CFR 131.11(a)(1) and 131.11(b)(2).

These revised criteria meet the requirements of section 40 CFR 131.11(a)(1) and 131.11(b)(2) and are approved.

Petroleum Hydrocarbons, Oil and Grease

Applicable Federal Criteria

Oil and grease is a measure of biodegradable animal greases and vegetable oils, along with the relative non-biodegradable mineral oils. Petroleum hydrocarbons is the measure of only the mineral oils. They are a subset of oil and grease and represent a large family of compounds that include straight and branched-chain hydrocarbons, monoaromatic hydrocarbons (single carbon-ring molecules), and polynuclear aromatic hydrocarbons (PAH) (multiple carbon-ring molecules).

Exhibit 17

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EPA has narrative criteria for oil and grease for domestic water supply and aquatic life. For protection of aquatic life, EPA has a narrative criterion for each of the following; the water column, sediments, and surface waters. The narrative water column criterion is based on a bioassay procedure. The sediment narrative criterion states that levels of oils or petrochemicals in the sediment which cause deleterious effects should not be allowed. Surface waters should be virtually free from floating nonpetroleum oils as well as petroleum derived oils.

EPA has not developed aquatic life or human health criteria for petroleum hydrocarbons as a class. EPA's regulations at 40 CFR 131.11(b) require States to adopt criteria based on: EPA's § 304(a) criteria, § 304(a) criteria modified to reflect site-specific conditions, or other scientifically defensible methods. For petroleum hydrocarbons, Alaska's revised standards are scientifically defensible in accordance with [40 CFR 131.11(b)(1)(iii)] as detailed below.

EPA included 20 individual aromatic hydrocarbon compounds (3 monoaromatic compounds and 17 PAHs) in the 1992 National Toxics Rule (NTR). EPA promulgated human health criteria for 14 of the 20 individual aromatic hydrocarbon compounds. Eight of the individual aromatic hydrocarbons compounds are carcinogenic and EPA promulgated human health criteria for Alaska for these eight carcinogens (57 FR 60922). EPA's policy is to apply human health criteria to all waters designated for aquatic life (57 FR 60860). Therefore, the human health criteria for aromatic hydrocarbons apply to freshwater and marine growth and propagation of fish, shellfish, other aquatic life, and wildlife uses in order to protect humans who might consume aquatic life. In general, for organic compounds, human health criteria tend to be more stringent than the corresponding aquatic life criteria and they would therefore be protective of Alaska's freshwater and marine uses.

1989 Alaska WQS for Petroleum Hydrocarbons

To protect the water column, Alaska's 1989 WQS contained numeric criteria for total hydrocarbons (TH) and total aromatic hydrocarbons (TAH) plus a procedural mechanism (bioassay procedure) to establish numeric criteria for aquatic life based on the sensitivity of resident Alaskan species. The 1989 WQS contained narrative criteria for the protection of aquatic life exposed to oil and grease and petroleum hydrocarbons in sediment and surface waters. These narrative criteria comply with the Federal criteria for this pollution category. The numeric and narrative criteria applied to the freshwater and marine growth and propagation of aquatic life use categories. Notes 8, 9, and 10 provided clarification about bioassay procedures. Definitions for TAH and TH were included. The TH definition specified the laboratory method to be used for measurement of TH and the sampling procedure for gathering a sample.

1996 Alaska WQS for Petroleum Hydrocarbons

Several provisions in the 1989 petroleum hydrocarbon standard have not changed in the 1994 and 1996 WQS. The unchanged portions include the numeric criteria, the fact that the numeric criteria apply to the water column, the narrative criteria for sediment and the surface of waterbodies, and the sampling procedure (sample must be taken below any observable sheen).

Alaska's Public Review Packet for the SCLDF petition indicates that Alaska has done studies to determine which fractions of petroleum hydrocarbons are the most toxic. Alaska also compared different methods of measurement to determine which analytical methods are best for quantifying the most toxic fractions of petroleum hydrocarbons and which methods are most sensitive for detecting petroleum hydrocarbons. The 1996 WQS regulate and measure the collective toxicity of several

individual hydrocarbon fractions found in the water column. (State of Alaska Public Review Packet, Proposed Revisions to the Antidegradation Policy in the WQS Regulations 18 AAC 70 and Request for Public Comment on the Petition by the Sierra Club Legal Defense Fund to Repeal Certain Sections of the Current WQS Regulations, February 1995)

As a result of these studies, the 1994 and 1996 Alaska WQS include several revisions to this pollutant category. The revisions include; 1) elimination of the bioassay procedure to establish numeric criteria for aquatic life based on the sensitivity of resident Alaskan species, 2) revisions to Note 8 that change the analytical methods to be used to test for petroleum hydrocarbons, 3) a new definition for TAH, 4) elimination of the TH standard, 5) adoption of the total aqueous hydrocarbon (TAQH) standard, and 6) application of the growth and propagation standard to additional use categories.

The first revision in 1994 and 1996 WQS eliminates the option to use the bioassay procedure (0.01 of the 96-hour LC_{50}) to establish numeric criteria for sensitive or biologically important species. (Old Notes 8, 9, and 10 have also been repealed as unnecessary since they provided additional information about the bioassay procedure that has been eliminated.) Because of the difficulty of implementing the bioassay procedure, EPA commented in Nov. 1992 on proposed changes to the Alaska WQS, and supported this action, indicating that it would be appropriate for the State to move away from the bioassay procedure to the no observable effects concentration (NOEC) in order to limit whole effluent toxicity. The NOEC approach is included in the newly adopted WET provision at 18 AAC 70.023. Elimination of the 1989 WQS bioassay procedure from this pollutant category is approvable because the "Toxics" narrative criterion at 18 AAC 70.020 and the WET provision at 18 AAC 70.023 can be used to provide the same protection. (See the discussions of these provisions.)

The second revision is a new Note 8 which specifies new analytical methods for measuring TAH and TAQH. The only method that was specified in the 1989 WQS was method 503(B) for TH which is an infra-red (IR) method that had a detection limit higher than the numeric criteria (EPA-600/4-79-020, p. 413.2-1). It is being replaced by EPA-approved methods 602 and 610 which use gas chromatography (GC). GC is a more sensitive detection method than IR and methods 602 and 610 can measure aromatic hydrocarbon concentrations lower than the numeric criteria of 10 ug/l for TAH and 15 ug/l for TAQH (40 CFR Part 136, App. A Method 602 Table 1 and Method 610 Table 1). A method detection limit that is lower than the numeric criteria is important for compliance monitoring and the assessment of ambient water quality. Unlike method 503(B), methods 602 and 610 also identify target compounds to be measured (40 CFR Part 136, App. A Method 602 1.1 and Method 610 1.1). Note 8 indicates that alternative methods can be used with Department approval. EPA endorses the concept of modifications to methods as long as the results obtained are no less precise and accurate than the results obtained using the unmodified method (EPA 821-B-93-001, p.10). We strongly encourage Alaska to use its own guidelines for preparing quality assurance project plans for sampling and testing for petroleum hydrocarbons. Adoption of these methods and summing the results are approvable.

The third revision is a new definition for TAH. The 10 ug/l criterion for TAH has not changed. The new 1996 definition limits TAH to "the sum of: benzene, ethylbenzene, toluene, and the xylene isomers (BETX)". Note 8 specifies that BETX or TAH is measured by EPA-approved method 602. BETX are among the most water soluble of the aromatic hydrocarbons and therefore, the most likely to be present in the water column. The definition for TAH at 18 AAC 70.990(52) is a narrative description of the aromatic hydrocarbons that are measured by method 602 (Note 8). Since the numeric criterion applies to the water column, the new definition [18 AAC 70.990(52)] and the

use of method 602 are approvable. Additionally, EPA acknowledged, by promulgating human health criteria in the NTR, that benzene, ethylbenzene, and toluene are aromatic hydrocarbons of concern [40 CFR 131.36(b)(19), (33) and (39)].

The fourth revision to the 1996 WQS is the elimination of the TH definition. TH was defined as those compounds measured, using method 503(B). Analytical method 503(B) (which is equivalent to EPA method 413.2) uses a chlorofluorocarbon (CFC) solvent for the extraction process. EPA has two methods for measuring total recoverable oil and grease (methods 413.1 and 413.2) and one method (418.1) for measuring total recoverable petroleum hydrocarbons. All three use the same CFC solvent and they will not be available or acceptable by the end of 1997 due to the international ban on CFCs (61 FR 1737 and 60 FR 24970). Method 503(B) had a detection level of 200 ug/l (EPA-600/4-79-020) which is higher than the 15 ug/l criterion. No alternative method is currently available as a direct replacement of method 503(B) (61 FR 1730). Elimination of the definition for TH is approvable for the reasons described above.

The fifth revision is the adoption of the TAqH standard. The TH numeric criterion (15 ug/l) applies to TAqH. Note 8 specifies that the TAqH criterion of 15 ug/l is the sum of monoaromatic hydrocarbons measured by Method 602 (BETX) plus PAHs measured by method 610. Method 610 is EPA-approved and it measures the concentration of each of 16 individual PAH compounds (40 CFR Part 136, App. A Method 610 1.1). The detection limits of method 610 are adequate to detect each of the individual 16 PAHs at concentrations that are equal to their solubilities in water (40 CFR Part 136, App. Method 610 Table 1). The definition for TAqH at 18 AAC 70.990(51) is a narrative description of the aromatic hydrocarbons that are measured by methods 602 and 610 (Note 8). Since the numeric criterion (15 ug/l) applies to the water column and TAqH represents the sum of relatively water soluble aromatic hydrocarbons, the new definition [18 AAC 70.990(51)] and the sum of methods 610 and 602 are approvable. The 16 PAHs that are measured by method 610 are among the 20 aromatic hydrocarbons that EPA included in the 1992 NTR.

The sixth revision, in the 1996 WQS, extends the combination of numeric and narrative criteria found in the growth and propagation use category to the freshwater and marine aquaculture uses. The previous standard for these aquaculture uses was based on continuous flow or static flow bioassay procedures. Application of the revised growth and propagation standard is appropriate for the cultivation of aquatic species for human consumption [18 AAC 70.990(4)] because it adds additional protection to aquatic life exposed to petroleum hydrocarbons in the sediment and surface waters not just the water column. Additionally, the revised standard now measures the concentrations of 19 (16 PAHs plus benzene, ethylbenzene, and toluene) out of 20 aromatic hydrocarbons that EPA included in the 1992 NTR. EPA has established human health criteria for the majority of these aromatic hydrocarbons and these criteria protect human health because they incorporate fish bioaccumulation, fish consumption factors, and the direct intake of drinking water into the calculations for each criterion. This revision is in accordance with 40 CFR 131.11(a)(1) which directs States to adopt criteria to protect designated uses.

Methods 602 and 610 measure specific "relatively water soluble" aromatic hydrocarbons. These methods do not measure other aromatic hydrocarbons; the straight chain and branched chain (aliphatic) petroleum hydrocarbons; or the "nonaqueous" petroleum hydrocarbons. Nonaqueous petroleum hydrocarbons include heavier (longer chains, more carbon rings) hydrocarbons that are less water soluble and are more likely to attach to particulates and settle out in the sediment or get caught in the thin layer (microlayer) at the surface. Several narrative criteria can be used to regulate the "nonaqueous" petroleum hydrocarbons. Several narrative criteria and the newly adopted whole

effluent toxicity (WET) limit can be used to regulate aromatic and aliphatic hydrocarbons, in the water column, that are not measured by methods 602 and 610.

WET is a useful parameter for assessing and protecting against impacts upon water quality and designated uses caused by the aggregate toxic effect of the discharge of pollutants [Technical Support Document for Water Quality-based Toxics Control (TSD) p. 4]. Since Alaska is one of the few States to formally adopt a numeric whole effluent toxicity limit (Regions 9 and 10 Guidance for implementing Whole Effluent Toxicity Testing Programs, May 1996, p. 2-11), WET testing could be used to measure the toxicity of an effluent that has hydrocarbons not measured by methods 602 and 610 and other toxic pollutants.

As stated in the WQS Handbook (p. 3-24), narrative criteria can supplement numeric criteria for toxicants or they can be the basis for establishing controls when the State has not adopted chemical-specific numeric criteria. EPA guidance acknowledges that a combination of independent approaches may be required to support designated uses (WQS Handbook p. 3-24). Other provisions in the Alaska WQS can be applied to: nonaqueous petroleum hydrocarbons in the sediment, nonaqueous petroleum hydrocarbons in the microlayer, or petroleum hydrocarbons that are not measured by methods 602 and 610.

- 1) The new narrative criterion language found in 18 AAC 70.020 for Toxic and Deleterious Substances can be applied to aromatic hydrocarbons not measured by methods 602 and 610 and nonaqueous hydrocarbons in the sediment;
- 2) the two previously approved narrative criteria for growth and propagation in the Residues pollutant category can be applied to aromatic hydrocarbons not measured by methods 602 and 610 and nonaqueous hydrocarbons in the sediment and in the microlayer on the surface;
- 3) the previously approved narrative criteria for Petroleum Hydrocarbons that "prohibits a film, sheen or discoloration on the surface or floor of the waterbody or adjoining shorelines" can be applied to nonaqueous hydrocarbons and to petroleum hydrocarbons in the microlayer; and
- 4) the newly adopted chronic WET provision at 18 AAC 70.023 which measures the aggregate toxic effect any hydrocarbons (including non-aromatic hydrocarbons), whether or not they are they are detected by methods 602 or 610, as well as any other non-petroleum hydrocarbon toxic substance in an effluent.

The new revisions to the Alaska hydrocarbon criteria, in conjunction with several State narrative criteria, will protect all designated uses. These revisions comply with section 303(c)(2)(A) of the CWA, the guidance in the WQS Handbook, and the requirement at 40 CFR 131.11(a)(2). These revised criteria meet the requirements of Section 131.11(b)(iii). EPA approves revisions found at; 18 AAC 70.020(b)(1)(A)(iii) and (b)(1)(C) for freshwater uses; 18 AAC 70.020(b)(2)(A)(1) and (b)(2)(C) for marine uses; definitions at 18 AAC 70.990(51) and (52); and Note 8.

During the next triennial review, Alaska should adopt or identify procedures to implement the new and previously adopted narrative criteria. The WQS Handbook contains general guidance for narrative criteria implementation on page 3-25. In addition, Alaska should utilize standard sediment toxicity test methods (e.g., EPA/600/R-94/025 and EPA/600/R-94/024) and chemical-specific sediment quality guidelines to implement the State's narrative criteria for protecting bottom sediments. (e.g., Appendix D in EPA's Draft National Sediment Quality Survey. EPA-823-D-96-002).

develops procedures to implement the narrative criteria that supplement the hydrocarbon criteria, EPA will use the guidance in the WQS Handbook for our NPDES permitting actions.

In response to the SCLDF petition, Alaska prepared a report titled "An Evaluation of the Need for Alaska to Adopt a Particulate Hydrocarbon Criterion. This report concludes that the narrative criteria in the Toxic and Deleterious Substances, Residues, and Petroleum Hydrocarbons pollutant categories should be used to regulate particulate hydrocarbons; the State should adopt EPA final sediment quality criteria for acenaphthene, fluoranthene, and phenanthrene (when available from EPA); and specific guidelines for application of sediment criteria need to be developed. We concur with this statement and strongly encourage the State to pursue these activities during the next triennial review.

Acute Exposure Duration

EPA approves the addition of 18 AAC 70.020(d). This revision addresses the exposure duration for acute aquatic life criteria. EPA interprets this addition in light of the more specific provision at 18 AAC 70.032(f)(3)(B)(ii) which is further clarified in the State's policy for acute toxics criteria (letter dated December 19, 1996 from Alaska to EPA Region 10) which designates the 1Q10 as the design flow implementing the duration and frequency component of acute aquatic life criteria.

18 AAC 70.022 - Human Health Risk Level

Alaska has adopted a 10^{-5} risk level for human health criteria. This risk level is within the range of risk levels acceptable to EPA. EPA's policy for acceptable risk for carcinogens is found at 45 FR 79323 and 57 FR 60864. EPA approves the risk level adopted by the State in this new section.

EPA promulgated human health criteria for carcinogens for Alaska at 40 CFR 131.36(d)(12). If the State adopts human health criteria and they are approved by EPA, EPA will be able to remove the Federal promulgation applicable to Alaska for human health criteria. Until Alaska adopts human health criteria, the Federal criteria will continue to apply.

We encourage Alaska to adopt human health criteria during the next triennial review. The Federal promulgation was meant to be a stop-gap measure until Alaska could adopt criteria for carcinogens.

18 AAC 70.023 - Whole Effluent Toxicity (WET) Limit

The "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants" found at 49 FR 9016 introduced EPA's integrated toxics control program. This program consists of the application of both chemical-specific and biological methods to reduce toxic discharges. In support of this policy, EPA developed the *Technical Support Document for Water Quality Based Toxics Control* (TSD). The TSD provides guidance on water quality program implementation issues such as whole effluent toxicity (WET) testing requirements. WET is a useful parameter for assessing and protecting against impacts upon water quality and designated uses caused by the aggregate toxic effect of the discharge of pollutants (TSD p. 4). EPA regulations at 54 FR 23868 strengthened the requirements of 40 CFR 122.44(d) by requiring water quality-based permit limits for specific toxicants and WET where a permittee has been shown to cause, or has the reasonable potential to cause or contribute to an in-stream excursion of a criterion (WQS Handbook p. 3-26). Biologically based

effluent testing procedures are a necessary component of a State's toxics control program under section 303(c)(2)(B) and a principal means for implementing a State's narrative "free from toxics" standard (WQS Handbook p.3-23). EPA would like to clarify that where there is a reasonable potential determination, federal regulations require WET limits as well as WET testing to be included in an NPDES permit [40 CFR 122.44(d)(1)(iv)].

Alaska has adopted a chronic WET limit expressed as 1.0 chronic toxicity unit at the point of discharge or at the edge of a mixing zone, if a mixing zone is approved by the State. Alaska's WET limit complies with the recommendation in the TSD for chronic protection (p. 35) and satisfies the requirements of 49 FR 9016, 54 FR 23868, and 40 CFR 131.11. EPA approves this addition to the Alaska WQS in its entirety.

18 AAC 70.025 - Site-Specific Criteria

The State has added new language at 18 AAC 70.025(a) which clarifies that there are two processes which may be followed for developing site-specific criteria (SSC). The second revision to 18 AAC 70.025(a) states that a SSC may be developed if the criteria found in 18 AAC 70.020 are "more stringent or less stringent than necessary to ensure full protection of the corresponding use class" [18 AAC 70.025(a)(2)]. The third revision is the addition of a definition for natural condition at 18 AAC 70.990(34).

Alaska has adopted a new definitions that relates to site-specific criteria. EPA requested that Alaska develop a definition for natural condition in comments submitted on Nov. 13, 1992. Alaska has adopted a definition that represents an acceptable variation on the definition that EPA proposed. The definition [18 AAC 70.990(34)] will prohibit increases in pollutant loading from human sources or causes.

The major change to the SSC section is the addition of 18 AAC 70.025(b). This new section allows the State to issue a SSC based on natural conditions, without formally amending the State's WQS regulations, where the State finds that the SSC fully protects the designated use and public participation has been provided. Specifically, the State will "administratively authorize in a permit, certification, or approval" a natural-condition based SSC.

This revision, 18 AAC 70.025(b), provides Alaska with an alternative mechanism to develop natural condition-based SSC. It reflects the key CWA requirements that SSC protect designated uses [40 CFR 131.11(a)(1)] and that public participation occurs before any SSC are adopted [40 CFR 131.20(b)]. All SSC, including those established in accordance with 18 AAC 70.025(c) or any new natural condition-based SSC developed under 18 AAC 70.025(b), must be submitted to EPA for review and approval or disapproval in accordance with 40 CFR 131.20. Alaska's demonstration must meet the test of scientific defensibility [40 CFR 131.11(b)(1)(iii)].

18 AAC 70.025(b) does not require that Alaska's WQS regulation be subsequently amended to reflect the new natural condition-based SSC. Therefore, Alaska needs to develop a public record-keeping, docketing system, or other means of appending any new natural condition-based SSC to its standards. Public notification is warranted so that Alaska citizens will be able to determine if a criterion has been changed and what the revised criterion is for a particular waterbody.

EPA approves the revisions and additions to 18 AAC 70.025(a) and (b) and 18 AAC 70.990(34) of the Alaska WQS regulations in accordance with 40 CFR 131.11(b)(ii) which allows the establishment of criteria to reflect site-specific conditions. EPA will review for approval or disapproval all individual SSC that are established in accordance with the procedures specified in this section.

Implementation of the Alaska natural condition provision will raise some complex issues. The State needs to develop guidance to address the technical issues involved in developing scientifically defensible SSC based on natural condition. Such guidance must be specific enough to establish natural background concentrations accurately and provide results that are reproducible (e.g., address issues like reference conditions, source analysis). Guidance is needed to deal with a number of technical issues related to sampling; the definition of a "site", the minimum number of samples needed, and procedures for determining the "highest quality natural condition". Implementation guidance would be the basis for translating the narrative statement in 18 AAC 70.025(b) into numerical values.

Section 18 AAC 70.025(b) does not make it clear how or when the State will "administratively authorize in a permit, certification, or approval" a natural condition-based SSC. The regulation does not spell out the process the State intends to use to give the public or EPA notice of its final decision to administratively authorize a natural condition-based SSC. The regulation does not clarify the procedure by which the State will submit the final natural condition-based SSC to EPA for approval.

EPA will not consider a natural condition-based SSC administratively authorized until Alaska submits documentation that demonstrates that the procedures and requirements in 18 AAC 70.025(b) have been followed. Alaska must submit to EPA documentation to show: 1) the natural condition of a waterbody has been demonstrated to be of lower quality than a water quality criterion for the use classes in 18 AAC 70.020(b); 2) the natural condition will fully protect designated uses in 18 AAC 70.020(b); 3) exceedences of WQS can be attributed to natural conditions; 4) how the natural condition based criterion was established; and 5) that the public has had an opportunity to provide comments on the proposed natural condition-based SSC. Once a SSC is administratively authorized by the State, EPA must be officially notified of any final decision to authorize natural condition-based SSC in order to carry out approval/disapproval duties under CWA section 303(c)(3). EPA will review the data and rationale submitted with each natural condition SSC and will determine whether development of the criterion is scientifically defensible as required by 40 CFR 131.11(b)(1)(iii).

Additionally, when the natural condition regulation is implemented it will affect the NPDES program, which is administered by EPA, Region 10. NPDES effluent limits will be linked to the authorization of a natural condition-based SSC. Alaska needs to provide EPA with its draft documentation for the natural condition-based SSC in time for EPA to develop limits based on the natural condition-based SSC in the draft NPDES permit. At a minimum, Alaska should initiate the public notice process, in 18 AAC 70.025(b), concurrently with EPA public review of the NPDES draft permit. To provide a meaningful public review process, the State should present the documentation described above. EPA will not use a natural condition-based SSC in a final NPDES permit unless it has been officially administratively authorized and the procedure in 18 AAC 70.025(b) has been completed.

It is our understanding that use of a natural condition-based SSC will preclude the use of a mixing zone. In general, the mixing zone concept involves dilution of effluent that has a concentration of a particular parameter that is higher than a water quality criterion, with receiving

water that has a concentration that is lower than the applicable criterion. If the receiving water is already at the concentration of the criterion, in this case a natural condition-based SSC, dilution is not available.

If implementation becomes problematic, we may revisit our approval of this provision at some point in the future. Additionally, this issue is being discussed at the national level and if relevant policy or guidance is developed from national discussions, we may revisit our approval.

18 AAC 70.032 - Mixing Zones

Approved Mixing Zone Provisions

EPA's WQS regulations at 40 CFR 131.13 authorize State mixing zone regulations as a matter of State discretion (WQS Handbook p. 5-1). Such policies are subject to EPA review pursuant to CWA §303(c). The EPA guidance for mixing zones is found in the 1993 WQS Handbook, second edition, and the 1991 *Technical Support Document for Water Quality-based Toxics Control* (TSD). The 1991 TSD provides technical descriptions of models to protect aquatic life from acute effects and descriptions of time and distance calculations. The TSD provides guidance on methodologies and examples of their use.

EPA guidance states that allowable mixing zone characteristics should be established to ensure that mixing zones do not impair the integrity of the waterbody as a whole, there is no lethality to organisms passing through the mixing zone, and there are no significant human health risks (WQS Handbook p. 5-1). The Alaska mixing zone policy contains provisions that deal with each of these mixing zone characteristics. EPA recommends that mixing zone characteristics should be defined on a case-by-case basis after it has been determined that the receiving water system can safely accommodate the discharge. The Alaska mixing zone policy has several provisions that take into consideration the physical, chemical and biological characteristics of the effluent and receiving water, the aquatic species that are present, and the uses.

EPA guidance indicates that mixing zone WQS regulatory language should describe the State's methodology for determining size, shape, location, outfall design, and in-zone quality of mixing zones (WQS Handbook p. 5-2). The new and revised portions of the mixing zone regulations found in the 1994 and 1996 WQS contain provisions that deal with these subject areas.

The new and revised portions of the mixing zone policy also contain terminology that is defined at 18 AAC 70.990. The following definitions [at 18 AAC 70.990] have been added to 1996 WQS for terms that are used in the mixing zone policy: 1, 2, 6, 10, 27, 32, 39, and 47.

EPA guidance states that prevention of lethality to passing organisms is an important component of a mixing zone policy (pp. 5-1 and 5-6). Lethality is a function of the magnitude of pollutant concentrations and the duration an organism is exposed to those concentrations. EPA has identified several ways to prevent lethality in the mixing zone and Alaska has adopted, by reference at 18 AAC 70.032(b), methods 2 and 3 from the EPA WQS handbook (p. 5-6). Closely linked with this topic are critical design flows. WQS should protect water quality for designated uses in critical low flow situations. In the 1996 WQS, Alaska has adopted a 7Q10 design flow for the protection of aquatic life from chronic exposure to toxic substances. In addition, Alaska has clarified a State policy to use the 1Q10 design flow for the protection of aquatic life from acute exposure to toxic substances

(letter dated December 19, 1996 from Michele Brown, ADEC Commissioner to Chuck Clarke, EPA Regional Administrator). The EPA recommended design flow for acute criteria is 1Q10 and for chronic criteria is 7Q10 (WQS Handbook p. 5-11).

For the reasons above, EPA approves all revisions and additions to this section of the WQS except for the 3Q2 design flow for conventional and nontoxic substances. EPA approves the following new definitions in the 1996 WQS because they are based on Federal guidance; definitions (1) and (10) have been adopted from the 1991 EPA TSD; definition (6) has been adopted from an EPA Federal Register notice (51 FR 33992), and definition (39) is consistent with EPA regional guidance for this term. EPA approves definition (2) because it is derived from a scientific process used by the State to designate waters important to anadromous fish. Definitions (27), (32), and (47) are reasonable and consistent with the CWA and are approved.

Alaska's mixing zone regulation also provides for a 3Q2 design flow for conventional and nontoxic substances. Alaska has not submitted information demonstrating that a 3Q2 design flow is protective of aquatic life for conventional and nontoxic substances. See the following paragraphs for EPA's justification for disapproval of the 3Q2 design flow and discussion of the type of information that is needed to evaluate the scientific defensibility of a 3Q2 design flow.

Disapproved Mixing Zone Provisions

At this time EPA is unable to determine whether Alaska's 3Q2 design flow for conventional and non-toxic substances at 18 AAC 70.032.(f)(3)(B)(ii) is protective of aquatic life. EPA's regulations at 40 CFR 131.11(b) require States and Tribes to adopt criteria based on: EPA's § 304(a) criteria, § 304(a) criteria modified to reflect site-specific conditions, or other scientifically defensible methods. Alaska's adoption of a 3Q2 for conventional appears to be less protective than EPA's § 304(a) criteria, which rely on a 1Q10 and 7Q10 for protection of aquatic life. Alaska has not submitted information demonstrating that a 3Q2 is sufficient to protect aquatic life in Alaska. EPA's regulations at 40 CFR 131.21(a)(2) require that new or revised standards be accompanied by supporting analysis. EPA cannot approve a 3Q2 for conventional and non-toxic substances without a scientifically defensible analysis demonstrating that it is protective of aquatic life.

18 AAC 70.032.(f)(3)(B)(ii) specifies that the lowest average 3 consecutive day flow with a recurrence frequency of once in two years (3Q2) be used for the volume of receiving water available for dilution when calculating the size of a mixing zone and maximum pollutant discharge limitations. EPA's ambient water quality criteria, which are incorporated by reference in Alaska's WQS regulations as Note 5 to 18 AAC 70.020.(b) are derived to be protective of aquatic life under certain conditions. One of those conditions is that the duration of exposure not exceed 4 days for protection from chronic effects or 1 hour for protection from acute effects. Another condition is that the criteria not be exceeded more than once every 3 years on average (50 FR 30784). These conditions are referred to as a 4B3 for protection from chronic effects and a 1B3 for protection from acute effects. For purposes of implementing ambient water quality criteria, EPA correlates a 4B3 biologic flow to a 7Q10 hydrologic flow for protecting aquatic life from chronic effects, and a 1B3 biologic flow to a 1Q10 hydrologic flow for protecting aquatic life from acute effects (see Appendix D to EPA's *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001).

The duration and allowable frequency of exceedences are integral components of ambient water quality criteria and represent EPA's best scientific judgement. EPA believes that attainment of the 4-day averaging period and once-in-three year excursion frequency is sufficiently protective of

aquatic ecosystems, but recognizes that these provisions are not always necessary to achieve adequate protection. Consequently, EPA will approve alternative, less stringent duration and frequency provisions if States or Tribes can demonstrate that they are scientifically defensible, per 40 CFR 131.11(b). This may be done on a state-wide, pollutant-specific, or stream-specific basis.

There are several areas that Alaska could address in an analysis to demonstrate that a 3Q2 is protective of native aquatic life. One area is a hydrologic analysis of lotic systems in Alaska to determine when low flows most frequently occur. This information would be useful to evaluate any overlap in the intervals of low flow with the intervals of sensitive life stages (e.g., salmonid spawning) for aquatic life native to Alaska. Another area to evaluate would be the sensitivity of aquatic life in Alaska to conventional and non-toxic stressors (e.g., ammonia, chlorine, and dissolved oxygen), particularly for sensitive life stages. Other information of interest is how the 3Q2 hydrologic flow correlates to the 1B3 and 4B3 biologic flows. Does Alaska's latitude or length of seasons affect lotic communities ability to recover from exceedences? Another area is the prevalence of refugia in Alaska's lotic systems.

The areas identified above are meant to provide Alaska with examples of the type of information that would be helpful for EPA to evaluate the scientific defensibility of a 3Q2 for conventional and non-toxics in Alaska. For additional guidance see Appendix D to EPA's *Technical Support Document for Water Quality-based Toxics Control* (EPA/505/2-90-001) and pages 102-103 of the *Water Quality Guidance for the Great Lakes System: Supplementary Information Document (SID)* (EPA-820-B-95-001). EPA staff are also available for assistance.

Future Development of Implementation Procedures

Implementation procedures for general policies are not required to be in regulation. They can be adequately addressed in State policy or guidance. We strongly suggest that the State develop a description of Alaska's methodology for specifying the location, boundaries, size, shape, and in-zone quality of mixing zones. The methodology should be sufficiently precise to support consistent regulatory actions. The procedures should be explained with a sufficient level of detail to ensure consistency when used to derive NPDES permit limits and best management practices (BMP) for nonpoint sources. Implementation procedures should clearly identify the issues and decisions that are left to the discretion and best professional judgement of Alaska Department of Environmental Conservation staff as part of the § 401 certification. Implementation procedures should clearly set forth the considerations, guidelines, and default assumptions that will be utilized in making case-by-case decisions.

We realize that the 1994 mixing zone regulations are undergoing public review and comment at this time. We have provided comments on these proposed revisions with an emphasis on clarification of regulatory language to avoid future implementation problems. Alaska has recently clarified that a policy exists to use a 10 year, 1-day (1Q10) critical design flow for acute criteria. Now that Alaska has adopted a point of application for acute aquatic life criteria, 18 AAC 70.032(b), EPA suggests that the State clarify, in regulation, the 1Q10 design flow for acute aquatic life criteria.

18 AAC 70.990 - Definitions

The 1994 and 1996 Alaska WQS contain the following new or revised definitions at 18 AAC 70.990: 1, 2, 3, 6, 10, 17, 20, 25, 27, 32, 34, 35, 39, 41, 45, 47, 51, 52, 53, 55, 57, and 58.

Discussion and approval of the following definitions are addressed in the specific sections to which they apply: 55 is in 18 AAC 70.010 - General; 20 and 25 are in 18 AAC 70.011 - Antidegradation Policy; 45 is in 18 AAC 70.020 - Protected Water Classes, Water Quality Standards Table, Sediment; 51 and 52 are in 18 AAC 70.020 - Protected Water Classes, Water Quality Standards Table, Petroleum Hydrocarbons; 34 is in 18 AAC 70.025 - Site-Specific Criteria; and 1, 2, 6, 10, 27, 32, 39, and 47 are in 18 AAC 70.032 - Mixing Zones.

The remaining definitions are used throughout the WQS regulations and are not found in specific sections or they are not part of a revised section. EPA approves the following 1996 WQS revisions to 18 AAC 70.990 because they are based on Federal guidance; definition (58) complies with the definition found in 40 CFR § 122.2 and definition (17) has been adopted from 40 CFR 131.3. EPA approves the following definitions because they are derived from standard scientific methods or explanations. Definition (3) represents a variation of the way this term is described in the EPA Red Book and matches the narrative description of this phrase found in *Standard Methods for the Examination Water and Wastewater*. Definition (35) is from another portion of Alaska regulations and it complies with the terminology found in *Standard Methods for the Examination Water and Wastewater*. EPA approves definitions (41), (53) and (57), although they are adopted from other portions of Alaska regulations, because they are comprehensive and consistent with the CWA.

TECHNICAL SUPPORT DOCUMENT

JUSTIFICATION OF APPROVAL/DISAPPROVAL THE 1994 AND 1996 ALASKA WQS

INTRODUCTION

EPA has participated in the review of the revisions to Alaska water quality standards (WQS) since December 1989. EPA WQS regulations direct States, at least once every three years, to hold public hearings for the purpose of reviewing applicable WQS and, as appropriate, modifying and adopting standards (triennial review) [40 CFR 131.20 (a)]. Alaska initiated the triennial review in December 1989 and completed it when revised WQS were adopted on December 4, 1994. The revised WQS became effective on January 4, 1995. During the triennial review, EPA provided written comments on proposed revisions in November 1992, November 1993, and February 1994. On January 12, 1995 Alaska received a petition from the Sierra Club Legal Defense Fund (SCLDF) that requested that Alaska take action to suspend the effective date or repeal certain portions of the recently adopted 1994 WQS regulations. Alaska conducted a public review of the issues raised in the SCLDF petition. EPA commented on the petition issues by letter in March 1995. At the same time as the public comment on the petition, Alaska proposed revisions to the antidegradation policy in the December 1994 WQS. EPA commented on the proposed antidegradation policy in the same March 1995 comment letter.

Three versions of the Alaska water quality standards (WQS) are referenced in the following discussion: the 1989 WQS - which represent a compilation of the Alaska WQS that reflect new mixing zone policy adopted Sept. 15, 1988 and stream reclassifications adopted Nov. 30, 1989; the 1994 WQS - adopted December 4, 1994 - effective January 4, 1995; and the 1996 WQS - adopted February 14, 1996 and effective March 16, 1996.

§18 AAC 70.010 - General (Same as the Detailed Discussion Attached to the Letter)

EPA approves the wording changes found in the February 1996 version of 18 AAC 70.010(b) and (f). Section (b) has added references to the revised antidegradation policy and the new whole effluent toxicity limit provision. The changes in this section clarify how these provisions will be applied. The basis for our approval of these new and/or revised provisions are found in the following pages.

18 AAC 70.010(f) contains an exemption from WQS for treatment works and a definition for treatment works has been added at 18 AAC 70.990(55). The February 1996 WQS repealed major portions of the December 1994 WQS treatment works exemption. As a result, the exemption now applies only within the boundaries of treatment works authorized by the Department. Such treatment works, defined at 18 AAC 70.990(55), are excluded from the definition of waters of the United States at 40 CFR 122.2. EPA approves the treatment works provision found at 18 AAC 70.010(f) and the treatment works definition found at 18 AAC 70.990(55) in the February 1996 WQS.

§18 AAC 70.011 - Antidegradation

Federal Guidance

The Federal requirements pertaining to antidegradation are included in 40 CFR 131.12 of the Federal WQS regulations. These requirements direct States to adopt antidegradation policies and identify the procedures that will be followed in implementing such policies. The regulation requires implementation based on three levels, or tiers of antidegradation protection:

- Tier 1: Maintain and protect existing in-stream water uses and the level of water quality necessary to protect such existing uses, whether or not such uses are included in the water quality standards. This level of protection applies to all surface waters.
- Tier 2: Maintain and protect existing water quality, where such existing water quality exceeds levels necessary to support propagation of fish, shellfish, wildlife, and recreation in and on the water, unless the State finds that certain conditions are satisfied. A key finding which must be made is that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located and that the water quality shall be adequate to support existing uses fully.
- Tier 3: Maintain and protect high quality waters that constitute an outstanding national resource, such as waters of national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance.

Antidegradation Policy

EPA's regulations require states to adopt an antidegradation policy consistent with 40 CFR § 131.12. The December 1994 WQS regulations did not contain a provision for Tier 1 waters [40 CFR 131.12(a)(1)] or Tier 3 - outstanding national resource waters [40 CFR 131.12(a)(3)]. The 1994 WQS regulations did contain a process for lowering water quality for high quality, tier 2, waterbodies but the process was not consistent with 40 CFR 131.12(a)(2). The 1996 WQS regulations have added Tier 1, Tier 3, and additional provisions for lowering the water quality in Tier 2 waters.

For Tier 1 waterbodies, new language has been added to 18 AAC 70.011(a)(1). This section states that "existing water uses and the level of water quality to protect existing uses must be maintained and protected". The language in 18 AAC 70.011(a)(1) satisfies 40 CFR 131.12(a)(1).

For Tier 2 waterbodies, 18 AAC 70.011(a)(2), the State has adopted new language that clarifies that water quality that exceeds levels necessary to support "fishable/swimmable" uses must be maintained and protected. The addition of this language complies with 40 CFR 131.12(a)(2). 18 AAC 70.011(a)(2) indicates that the State will authorize a reduction in water quality "only after" the antidegradation analysis in 18 AAC 70.011(a)(2)(A), (B), (C), (D), and (E) has been completed. 18 AAC 70.011(a)(2)(A) was previously approved by EPA, it has no new or revised language, and it satisfies Federal requirements. 18 AAC 70.012(a)(2)(B) was previously approved but it now clarifies that the newly adopted whole effluent toxicity (WET) requirements are incorporated into the antidegradation policy. In accordance with 40 CFR 131.12(a)(2), 18 AAC 70.011(a)(2)(C) specifies that existing uses must be fully protected. 18 AAC 70.011(a)(2)(D) was previously approved, it has no new or revised language, and it satisfies Federal requirements. In 18 AAC 70.011(a)(2)(E) the

State has adopted, almost verbatim, the wording from 40 CFR 131.12(a)(2) and it is consistent with 40 CFR 131.12(a)(2). These provisions, A - E, are all approvable since they satisfy the requirements of 40 CFR 131.12(a)(2).

The State's antidegradation policy, at 18 AAC 70.011(a)(2), indicates that for tier 2 waters, the water quality must be protected and maintained unless the State allows a short-term variance, mixing zone, or zone of deposit. These are all provisions within the Alaska WQS regulations that can result in lowering of water quality. The State antidegradation policy states that a reduction in water quality will be authorized "only after" the antidegradation analysis in 18 AAC 70.011(a)(2)(A), (B), (C), (D), and (E) has been completed. As discussed in the paragraph above, A, B, C, D and E comply with Federal requirements. Thus a variance, mixing zone, or zone of deposit is allowed in Tier 2 waters only after an applicant demonstrates that the lowering of water quality associated with these actions conforms to federal antidegradation requirements for Tier 2 waterbodies [18 AAC 70.011(a)(2)(A), (B), (C), (D), and (E)]. Therefore, this provision of the Alaska WQS is approvable because the full antidegradation analysis for Tier 2 waters must be completed in order to demonstrate that the lowering of water quality associated with a variance, mixing zone or zone of deposit is warranted in accordance with the policy.

The State has adopted a definition for "highest statutory and regulatory requirements" that is consistent with Sections 301(b) and 306 of the CWA. The definition is consistent with EPA interpretation of this phrase (40 CFR 131.12; Questions and Answers on: Antidegradation, August 1985; and 1991 WQS Reviewers Guide). Alaska has also adopted the definition for existing use [18 AAC 70.990(20)] found at 40 CFR 131.3.

For Tier 3 waterbodies new language has been added to 18 AAC 70.011(a)(3). This section states that "if a high quality water constitutes an outstanding national resource, such as a water of a national or state park or wildlife refuge or a water of exceptional recreational or ecological significance, the quality of that water must be maintained and protected". The language in 18 AAC 70.011(a)(3) satisfies 40 CFR 131.12(a)(3) and can be approved.

Alaska has adopted revisions at 18 AAC 70.011(4) for thermal discharges. The WQS Handbook section 4.2 p. 4-2 provides guidance about antidegradation and thermal discharges. 40 CFR 131.12(a)(4) is intended to coordinate the requirements and procedures of the antidegradation policy with those established in section 316 of the Clean Water Act for setting thermal discharge limitations. Regulations implementing section 316 are found at 40 CFR 124.66. This addition satisfies the requirements 40 CFR 131.12(a)(4).

Section 18 AAC 70.011(b) is new and it clarifies that an applicant who seeks to reduce water quality must provide all relevant information to the State. This is not a Federal requirement but it is reasonable.

Section 18 AAC 70.011(c) is new and it includes the public participation requirements of 40 CFR 131.12(a)(2). EPA approves this new section since it satisfies federal requirements.

EPA approves all new and revised regulatory language found in the February 1996 version of 18 AAC 70.011(a)(1), (a)(2), (a)(3), and (a)(4); 18 AAC 70.011(b) and (c); 18 AAC 70.015(a); and 18 AAC 70.990(20) and (25). Definition 18 AAC 70.990(20) has been adopted from 40 CFR 131.3 and

definition 18 AAC 70.990(25) complies with the EPA interpretation of this phrase. With these revisions, the policy complies with the requirements of 40 CFR 131.12.

Antidegradation Implementation

With the revisions EPA is approving, Alaska's antidegradation policy now meets the requirements of 40 CFR 131.12(a). Section 131.12(a) also requires States to identify implementation methods for their antidegradation policies. The reason for this is two-fold. First, such implementation methods encourage consistent application of the antidegradation policy and provide guidance to EPA where, as in Alaska, EPA issues National Pollutant Discharge Elimination System (NPDES) permits. Second, by requiring States to identify implementation methods, section 131.12(a) deters States from adopting implementation methods which undercut or reinterpret the State's antidegradation policy so as to render it, in practice, inconsistent with the requirements of section 131.12(a). Were a State to do so, EPA has the authority to promulgate a federal antidegradation policy for waters in the State with sufficient detail to supersede the State's policy as implemented by the State.

Antidegradation During the next Triennial Review

Alaska has not yet adopted implementation methods for its revised antidegradation policy. EPA expects Alaska to do so during the next triennial review. In the meanwhile, EPA will, as needed, follow the antidegradation guidance in its 1993 WQS Handbook (Second Edition) in interpreting Alaska's antidegradation policy, and recommends that Alaska do the same.

As Alaska begins to work on antidegradation implementation methods we would like to reiterate EPA's position on existing use protection requirements. In EPA guidance, Questions and Answers on Antidegradation, August, 1985 (50 FR 34546) question 7 asks about the proper interpretation of the term "an existing use". The answer to question 7 states:

An existing use can be established by demonstrating that fishing, swimming, or other uses have actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur (unless there are physical problems which prevent the use regardless of water quality). An example of the latter is an area where shellfish are propagating and surviving in a biologically suitable habitat and are available and suitable for harvesting. Such facts clearly establish that shellfish harvesting is an "existing" use, not one dependent on improvements in water quality.

In other words, establishing an existing use (past or present) is not dependent solely upon a demonstration that the use is being satisfied in a functional sense. As illustrated in this example, the existing use question should address both the functional use and the water quality. The intent of the regulation is to ensure the existing use and water quality necessary to support that use are maintained and protected.

§18 AAC 70.020 - Protected Water Use Classes; Water Quality Criteria; and Water Quality Standards Table

18 AAC 70.020(b) (Same as the Detailed Discussion Attached to the Letter)

At 18 AAC 70.020(b), minor wording changes have been incorporated to reflect the ability of the State to develop site-specific criteria. Revised 18 AAC 70.020(b) clarifies that water quality criteria apply except "as modified" under the site-specific criteria provision and the thermal discharge provision. Throughout 18 AAC 70.020(b)(1) and (2) WQS Table, the wording has been changed from "shall not" to "may not" to reflect the ability of the State to approve site-specific criteria (18 AAC 70.025 and 18 AAC 70.034). EPA approves these clarifications. EPA previously approved 18 AAC 70.025 and 18 AAC 70.034; 18 AAC 70.025 has been revised and the basis for our approval of the revision is found below.

Groundwater Criteria (Not in the Detailed Discussion Attached to the Letter)

Alaska solicited public comment on whether to continue the application of aquatic life criteria and human health criteria to groundwater. Alaska determined that it is "warranted to continue protecting groundwater with both aquatic life and human health criteria". Therefore, there are no changes to the 1994 and 1996 WQS for this issue and we have no changes to approve related to this topic.

Fecal Coliform Bacteria

Alaska revised its freshwater and marine contact recreation fecal coliform criteria from a 20 FC/100 ml (in the 1989 WQS) to 100 FC/100 ml in the 1994 and 1996 WQS. While less stringent than the 1989 WQS, the 100 FC/100 ml criterion is still more stringent than the fecal coliform criteria recommendation of 200 FC/100 ml recommended by EPA in its section 304(a)(1) bacteriological criteria documents prior to 1986.

Historically, fecal coliform bacteria were used as an indicator species for bacteria likely to cause gastroenteritis in humans. In 1986, EPA issued a revised bacteriological criteria document which recommended use of *Escherichia coli* and enterococci as indicator species for swimming uses, because statistics showed they better correlated with gastroenteritis rates from contact recreation (51 FR 8012 March 7, 1986). EPA's evaluation of the bacteriological data indicated that using the fecal coliform indicator group at the maximum geometric mean of 200 FC/100 ml would cause an estimated 8 illness/1,000 swimmers at freshwater beaches and 19 illness/1,000 swimmers at marine beaches. EPA's 1986 *E. coli* and enterococci criteria recommendation provided the same level of protection for contact recreation as intended by the previous fecal coliform criteria (EPA 440/5-84-002). Alaska's fecal coliform criterion is half the 200 FC/100 ml old criterion. EPA's Federal Register (FR) notice announcing the availability of the new bacteriological criteria document stated that, "EPA expects a gradual transition from the fecal coliform criteria to the new indicator bacteria by the States." (51 FR 8013)

Alaska's response to public comments, submitted to EPA as part of the review package for the Dec. 1994 WQS, states that it "will consider such criteria in the next Triennial Review." Given the stringency of the revised fecal coliform criteria and EPA's expectation that there could be a gradual transition, balanced against the length of time that has elapsed since issuance of the revised 304(a)

criteria document, EPA approves Alaska's revised criteria, with the EPA recommendation that Alaska should adopt the more precise E. coli/enterococci indicators during its next triennial review.

EPA recently sent a letter to Alaska expressing agency concern with public health risks posed by contaminated bathing beaches (see enclosed letter from Robert-Perciasepe to Michele Brown). EPA is initiating a national program to protect public health at our nation's beaches and a cornerstone of that effort is State adoption of EPA's 1986 updated bacteriological ambient water quality criteria.

Settleable Solids/Sediment

Applicable Federal Criteria

Alaska WQS have previously established "sediment" as a pollution category. The 1996 WQS revisions to this category deal with settleable solids, a component of sediment. The corresponding EPA guidance for sediment and settleable solids is found under the heading Solids (Suspended, Settleable) and Turbidity. EPA addresses the issue by defining several fractions. Alaska's revisions to this pollutant category only address one of the fractions but the Alaska regulations in total are equally protective as Federal criteria.

EPA criteria for Solids (Suspended, Settleable) and Turbidity do not specify a single analytical methodology for measuring the inorganic and organic particulate matter found and transported in the aquatic environment. The EPA criterion for this pollutant category references several definitions and methods; total suspended matter (suspended solids), settleable matter (settleable solids), fixed suspended matter (fixed suspended solids), and volatile suspended matter (volatile solids) found in the 1971 *Standard Methods for the Examination of Water and Wastewater*. The Federal criterion for "solids (suspended, settleable) and turbidity" for the protection of freshwater fish and other aquatic life is "settleable and suspended solids should not reduce the depth of the compensation point for photosynthetic activity by more than 10 percent from the seasonally established norm for aquatic life."

Color is also related to solids and turbidity. Surface waters may appear colored because of suspended matter which comprises turbidity. Color in water principally results from degradation processes in the natural environment. The most common causes of color in water are complex organic compounds originating from the decomposition naturally occurring organic matter. The Federal criterion for color for the protection of aquatic life is: Increased color (in combination with turbidity) should not reduce the depth of the compensation point for photosynthetic activity by more than 10 percent from the seasonally established norm for aquatic life".

For recreation and drinking water uses, EPA has not developed criteria and site-specific considerations would be important. EPA has not been able to delineate a general raw water criterion for municipal and industrial water supply (EPA Quality Criteria for Water 1986). For recreation uses turbidity is the parameter that interferes with recreational and aesthetic enjoyment of the water (EPA Quality Criteria for Water 1986).

The Federal criterion for protection of aquatic life, no more than a 10 percent reduction in the depth of the photosynthetic compensation point, applies equally to solids or turbidity. The 1996 Alaska WQS contain a marine aquatic life criterion for turbidity and a freshwater and marine aquatic life criteria for color that comply with the federal criterion for these pollutant categories. These turbidity and color criteria are not new or revised and they have been previously approved by EPA.

Freshwater Uses

The 1989 Alaska WQS for this pollutant category for freshwater (FW) uses (water supply, (i) drinking culinary and food processing, and contact recreation) stated "no increase in concentration of sediment, including settleable solids, above natural conditions. (See Note 15)" Note 15 described, in detail, the volumetric Imhoff cone method for measuring settleable solids. Now the Alaska standard for these two FW use categories states, "no measurable increase in concentration of settleable solids above natural condition as measured by the volumetric Imhoff cone method (see note 15)."

In the 1996 WQS the word "measurable" has been added before increase, "sediment" has been dropped, the reference to the Imhoff cone method has been added to the narrative statement, Note 15 remains the same, and a definition for settleable solids has been added to the definition section. The definition specifies that "solid material of organic or mineral origin that is transported or deposited from water" should be measured by the Imhoff cone method, method 2540(B) in *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992). The sediment standard for the FW uses described above has always specified the volumetric Imhoff cone method which measures settleable solids. Although the word "sediment" has been removed in the 1996 WQS, it makes no substantive difference because the method to measure only settleable solids was previously specified for these use categories. Additionally, Alaska has not implemented its sediment standard to restrict total suspended solids (EPA Nov. 1992 comments). Therefore, the only change to the FW uses in this pollutant category is the new definition which now specifies the laboratory method. The sediment criteria for the other freshwater use categories have been previously approved.

Marine Uses

The 1989 Alaska WQS for this pollutant category for marine uses (contact recreation and growth and propagation of fish) stated "no measurable increase in concentration above natural conditions". Unlike the FW sediment standard, the marine narrative criterion did not reference Note 15 and Note 15 did not specify to which use categories the Imhoff cone method should apply. In other words, the 1989 Alaska WQS marine standard for sediment did not specify settleable solids or the Imhoff cone method.

In the 1996 WQS, Alaska has changed the marine criteria for sediment by adding two phrases ("of settleable solids" and "as measured by the Imhoff cone method") and adding a new definition for settleable solids that specifies the method to be used to measure settleable solids. These revisions apply to the following marine use categories: contact recreation - 18 AAC 70.020(b)(2)(B)(i) and growth and propagation of fish, shellfish, other aquatic life, and wildlife - 18 AAC 70.020(b)(2)(C). The sediment criteria for the other freshwater and marine use categories have been previously approved.

The State's new definition of settleable solids now includes only settleable solids and excludes suspended sediment or nonsettleable solids. However, there are a number of other provisions within the Alaska WQS regulations and National Pollutant Discharge Elimination System (NPDES) permitting requirements that deal with suspended sediment. These revisions in combination with the following provisions found elsewhere in the Alaska 1996 WQS provide adequate protection of all uses with regard to sediment. Guidance in the WQS Handbook acknowledges that a combination of independent approaches may be required to support designated uses (p. 3-24). For the following reasons, we find the Alaska revisions to this pollution category to be equally stringent to the Federal criteria.

The volumetric Imhoff cone method is an EPA approved method for the analysis of "settleable residue" (EPA-600/4-79-020, 160.5-1).

Settleable solids will be limited by the new definition for natural condition which prohibits any increases in settleable solids loading from human sources or causes.

Alaska has separate marine turbidity and color criteria that measure suspended sediment that are as stringent as Federal criteria. EPA has previously approved the turbidity and color criteria and determined that they are protective of designated uses. For the marine growth and propagation use category, Alaska has adopted the Federal criterion for solids (suspended, settleable) and turbidity (described above) as well as color.

All waters are designated for all uses and the most stringent water quality criteria for all the included use classes will apply [18 AAC 70.030(1)]. For example, the marine turbidity criterion for water supply-aquaculture states that turbidity "may not exceed 25 nephelometric turbidity units (NTU)". The marine turbidity criterion for growth and propagation may not reduce the depth of the photosynthetic compensation point by 10 percent. On a site-specific basis, the most stringent of the two, would apply in marine waters.

EPA and Alaska, if it assumes primacy of the NPDES program, have an independent regulatory responsibility to include Total Suspended Solids (TSS) in NPDES permits for those industrial categories where TSS is an effluent guideline/limit. TSS measures all solids that do not pass through a 0.0015 mm standard glass fiber filter. The pore size in this filter would remove a major proportion of the suspended solids as well as settleable solids.

EPA approves the revisions found in the marine use categories 18 AAC 70.020(b)(2)(B)(i) and 18 AAC 70.020(b)(2)(C) for this pollutant category. EPA approves the definition at 18 AAC 70.990(45) for this pollutant category. It includes a narrative description and the EPA approved laboratory method to be used to measure this parameter (EPA-600/4-79-020, 160.5-1). These revisions comply with the requirements of 40 CFR § 131.11.

Past EPA Comments

In past comments on this pollutant category, EPA has indicated that by focusing on settleable solids, and thereby dropping total suspended solids protection, nonsettleable solids are not covered. (Total suspended solids = settleable solids + nonsettleable solids.) While settleable solids have particularly significant impacts in the suffocation and burial of life on the bottoms of water bodies, and turbidity has impacts on primary production and visual acuity, nonsettleable solids may affect aquatic life (especially eggs, larvae, filter feeding invertebrates and fishes) in ways which would not be protected by standards for settleable solids and turbidity.

In our November 1992 comments on the draft version of this change we were not able to quantify with certainty the difference between settleable solids + turbidity and measurements for total suspended solids (TSS). Nor were we able to document with certainty the nature of environmental impact associated with the nonsettleable form of TSS. We estimated that "perhaps 10 percent of the environmental impacts involving the three parameters could be better controlled with the support of a WQS for suspended solids."

EPA also indicated in our Nov. 1992 comments that regulation of turbidity would not offer protection against harmful levels of suspended solids. The basis for this statement was that, "correlation of turbidity with the weight concentration of suspended matter is difficult because the size, shape, and refractive index of the particulates also affect the light-scattering properties of the suspension." Standard Methods (1992). The lack of direct correlation between turbidity and the weight of suspended matter (TSS) could result in an underestimation or an over estimation of the actual TSS.

Alaska, by adopting the revisions in this pollutant category, has determined that turbidity is sufficient to control suspended sediment. Recent developments in EPA and Alaska regulation of turbidity have resulted in a more rigorous application of the turbidity criteria. Regulation of turbidity occurs most frequently in the mining industry and specifically, placer mining. The most recent placer mining general permit:

uses the 5 NTU above natural background criterion;

does not provide a turbidity variance similar to permits issued in the past;

allows a mixing zone that it is based on complete dilution with a 7Q10 design flow, which is more stringent than the 3Q2 design flow used in the past; and

requires monitoring of the first three discharges and once a month for each month of discharge thereafter which is more frequent than in the past.

Further, EPA disapproved the 3Q2 design flow that is used with turbidity. Alaska adopted a 3Q2 design flow for conventional and nontoxic substances. To date, this design flow has been used primarily with the turbidity criterion in placer mining situations. Design flows for ambient water quality criteria are an integral component of criteria. Criteria are deemed to be protective based on certain duration and frequency assumptions. EPA has disapproved this design flow because it appears to be less protective than EPA's criteria.

Toxic Substances

Under the "Toxics and Other Deleterious Organic and Inorganic Substances" pollutant category, the 1994 and 1996 WQS contain four changes. One revision applies to the freshwater (FW) water supply (i) drinking, culinary, and food processing use category [18 AAC 70.020 (b)(1)(A)(i)]. The other three revisions apply to the FW aquaculture [18 AAC 70.020 (b)(1)(A)(iii)], FW growth and propagation [18 AAC 70.020 (b)(1)(C)], marine aquaculture [18 AAC 70.020 (b)(2)(A)], marine growth and propagation [18 AAC 70.020 (b)(2)(C)], and marine harvesting and consumption [18 AAC 70.020 (b)(2)(D)] uses.

FW - Water Supply; Drinking, Culinary, and Food Processing [18 AAC 70.020 (b)(1)(A)(i)] Use

Alaska revised this use category to clarify those instances when criteria based on standards from the Safe Drinking Water Act [drinking water standards (DWS)] should be used as the applicable criteria rather than the criteria included in EPA *Quality Criteria for Water* (water quality criteria) to protect this use category. The 1989 Alaska WQS applied both water quality criteria and DWS to this use category. The revised 1996 WQS clarify that when both a DWS and water quality criteria exist

for a particular toxic substance, DWS should be used as the applicable criteria for this use category. This revision complies with EPA guidance found at 45 FR 79356 that indicates that DWS are appropriate for protection of human health from exposure to toxic substances from ingestion of contaminated drinking water. DWS are derived to protect human health from consumption of toxicants found in finished (at-the-tap) drinking water. Alaska has adopted EPA DWS and applies them to ambient surface water. The use of DWS instead of water quality criteria, also complies with guidance found in the WQS Handbook that indicates that States have the option of applying DWS, human health water quality criteria, modified human health criteria, or controls more stringent than these three to protect against the effects of ingesting contaminated drinking water (p.3-12).

When no DWS exist, Alaska has chosen to apply EPA water quality criteria. Water quality criteria include acute and chronic aquatic life criteria as well as human health criteria. The human health criteria provide pollutant concentrations protective of human health and include fish bioaccumulation and consumption factors in addition to direct human drinking water intake (WQS Handbook p.3-12). Alaska has previously adopted EPA water quality criteria, by reference, and EPA has promulgated, for Alaska, water quality criteria for priority pollutants where gaps existed in Alaska's coverage for toxic substances [40 CFR 131.36(d)(12)]. Using water quality criteria where there are no DWS complies with guidance found in the WQS Handbook on page 3-12 discussed above. EPA approves the revisions to this use category. These revision comply with 40 CFR 131.11(a)(1).

FW - Aquaculture [18 AAC 70.020 (b)(1)(A)(iii)], FW - Growth and Propagation [18 AAC 70.020 (b)(1)(C)], Marine Aquaculture [18 AAC 70.020 (b)(2)(A)], Marine Growth and Propagation [18 AAC 70.020 (b)(2)(C)], and Marine Harvesting and Consumption [18 AAC 70.020 (b)(2)(D)] Uses

The first revision to these use categories clarifies when to use drinking water standards (DWS) as criteria and when to use EPA *Quality Criteria for Water* (water quality criteria). In the 1989 Alaska WQS, water quality criteria and DWS were applied on the basis of "whichever is less" (more stringent). In the 1994 and 1996 WQS, the revision establishes that when both a DWS and water quality criteria exist for a particular toxic substance, the EPA CWA water quality criteria will be used, instead of the DWS, in these use categories.

Both aquatic life and human health criteria are relevant to these uses. The following paragraphs lay out the basis for our approval of this first revision for each criteria type.

For aquatic life, Alaska has previously adopted EPA aquatic life criteria, by reference, and EPA has promulgated, for Alaska, water quality criteria for priority pollutants where gaps existed in Alaska's coverage for toxic substances 40 CFR 131.36(d)(12). The WQS Handbook clearly states that section 304(a)(1) criteria for aquatic life should be used to support these designated uses (p.3-11). This revision complies with 40 CFR 131.11(b)(1)(i).

The human health criteria are protective of human health because they incorporate fish bioaccumulation, fish consumption factors, and direct intake of drinking water into the calculations to derive these criteria (WQS Handbook p.3-12). Human health water quality criteria would apply to the freshwater and marine aquaculture uses and the marine harvesting for consumption use since these uses involve human consumption of aquatic life. However, EPA's policy is to apply human health criteria to all waters designated for aquatic life (57 FR 60860). Therefore, human health criteria would also apply to the FW and marine growth and propagation uses in order to protect humans that might

eat the aquatic life. Alaska has previously adopted EPA water quality criteria, by reference, and EPA has promulgated, for Alaska, water quality criteria for priority pollutants where gaps existed in Alaska's coverage for toxic substances. EPA aquatic life and human health criteria will protect these uses. This revision is consistent with 40 CFR 131.11(b)(1)(i).

When no water quality criteria exist the State has chosen to apply DWS as criteria. This will protect those who drink the water and it complies with the flexibility given to States to apply DWS or human health water quality criteria to protect against the effects of contaminants by ingestion from drinking water (WQS Handbook p.3-12).

Finally, Alaska has designated all waters for all uses [18 AAC 70.050(a) and waters with multiple use designations must apply the most stringent water quality criteria for all the included use classes [18 AAC 70.030(1)]. Therefore, a comparison must be made between DWS, aquatic life criteria, and human health criteria to determine which criteria are most stringent. The most stringent criterion among the three criteria categories will apply for any particular waterbody. The exception to this involves the 16 waterbodies listed at 18 AAC 70.050(b) which are not designated for all uses.

EPA approves the first revision to these use categories. This revision complies with 40 CFR 131.11(a)(1) and 40 CFR 131.11(b)(1)(i). EPA is approving this revision because, as discussed above, the particular water quality criteria in effect in Alaska are scientifically based and protective of the use whether or not they are more stringent than DWS.

The second revision applicable to these use categories is a new provision that allows Alaska to develop acute and chronic aquatic life criteria, in regulation, for sensitive resident Alaskan species. This revision provides the State a mechanism to revise toxics criteria based on the sensitivity of resident Alaskan species. This revision is in accordance with 40 CFR 131.11(b)(iii). Any new Alaska specific toxic criteria must be submitted to EPA for review and approval or disapproval in accordance with 40 CFR 131.20 and 131.21.

The third revision applicable to these use categories involves new wording for a narrative criterion for toxic substances. Such narrative criteria are statements that describe the desired water quality goal. As stated in the WQS Handbook (p. 3-24), narrative criteria can supplement numeric criteria for toxicants or they can be the basis for establishing controls when the State has not adopted chemical-specific numeric criteria. EPA considers narrative criteria for toxic substances to apply to all designated uses at all flows and are necessary to meet the statutory requirements of section 303(c)(2)(A) of the CWA.

Specifically, the narrative criterion language in the 1989 Alaska WQS regulations focused on undesirable odor or taste to fish. The 1996 Alaska WQS now include the phrase "no concentration of toxic substances in water or in shoreline or bottom sediments, that, singly or in combination, cause or reasonably can be expected to cause toxic effects on aquatic life, except as authorized in this chapter". This new narrative criterion addresses: the water column, sediment, and the shoreline; cumulative effects of more than one toxic substance; and potential toxic effects, not just demonstrated toxic effects. Compared to the 1989 narrative criterion, this revision provides a clear goal statement and provides additional protection to aquatic resources from exposure to toxic substances. This revision complies with section 303(c)(2)(A) of the CWA, the guidance in the WQS Handbook, and the requirement at 40 CFR 131.11(a)(2), and 40 CFR 131.11(b)(2). EPA approves this third revision applicable to these use categories.

Color (Same as the Detailed Discussion Attached to the Letter)

Alaska has adopted new numeric color criteria for the following freshwater use categories: FW drinking water - 18 AAC 70.020(b)(1)(A)(i), FW aquaculture - 18 AAC 70.020(b)(1)(A)(iii), FW growth and propagation - 18 AAC 70.020(b)(1)(C), marine aquaculture - 18 AAC 70.020(b)(2)(A)(i), marine seafood processing - 18 AAC 70.020(b)(2)(A)(ii) and marine growth and propagation - 18 AAC 70.020(b)(2)(C). The 1996 WQS for color are a combination of numeric and narrative criteria. The numeric revisions to the color criteria for these uses are no less stringent than Federal criteria.

The narrative revisions to the color criterion for the use categories identified above adds the phrase "or the natural condition whichever is greater". This phrase could result in an adjustment to the numeric criterion (15 color units) based on the natural condition. While natural conditions may not automatically be protective of the uses in question, such protection can be assured by using the site-specific criteria provisions of 18 AAC 70.025(b) before substituting natural conditions for the numeric criterion. Read together, these provisions meet the requirements of 40 CFR 131.11(a)(1) and 131.11(b)(2).

These revised criteria meet the requirements of section 40 CFR 131.11(a)(1) and 131.11(b)(2) and are approved.

Petroleum Hydrocarbons

Applicable Federal Criteria

Oil and grease is a measure of biodegradable animal greases and vegetable oils, along with the relative non-biodegradable mineral oils. Petroleum hydrocarbons is the measure of only the mineral oils. They are a subset of oil and grease and represent a large family of compounds that include straight and branched-chain hydrocarbons, monoaromatic hydrocarbons (single carbon-ring molecules), and polynuclear aromatic hydrocarbons (PAH) (multiple carbon-ring molecules).

EPA has narrative criteria for oil and grease for domestic water supply and aquatic life. For domestic water supply the EPA criterion is: "virtually free from oil and grease, particularly from the tastes and odors that emanate from petroleum products." For aquatic life, the EPA criterion includes narrative statements for the water column, sediment, and surface waters. The three narrative statements are: 1) levels of individual petrochemicals in the water column should not exceed 0.01 of the lowest continuous flow 96-hour LC₅₀ to several important freshwater or marine species, each having a demonstrated high susceptibility to oils and petrochemicals; 2) levels of oils or petrochemicals in the sediment which cause deleterious effects to biota should not be allowed; and 3) surface waters shall be virtually free from floating nonpetroleum oils of vegetable or animal origin as well as petroleum derived oils.

EPA has not developed aquatic life or human health criteria for petroleum hydrocarbons as a class. EPA's regulations at 40 CFR 131.11(b) require States to adopt criteria based on: i) EPA's 304(a) criteria, ii) 304(a) criteria modified to reflect site-specific conditions, or iii) other scientifically defensible methods. Since EPA has not developed criteria for petroleum hydrocarbons, Alaska's demonstration must meet the test of scientific defensibility [40 CFR 131.11(b)(1)(iii)]. For petroleum hydrocarbons, Alaska's revised standards are scientifically defensible in accordance with [40 CFR 131.11(b)(1)(iii)] as detailed below.

Prior to 1992, EPA had, for PAHs as a class, human health criteria and a lowest observed effect concentration (LOEC) for exposure of aquatic life to PAHs (45 FR 79339). In the 1992 National Toxics Rule (NTR), EPA eliminated the aquatic life LOEC and human health criteria for PAHs as a class and included 20 individual aromatic hydrocarbon compounds (3 monoaromatic compounds and 17 PAHs). EPA promulgated human health criteria for 14 of the 20 individual aromatic hydrocarbon compounds. Eight of the individual aromatic hydrocarbon compounds are carcinogenic. EPA promulgated human health criteria for Alaska for these eight carcinogens (57 FR 60922). The eight carcinogenic aromatic hydrocarbons include: benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. EPA's policy is to apply human health criteria to all waters designated for aquatic life (57 FR 60860). Therefore, the human health criteria for aromatic hydrocarbons apply to freshwater and marine growth and propagation of fish, shellfish, other aquatic life, and wildlife uses in order to protect humans who might consume aquatic life. In general, for organic compounds, human health criteria tend to be more stringent than the corresponding aquatic life criteria and they would therefore, be protective of Alaska's freshwater and marine uses.

1989 Alaska Petroleum Hydrocarbon Standard

The 1989 WQS contained numeric criteria plus a procedural mechanism (bioassay procedure) to establish criteria for aquatic life based on toxicity tests conducted with sensitive resident Alaskan species: 15 ug/l total hydrocarbon (TH) or 0.01 of the lowest measured continuous flow 96-hour LC_{50} sensitive or biologically important species and 10 ug/l total aromatic hydrocarbon (TAH) or 0.01 of the lowest measured continuous flow 96-hour LC_{50} for sensitive or biologically important species. These numeric criteria and the associated procedural mechanism applied to the water column.

The 1989 WQS also contained narrative criteria: concentrations of hydrocarbons, animal fats, or vegetable oils in the sediment shall not cause deleterious effects to aquatic life; shall not cause a film, sheen, or discoloration on the surface or floor of the waterbody or adjoining shorelines; surface waterbodies shall be virtually free from floating oils. The numeric and narrative criteria applied to the freshwater and marine growth and propagation of fish, shellfish, other aquatic life and wildlife use category. Notes 8, 9, and 10 in the 1989 Alaska WQS provided additional clarification about the use of continuous flow and static bioassays, the procedures for analysis, and the use of water soluble extracts of petroleum hydrocarbons for the bioassays. Definitions for TAH and TH were included in the 1989 WQS. The definition for TH specified the laboratory method to be used for measurement of TH and the sampling method for gathering a sample. No laboratory method was specified for TAH.

Alaska has adopted numeric petroleum hydrocarbon criteria that are more stringent than any other State based on a 1992 survey of state WQS for hydrocarbons.

1996 Alaska Petroleum Hydrocarbon Standard

Several provisions in the 1989 petroleum hydrocarbon standard have not changed in the 1994 and 1996 WQS. The unchanged portions include the numeric criteria, the fact that the numeric criteria apply to the water column, the narrative criteria for sediment and the surface of waterbodies, and the sampling procedure (sample must be taken below any observable sheen).

Alaska's Public Review Packet for the SCLDF petition indicates that Alaska has done studies to determine which fractions of petroleum hydrocarbons are the most toxic. Alaska also compared

different methods of measurement to determine which analytical methods are best for quantifying the most toxic fractions of petroleum hydrocarbons and which methods are most sensitive for detecting petroleum hydrocarbons. The 1996 WQS regulate and measure the collective toxicity of several individual hydrocarbon fractions found in the water column. (State of Alaska Public Review Packet, Proposed Revisions to the Antidegradation Policy in the WQS Regulations 18 AAC 70 and Request for Public Comment on the Petition by the SCLDF to Repeal Certain Sections of the Current WQS Regulations, February 1995)

As a result of these studies, the 1994 and 1996 Alaska WQS include several revisions to this pollutant category. The revisions include; 1) elimination of the bioassay procedure to establish numeric criteria for aquatic life based on the sensitivity of resident Alaskan species, 2) revisions to Note 8 that change the analytical methods to be used to test for petroleum hydrocarbons, 3) a new definition for TAH, 4) elimination of the TH standard, 5) adoption of the total aqueous hydrocarbon (TAQH) standard, and 6) application of the growth and propagation standard to additional use categories.

1) elimination of the bioassay procedure to establish numeric criteria for aquatic life based on the sensitivity of resident Alaskan species

The first revision in 1994 and 1996 WQS eliminates the option to use the bioassay procedure (0.01 of the 96-hour LC_{50}) to establish numeric criteria for sensitive or biologically important species. (Old Notes 8, 9, and 10 have also been repealed as unnecessary since they provided additional information about the bioassay procedure that has been eliminated.) Because of the difficulty of implementing the bioassay procedure, EPA commented in Nov. 1992 on proposed changes to the Alaska WQS, and supported this action, indicating that it would be appropriate for the State to move away from the bioassay procedure to the no observable effects concentration (NOEC) in order to limit whole effluent toxicity. The NOEC approach is included in the newly adopted WET provision at 18 AAC 70.023.

The newly adopted WET provision found at 18 AAC 70.023 can be used to provide the same protection. Additionally, since petroleum hydrocarbons can be included in the broad definitions for "toxic" [18 AAC 70.990(53)] or "toxic substances" [18 AAC 70.990 (54)], the newly adopted narrative criterion under the "Toxics and Other Deleterious Organic and Inorganic Substances" could also be used to establish "in regulation chronic and acute criteria to protect sensitive and biologically important life stages of resident Alaska species" [18 AAC 70.020(b)]. The narrative criterion in the "Toxics" pollutant category indicate that the methods to be used to develop chronic and acute criteria must be EPA or Alaska Department of Environmental Conservation (DEC) approved methods. The narrative criterion specifies that any criteria developed under this provision must be adopted in regulation. Therefore, any criteria developed under this narrative provision must be submitted to EPA for review and approval or disapproval. Elimination of the 1989 WQS bioassay procedure from this pollutant category is approvable because the "Toxics" narrative criterion at 18 AAC 70.020 and the WET provision at 18 AAC 70.023 can be used to provide the same protection. (See the discussions of these provisions.)

2) revisions to Note 8 that change the analytical methods to be used to test for petroleum hydrocarbons

The second revision is a new Note 8 which specifies new analytical methods for measuring TAH and TAqH. The only method that was specified in the 1989 WQS was method 503(B) for TH which is an infra-red (IR) method that had a detection limit higher than the numeric criteria (EPA 600/4-79-020, p. 413.2-1). It is being replaced by EPA-approved methods 602 and 610 which use gas chromatography (GC). GC is a more sensitive detection method than IR and methods 602 and 610 can measure aromatic hydrocarbon concentrations lower than the numeric criteria of 10 ug/l for TAH and 15 ug/l for TAqH (40 CFR Part 136, App. A Method 602 Table 1 and Method 610 Table 1). A method detection limit that is lower than the numeric criteria is important for compliance monitoring and the assessment of ambient water quality. Unlike method 503(B), methods 602 and 610 also identify target compounds to be measured (40 CFR Part 136, App. A Method 602 1.1 and Method 610 1.1). Note 8 indicates that alternative methods can be used with Department approval. EPA endorses the concept of modifications to methods as long as the results obtained are no less precise and accurate than the results obtained using the unmodified method (EPA 821-B-93-001, p.10). Adoption of these methods and summing the results are approvable.

Although methods 602 and 610 were developed and have been available for almost 20 years, EPA does not consider them to be outdated or inflexible. The detection limits can be met with good quality laboratory instruments. For example, method 610 allows for either gas chromatography (GC) or high performance liquid chromatography (HPLC) analysis. However, GC analysis has problems with analytes that co-elute. HPLC can be used to overcome the co-elution problem but then there can be a problem with the detection of the first four compounds. Laboratories can meet the specified detection limits of these compounds by selecting U.V. detection equipment that meets or is lower than the published minimum detection limits (MDL).

Flexibility is permitted in the 600 Series Methods used for NPDES compliance monitoring. A list of selected methods with the location and documentation of recommended acceptable test procedures (ATP) is found in a memo from James O'Dell, ATP Coordinator dated Nov. 15, 1996. For example, the analyst is permitted to "improve separations or lower costs of analyses" provided that the results obtained are no less precise and accurate than the results obtained using the unmodified method (EPA 821-B-93-001, p.10). The analyst is allowed to use professional judgement in selecting packed or open tubular (capillary) columns (EPA 821-B-93-001, p.10). This flexibility concern is applicable to the use of method 602. Many labs no longer use or have access to the packed columns specified in method 602 but capillary columns are available. EPA provides the flexibility to use capillary columns as long as the results are as precise and accurate as those conducted with a packed column. In other words, a lab can substitute a column as long as the method performance requirements are met. Methods 602 and 610 also allow the use of other methods when the nature of the sample is unknown. Method 602 allows the use of method 624 and method 610 allows the use of method 625 (40 CFR Part 136).

The use of SW-846 Methods such as 8260 and 8270 to replace 600 Series Methods such as 624 and 625 is not acceptable because the SW-846 methods do not satisfy the requirements of 40 CFR, Part 136. "NPDES approved and accepted methods contain quality control requirements and procedures specifically designed for NPDES compliance monitoring. To ensure data integrity and legal defensibility, such requirements and procedures must be followed exactly. Although other EPA

methods may appear to be similar and claim to produce comparable results, until unified EMMC methods are promulgated, only NPDES Methods may be used for compliance monitoring."

We strongly encourage Alaska to use its own guidelines for preparing quality assurance project plans for sampling and testing for petroleum hydrocarbons.

3) a new definition for TAH

The third revision is a new definition for TAH. The 10 ug/l criterion for TAH has not changed. The 1989 definition included compounds with at least one aromatic ring and a number of functional groups: oxyaromatics, heterocyclic compounds, benzene family mononuclear aromatics, and PAHs. No method was specified, in the 1989 WQS, for the determination of TAH. However, prior to the new 1994 WQS, EPA used EPA method 602 to determine the TAH concentrations in NPDES permits. The 1996 definition for TAH is "the sum of the following volatile monoaromatic hydrocarbons: benzene, ethylbenzene, toluene, and the xylene isomers, commonly called BETX." The 1996 WQS Note 8 specifies that BETX or TAH is measured by EPA approved method 602. Method 602 measures; benzene, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, ethylbenzene, and toluene. Xylenes (o-, m-, and p-) are also contaminants of concern and are not listed as analytes in this method. However, if analyses by methods 602 (or 624) is extended slightly, xylenes can be determined by this method. Xylenes would have to be added to the initial and continuing calibration mixtures in order to measure these compounds. Benzene, ethylbenzene, toluene, and xylene (BETX) are the most water soluble of the aromatic hydrocarbons and therefore, the most likely to be present in the water column. Since the numeric criterion applies to the water column, the new definition [18 AAC 70.990(52)] and the use of method 602 are approvable. Additionally, EPA acknowledged, by promulgating human health criteria in the NTR, that benzene, ethylbenzene, and toluene are aromatic hydrocarbons of concern [40 CFR 131.36(b)(19), (33) and (39)].

4) elimination of the TH standard

The fourth revision to the 1996 WQS is the elimination of the TH definition: TH was defined as those compounds measured, using method 503(B) as specified in the 16th edition of *Standard Methods for the Examination of Wastewater*. Analytical method 503(B) (which is equivalent to EPA method 413.2) uses a chlorofluorocarbon (CFC), trichlorotrifluoroethane (Freon-113), solvent for the extraction process. EPA has two methods for measuring total recoverable oil and grease (methods 413.1 and 413.2) and one method (418.1) for measuring total recoverable petroleum hydrocarbons. All three use the same CFC solvent and they will not be available or acceptable by the end of 1997 due to the international ban on CFCs (61 FR 1737 and 60 FR 24970).

Method 503(B) had a detection level of 200 ug/l (EPA-600/4-79-020) which is higher than the 15 ug/l criterion. A detection limit higher than the numeric criteria causes problems with compliance monitoring and the assessment of ambient water quality.

No alternative method is currently available as a direct replacement of method 503(B) (61 FR 1730). EPA-proposed method 1664: *N-Hexane Extractable Material (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM) by Extraction and Gravimetry (Oil and Grease and Total Hydrocarbons)* (61 FR 1730, 1-23-96) does not use a CFC solvent for sample extraction. However, the detection limits of method 1664 range from 1.4 to 1.6 mg/l which are higher than Alaska's numeric criteria.

Elimination of the definition for TH is approvable for the reasons described above.

5) adoption of the total aqueous hydrocarbon (TAqH) standard

The fifth revision is the adoption of the TAqH standard. The TH numeric criterion (15 ug/l) applies to TAqH. Note 8 specifies that the TAqH criterion of 15 ug/l is the sum of monoaromatic hydrocarbons measured by Method 602 (BETX) plus PAHs measured by method 610. Method 610 is EPA-approved and it measures the concentration of each of 16 individual PAH compounds (40 CFR Part 136, App. A Method 610 1.1). Method 610 is used for wastewater to determine the concentration of: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. The detection limits of method 610 are adequate to detect each of the individual 16 PAHs at concentrations that are equal to their solubilities in water (40 CFR Part 136, App. Method 610 Table 1). The definition for TAqH at 18 AAC 70.990(51) is a narrative description of the aromatic hydrocarbons that are measured by methods 602 and 610 (Note 8): "those collective dissolved and water-accommodated monoaromatic and polynuclear aromatic petroleum hydrocarbons that are persistent in the water column; TAqH does not include floating surface oils and grease". Since the numeric criterion (15 ug/l) applies to the water column and TAqH represents the sum of relatively water soluble aromatic hydrocarbons, the new definition [18 AAC 70.990(51)] and the sum of methods 610 and 602 are approvable. The 16 PAHs that are measured by method 610 are among the 20 aromatic hydrocarbons that EPA included in the 1992 NTR.

6) application of the growth and propagation standard to additional use categories

The sixth revision, in the 1996 WQS, extends the combination of numeric and narrative criteria found in the growth and propagation use category to the freshwater and marine aquaculture uses. In the 1989 WQS the petroleum hydrocarbon standard for aquaculture was "shall not exceed 0.01 times the continuous flow 96-hour LC₅₀ or, if not available, the static test 96-hour LC₅₀ for the species involved". The 1989 standard did not include the narrative criteria for sediment and surface water. Application of the revised growth and propagation standard is appropriate for the cultivation of aquatic species for human consumption [18 AAC 70.990(4)] because it adds additional protection to aquatic life exposed to petroleum hydrocarbons in the sediment and surface waters not just the water column. Additionally, the revised standard now measures the concentrations of 19 (16 PAHs plus benzene, ethylbenzene, and toluene) out of 20 aromatic hydrocarbons that EPA included in the 1992 NTR. EPA has established human health criteria for the majority of these aromatic hydrocarbons and these criteria protect human health because they incorporate fish bioaccumulation, fish consumption factors, and the direct intake of drinking water into the calculations for each criterion. This revision is in accordance with 40 CFR 131.11(a)(1) which directs States to adopt criteria to protect designated uses.

Aromatic Hydrocarbons of Concern

The U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry has identified the 16 PAHs measured by method 610, except naphthalene, as suspected of being more harmful to human health than other PAHs, exhibiting harmful effects to humans, and representing a greater chance of human exposure to these PAHs than to others. EPA has acknowledged concern about 20 individual PAHs by including them in the NTR. The 16 compounds

detected by method 610 plus benzene, ethylbenzene, and toluene (from method 602) represent 19 out of the 20 PAH compounds that EPA included in the NTR. (The 20th compound not detected by methods 602 or 610 is 2-chloronaphthalene.) EPA has not developed aquatic life criteria for any of these 20 PAH compounds.

EPA included 20 individual PAHs in the NTR. Out of the 20, EPA promulgated human health criteria for 14. Out of the 14 PAHs with human health criteria, 8 are considered carcinogens. In the NTR, EPA promulgated human health criteria for the eight carcinogenic PAHs for Alaska. Currently, only the eight carcinogenic PAH human health criteria apply to Alaska. Alaska has not adopted any of the noncarcinogenic PAH human health criteria. However, the Alaska TAqH criterion, since it is a summation of 19 out of 20 PAHs, will measure more of the PAHs than have been promulgated for Alaska. The two numeric criteria, 10 ug/l TAH and 15 ug/l TAqH, are lower than the individual human health criteria for the 6 noncarcinogenic PAHs.

Numeric plus Narrative Petroleum Hydrocarbon Criteria

Methods 602 and 610 measure specific "relatively water soluble" aromatic hydrocarbons. These methods do not measure other aromatic hydrocarbons; the straight chain and branched chain (aliphatic) petroleum hydrocarbons; or the "nonaqueous" petroleum hydrocarbons. Nonaqueous petroleum hydrocarbons include heavier (longer chains, more carbon rings) hydrocarbons that are less water soluble and are more likely to attach to particulates and settle out in the sediment or get caught in the thin layer (microlayer) at the surface. Several narrative criteria can be used to regulate the "nonaqueous" petroleum hydrocarbons. Several narrative criteria and the newly adopted whole effluent toxicity (WET) limit can be used to regulate aromatic and aliphatic hydrocarbons, in the water column, that are not measured by methods 602 and 610.

WET is a useful parameter for assessing and protecting against impacts upon water quality and designated uses caused by the aggregate toxic effect of the discharge of pollutants [Technical Support Document for Water Quality-based Toxics Control (TSD) p. 4]. Since Alaska is one of the few States to formally adopt a numeric whole effluent toxicity limit (Regions 9 and 10 Guidance for implementing Whole Effluent Toxicity Testing Programs, May 1996, p. 2-11), WET testing could be used to measure the toxicity of an effluent that has hydrocarbons not measured by methods 602 and 610 and other toxic pollutants. 40 CFR 122.44(d)(1)(v) requires effluent limitations on whole effluent toxicity when it is determined that a narrative criterion will be exceeded. Where there is a reasonable potential determination, federal regulations require limits as well as testing to be included in a permit 40 CFR 122.44(d)(1)(iv).

As stated in the WQS Handbook (p. 3-24), the intent of narrative criteria is to supplement numeric criteria for toxicants. Narrative criteria can also be the basis for establishing controls when the State has not adopted chemical-specific numeric criteria. EPA considers that the narrative criteria for toxic substances apply to all designated uses at all flows and are necessary to meet the statutory requirements of section 303(c)(2)(A) of the CWA. Guidance in the WQS Handbook acknowledges that a combination of independent approaches may be required to support designated uses (p. 3-24). Other provisions in the Alaska WQS can be applied to: nonaqueous petroleum hydrocarbons in the sediment, nonaqueous petroleum hydrocarbons in the microlayer, or petroleum hydrocarbons that are not measured by methods 602 and 610.

- 1) The new narrative criterion language found in 18 AAC 70.020 for Toxic and Deleterious Substances that states that "there may be no concentrations of toxic substances in the water or in shoreline or bottom sediments that, singly or in combination, cause, or reasonable be expected to cause, toxic effects on aquatic life".
- 2) The two previously approved narrative criteria for growth and propagation in the Residues pollutant category that state: "May not alone or in combination with other substances or wastes, make the water unfit or unsafe for the use, or cause acute or chronic problem levels as determined by bioassay or other appropriate methods. May not, alone or in combination with other substances, cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines, or cause leaching of toxic or deleterious substances, or cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines.
- 3) The previously approved narrative criteria for Petroleum Hydrocarbons that "prohibits a film, sheen or discoloration on the surface or floor of the waterbody or adjoining shorelines" can be applied to nonaqueous hydrocarbons and to petroleum hydrocarbons in the microlayer.
- 4) The newly adopted chronic WET provision at 18 AAC 70.023 which measures the aggregate toxic effect any hydrocarbons (including non-aromatic hydrocarbons), whether or not they are they are detected by methods 602 or 610, as well as any other non-petroleum hydrocarbon toxic substance in an effluent.

The new revisions to the Alaska hydrocarbon criteria, in conjunction with several State narrative criteria, will protect all designated uses. These revisions comply with section 303(c)(2)(A) of the CWA, the guidance in the WQS Handbook, and the requirement at 40 CFR 131.11(a)(2). These revised criteria meet the requirements of Section 131.11(b)(iii). EPA approves revisions found at; 18 AAC 70.020(b)(1)(A)(iii) and (b)(1)(C) for freshwater uses; 18 AAC 70.020(b)(2)(A)(1) and (b)(2)(C) for marine uses; definitions at 18 AAC 70.990(51) and (52); and Note 8.

Petroleum Hydrocarbons During the Next Triennial Review Cycle

During the next triennial review, Alaska should adopt or identify procedures to implement the new and previously adopted narrative criteria. The WQS Handbook contains general guidance for narrative criteria implementation on page 3-25. In addition, Alaska should utilize standard sediment toxicity test methods (e.g., EPA/600/R-94/025 and EPA/600/R-94/024) and chemical-specific sediment quality guidelines to implement the State's narrative criteria for protecting bottom sediments. (e.g., Appendix D in EPA's Draft National Sediment Quality Survey. EPA-823-D-96-002). Until Alaska develops procedures to implement the narrative criteria that supplement the hydrocarbon criteria, EPA will use the guidance in the WQS Handbook for our NPDES permitting actions.

In response to the SCLDF petition, Alaska prepared a report titled "An Evaluation of the Need for Alaska to Adopt a Particulate Hydrocarbon Criterion. This report concludes that the narrative criteria in the Toxic and Deleterious Substances, Residues, and Petroleum Hydrocarbons pollutant categories should be used to regulate particulate hydrocarbons; the State should adopt EPA final sediment quality criteria for acenaphthene, fluoranthene, and phenanthrene (when available from EPA);

and specific guidelines for application of sediment criteria need to be developed. We concur with this statement and strongly encourage the State to pursue these activities during the next triennial review.

Acute Exposure Duration (Same as the Detailed Discussion Attached to the Letter)

EPA approves the addition of 18 AAC 70.020(d). This revision addresses the exposure duration for acute aquatic life criteria. EPA interprets this addition in light of the more specific provision at 18 AAC 70.032(f)(3)(B)(ii) which is further clarified in the State's policy for acute toxics criteria (letter dated December 19, 1996 from Alaska to EPA Region 10) which designates the 1Q10 as the design flow implementing the duration and frequency component of acute aquatic life criteria.

§18 AAC 70.022 - Human Health Risk Level (Same as the Detailed Discussion Attached to the Letter)

Alaska has adopted a 10^{-5} risk level for human health criteria. This risk level is within the range of risk levels acceptable to EPA. EPA's policy for acceptable risk for carcinogens is found at 45 FR 79323 and 57 FR 60864. EPA approves the risk level adopted by the State in this new section.

EPA promulgated human health criteria for carcinogens for Alaska at 40 CFR 131.36(d)(12). If the State adopts human health criteria and they are approved by EPA, EPA will be able to remove the Federal promulgation applicable to Alaska for human health criteria. Until Alaska adopts human health criteria, the Federal criteria will continue to apply.

We encourage Alaska to adopt human health criteria during the next triennial review. The Federal promulgation was meant to be a stop-gap measure until Alaska could adopt criteria for carcinogens.

§18 AAC 70.023 - Whole Effluent Toxicity Limit (Same as the Detailed Discussion Attached to the Letter)

The "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants" found at 49 FR 9016 introduced EPA's integrated toxics control program. This program consists of the application of both chemical-specific and biological methods to reduce toxic discharges. In support of this policy, EPA developed the *Technical Support Document for Water Quality Based Toxics Control* (TSD). The TSD provides guidance on water quality program implementation issues such as whole effluent toxicity (WET) testing requirements. WET is a useful parameter for assessing and protecting against impacts upon water quality and designated uses caused by the aggregate toxic effect of the discharge of pollutants (TSD p. 4).

EPA regulations at 54 FR 23868 strengthened the requirements of 40 CFR 122.44(d) by requiring water quality-based permit limits for specific toxicants and WET where a permittee has been shown to cause, or has the reasonable potential to cause or contribute to an in-stream excursion of a criterion (WQS Handbook p. 3-26). Biologically based effluent testing procedures are a necessary component of a State's toxics control program under section 303(c)(2)(B) and a principal means for implementing a State's narrative "free from toxics" standard (WQS Handbook p.3-23). Since this provision contains language that allows Alaska some discretion in implementing WET, EPA would

like to clarify that where there is a reasonable potential determination, federal regulations require WET limits as well as WET testing to be included in an NPDES permit [122.44(d)(1)(iv)].

Alaska has adopted a chronic WET limit expressed as 1.0 chronic toxicity unit at the point of discharge or at the edge of a mixing zone, if a mixing zone is approved by the State. Alaska's WET limit complies with the recommendation in the TSD for chronic protection (p. 35) and satisfies the requirements of 49 FR 9016, 54 FR 23868, and 40 CFR 131.11. EPA approves this addition to the Alaska WQS in its entirety.

§18 AAC 70.025 - Site-Specific Criteria

General Revisions

The State has added new language at 18 AAC 70.025(a) which clarifies that there are two processes which may be followed for developing site-specific criteria (SSC). The second revision to 18 AAC 70.025(a) states that a SSC may be developed if the criteria found in 18 AAC 70.020 are "more stringent or less stringent than necessary to ensure full protection of the corresponding use class" [18 AAC 70.025(a)(2)].

Background Information about Natural Condition

In the Amendments to WQS Regulations Pertaining to Indian Reservations (Dec. 12, 1991, preamble FR 64866) EPA states that: "EPA also does not advocate the adoption of water quality criteria more stringent than natural background water quality."

The flexibility available to States for discharge-/stream-specific adjustments includes site-specific criteria (SSC), variances, design low-flow provisions, compliance schedules for NPDES permits, and use attainability analysis (UAA) for designated use removal. These provisions, with the exception of compliance schedules, are found in the WQS Regulations 40 CFR Part 131. 40 CFR Part 131 does not provide guidance on natural conditions. The 40 CFR Part 131 Regulations do not define natural condition. The EPA WQS Handbook describes 3 methodologies for doing SSC: 1) National Data Base Recalculation Procedure, 2) Resident Species Procedure, and 3) Water Effects Ratio Procedure. None of these three SSC procedures specifically includes natural condition based SSC.

Alaska, prior to 1989, had an independent natural condition heading. The 1994 and 1996 WQS has consolidated the natural condition provision into the site-specific criteria heading in the Alaska WQS. However, no matter where a natural condition provision is located, conceptually it can lead to the development of numeric criteria, 40 CFR 131.11(b)(ii) and (iii) and any changes to criteria must be submitted to EPA for review and approval and disapproval in accordance with 40 CFR 131.20.

Alaska has adopted revisions that include: a definition for natural condition that draws a regulatory distinction between a situation caused by nature, without human-caused changes, and human-caused problems; a provision that criteria may be set equal to the natural condition; a formal process for the authorization of natural condition based SSC; a provision to protect designated uses; and an opportunity for public comment.

Natural Condition Revision

The State has added new language at 18 AAC 70.025(a) which clarifies that there are two processes which may be followed for developing site-specific criteria (SSC). The second revision to 18 AAC 70.025(a) states that a SSC may be developed if the criteria found in 18 AAC 70.020 are "more stringent or less stringent than necessary to ensure full protection of the corresponding use class" [18 AAC 70.025(a)(2)]. The third revision is the addition of a definition for natural condition at 18 AAC 70.990(34).

Alaska has adopted a new definitions that relates to site-specific criteria. EPA requested that Alaska develop a definition for natural condition in comments submitted on Nov. 13, 1992. Alaska has adopted a definition that represents an acceptable variation on the definition that EPA proposed. The definition [18 AAC 70.990(34)] will prohibit increases in pollutant loading from human sources or causes.

The major change to the SSC section is the addition of 18 AAC 70.025(b). This new section allows the State to issue a SSC based on natural conditions, without formally amending the State's WQS regulations, where the State finds that the SSC fully protects the designated use and public participation has been provided. Specifically, the State will "administratively authorize in a permit, certification, or approval" a natural-condition based SSC.

This revision, 18 AAC 70.025(b), provides Alaska with an alternative mechanism to develop natural condition-based SSC. It reflects the key CWA requirements that SSC protect designated uses [40 CFR 131.11(a)(1)] and that public participation occurs before any SSC are adopted [40 CFR 131.20(b)]. All SSC, including those established in accordance with 18 AAC 70.025(c) or any new natural condition-based SSC developed under 18 AAC 70.025(b), must be submitted to EPA for review and approval or disapproval in accordance with 40 CFR 131.20. Alaska's demonstration must meet the test of scientific defensibility [40 CFR 131.11(b)(1)(iii)].

18 AAC 70.025(b) does not require that Alaska's WQS regulation be subsequently amended to reflect the new natural condition-based SSC. Therefore, Alaska needs to develop a public record-keeping, docketing system, or other means of appending any new natural condition-based SSC to its standards. Public notification is warranted so that Alaska citizens will be able to determine if a criterion has been changed and what the revised criterion is for a particular waterbody.

EPA approves the revisions and additions to 18 AAC 70.025(a) and (b) and 18 AAC 70.990(34) of the Alaska WQS regulations in accordance with 40 CFR 131.11(b)(ii) which allows the establishment of criteria to reflect site-specific conditions. EPA will review for approval or disapproval all individual SSC that are established in accordance with the procedures specified in this section.

Implementation of the Alaska Natural Condition Provision

Implementation of the Alaska natural condition provision will raise some complex issues. The State needs to develop guidance to address the technical issues involved in developing scientifically defensible SSC based on natural condition. Such guidance must be specific enough to establish natural background concentrations accurately and provide results that are reproducible (e.g., address issues like reference conditions, source analysis). Guidance is needed to deal with a number of

technical issues related to sampling; the definition of a "site", the minimum number of samples needed, and procedures for determining the "highest quality natural condition". Implementation guidance would be the basis for translating the narrative statement in 18 AAC 70.025(b) into numerical values.

Section 18 AAC 70.025(b) does not make it clear how or when the State will "administratively authorize in a permit, certification, or approval" a natural condition-based SSC. The regulation does not spell out the process the State intends to use to give the public or EPA notice of its final decision to administratively authorize a natural condition-based SSC. The regulation does not clarify the procedure by which the State will submit the final natural condition-based SSC to EPA for approval.

EPA will not consider a natural condition-based SSC administratively authorized until Alaska submits documentation that demonstrates that the procedures and requirements in 18 AAC 70.025(b) have been followed. Alaska must submit to EPA documentation to show: 1) the natural condition of a waterbody has been demonstrated to be of lower quality than a water quality criterion for the use classes in 18 AAC 70.020(b); 2) the natural condition will fully protect designated uses in 18 AAC 70.020(b); 3) exceedences of WQS can be attributed to natural conditions; 4) how the natural condition based criterion was established; and 5) that the public has had an opportunity to provide comments on the proposed natural condition-based SSC. Once a SSC is administratively authorized by the State, EPA must be officially notified of any final decision to authorize natural condition-based SSC in order to carry out approval/disapproval duties under CWA section 303(c)(3). EPA will review the data and rationale submitted with each natural condition SSC and will determine whether development of the criterion is scientifically defensible as required by 40 CFR 131.11(b)(1)(iii).

Additionally, when the national condition regulation is implemented it will affect the NPDES program, which is administered by EPA, Region 10. NPDES effluent limits will be linked to the authorization of a natural condition-based SSC. Alaska needs to provide EPA with its draft documentation for the natural condition-based SSC in time for EPA to develop limits based on the natural condition-based SSC in the draft NPDES permit. At a minimum, Alaska should initiate the public notice process, in 18 AAC 70.025(b), concurrently with EPA public review of the NPDES draft permit. To provide a meaningful public review process, the State should present the documentation described above. EPA will not use a natural condition-based SSC in a final NPDES permit unless it has been officially administratively authorized and the procedure in 18 AAC 70.025(b) has been completed.

It is our understanding that use of a natural condition-based SSC will preclude the use of a mixing zone. In general, the mixing zone concept involves dilution of effluent that has a concentration of a particular parameter that is higher than a water quality criterion, with receiving water that has a concentration that is lower than the applicable criterion. If the receiving water is already at the concentration of the criterion, in this case a natural condition-based SSC, dilution is not available.

If implementation becomes problematic, we may revisit our approval of this provision at some point in the future. Additionally, this issue is being discussed at the national level and if relevant policy or guidance is developed from national discussions, we may revisit our approval.

§18 AAC 70.032 - Mixing Zones

Approved Mixing Zone Provisions

EPA's WQS regulations at 40 CFR 131.13 authorizes State mixing zone regulations as a matter of State discretion. "States may, at their discretion adopt certain policies in their standards affecting the application and implementation of standards." (WQS Handbook p. 5-1 and 40 CFR 131.13). EPA has reserved the right to approve/disapprove the adopted State policy pursuant to CWA §303(c). The current EPA guidance for mixing zones is found in the 1993 WQS Handbook (second edition) and the 1991 Technical Support Document (TSD). The TSD provides technical descriptions of models to protect drifting organisms for acute effects and descriptions of time and distance calculations. The TSD provides guidance on methodologies and examples of their use.

Relationship between Existing Uses and Designated Uses

Throughout the mixing zone policy, is reference to protection of existing uses. This explicit treatment of existing uses in no way negates protection of designated uses. The mixing zone policy itself will protect designated uses. Conceptually, state's designate uses and establish numeric and narrative criteria that protect the designated uses. If numeric and narrative criteria are met at the edge of the mixing zone then designated uses will be protected. The Alaska WQS clearly state that:

"the water quality standards and limits set under this chapter may be exceeded only within a mixing zone authorized by the department. A discharge may not cause or reasonably be expected to cause lethality to passing organisms in the mixing zone, or a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone. Human health and chronic aquatic life criteria apply at and beyond the boundaries of the mixing zone." [18 AAC 70.032(b)].

Therefore, since Alaska's mixing zone policy provides that criteria will be met at the edge of the mixing zone and the mixing zone does not impair the integrity of the waterbody as a whole [18 AAC 70.032(c)], designated uses are protected.

In situations where the site-specific existing use is of higher quality or better than the designated use, the Alaska mixing zone policy states that the existing use must be protected. The Alaska mixing zone policy contains several provisions that allow for more site-specific adjustment of the mixing zone. In situations where the existing use is of lower quality than the designated use, criteria that protect the designated use have to be met at the edge of the mixing zone. Therefore, the Alaska mixing zone policy will protect criteria that maintain standards and the designated uses the criteria protect. The mixing zone policy specifically states that existing uses will be maintained or protected [18 AAC 70.032(c)]. If the existing use is better than the designated use, then this policy will require site-specific adjustments to protect the existing use.

Allowable Mixing Zone Characteristics

EPA guidance describes allowable mixing zone characteristics that should be established to ensure that:

- mixing zones do not impair the integrity of the waterbody as a whole;
- there is no lethality to organisms passing through the mixing zone; and

-there are no significant human health risks considering likely pathways of exposure. The Alaska mixing zone policy contains provisions that deal with each of these allowable mixing zone characteristics (WQS Handbook p.5-1).

The key consideration in the designation of a mixing zone is the protection of the integrity of the water body as a whole. A mixing zone is an exception to the designated use but the exception cannot consume the rule. The Alaska WQS contain this wording at 18 AAC 70.032(c). This provision indicates that in determining the appropriateness of a mixing zone and the size DEC will ensure that existing uses of the waterbody as a whole is maintained.

A mixing zone cannot result in lethality to organisms passing through the mixing zone. The Alaska mixing zone policy contains this provision at 18 AAC 70.032(b). This section of the mixing zone policy has adopted, by reference, methods 2 and 3 from the EPA WQS handbook to prevent lethality.

A provision for determining that there are no significant health risks is found at 18 AAC 70.032(a)(1)(B). This section indicates that if evidence demonstrates bioaccumulation, concentration, or persistence of these compounds then this can be used as a basis to not authorize a mixing zone. For carcinogens, a mixing zone will be evaluated based on a risk-assessment like process. EPA guidance on mixing zones does not prohibit the discharge of carcinogens or bioaccumulative compounds (WQS Handbook p.5-8).

The WQS handbook guidance recommends that a mixing zone policy should include statement in the WQS on whether or not mixing zones are allowed. The Alaska WQS mixing zone policy indicates the factors to consider before the State decides to authorize or not authorize a mixing zone at 18 AAC 70.032(a). 18 AAC 70.032(a) specifies the issues to consider that would allow the State to decide to NOT authorize a mixing zone. "The department will not authorize a mixing zone if it finds available evidence that reasonably demonstrates that pollutants could":

- bioaccumulation and bioconcentration, to "significantly adverse levels",
- cause carcinogenic, mutagenic, or teratogenic effects on biota and or significant human health risks,
- create a public health hazard,
- fail to provide a zone of passage to aquatic life, and
- cause an adverse impact on anadromous or resident fish or shellfish,
- cause an adverse effect on threatened or endangered species.

Mixing Zone Methodologies

EPA guidance indicates that mixing zone WQS regulatory language should describe the State's methodology for determining location, size, shape, outfall design, and in-zone quality of mixing zones (WQS Handbook p. 5-2). The new and revised portions of the mixing zone regulations found in the 1994 and 1996 WQS contain provisions that deal with these subject areas.

Location

Under this heading a mixing zone policy should indicate the important biological areas that should be protected. 18 AAC 70.032(f)(3)(D) states that mixing zones will not be authorized in areas of anadromous fish spawning or resident fish spawning redds. When a mixing zone is allowed it

should provide a continuous zone of passage for free swimming and drifting organisms and prevent impairment of resource areas. 18 AAC 70.032(a)(2) includes "no adverse impacts on anadromous or resident fish or shellfish spawning or rearing; a barrier formed to migratory species; failure to provide a zone of passage; or adverse effects on T and E species. 18 AAC(f)(C) indicates that a mixing zone may not result in permanent displacement of indigenous organisms or cause a reduction in fish population levels in the waterbody.

Size and Shape

To ensure that mixing zones do not impair the integrity of the water body as a whole, it should be determined that the mixing zone will not cause lethality to passing organisms and that considering likely pathways of exposure, no significant human health risks exist. One way to achieve these objectives is to limit the size of the area affected by the mixing zone. In 18 AAC 70.032(d) a mixing zone must be as small as practicable and in 18 AAC 70.032(e) the mixing zone will be reduced if pollutants will cause nuisance aquatic life, objectionable odors, color, taste, in commercially harvested species. Specific size limitations for estuarine and marine waters, lakes, and streams, rivers, and other flowing fresh water are found in 18 AAC 70.032(f).

Outfall Design

Before a mixing zone is designated engineering design should be considered. 18 AAC 70.032(c) includes: flushing and mixing characteristics; effluent treatment technology; modelling of near-field and far-field mixing; and cumulative effects of multiple mixing zones.

In-Zone Quality

According to the WQS Handbook, in zone quality is dependent on application of several of the narrative criteria found in other sections of the Alaska WQS (free froms).

Prevention of Lethality and Design Flows

Prevention of lethality to passing organisms is an important component of a mixing zone policy. Lethality is a function of the magnitude of pollutant concentrations and then duration an organism is exposed to those concentrations. EPA has identified several ways to prevent lethality to passing organisms in the mixing zone and Alaska has adopted, by reference two of them (WQS Handbook p. 5-6) at 18 AAC 70.032(b).

Closely linked with this topic are critical design flows. WQS should protect water quality for designated uses in critical low flow situations. In the 1996 WQS, Alaska has adopted a 7Q10 design flow for the protection of aquatic life from chronic exposure to toxic substances. In addition, Alaska has clarified a State policy to use the 1Q10 design flow for the protection of aquatic life from acute exposure to toxic substances (letter dated December 19, 1996 from Michele Brown, ADEC Commissioner to Chuck Clarke, EPA Regional Administrator). The EPA recommended design flow for acute criteria is 1Q10 and for chronic criteria is 7Q10 (WQS Handbook p. 5-11).

The new and revised portions of the mixing zone policy also contain terminology that is defined at 18 AAC 70.990. The following definitions [at 18 AAC 70.990] have been added to 1996 WQS for terms that are used in the mixing zone policy: 1, 2, 6, 10, 27, 32, 39, and 47. Although Alaska has not included C class carcinogens in the definition for carcinogens [18 AAC 70.990(6)], EPA is in the process of establishing a new cancer ranking system and when the new classification scheme is finalized, EPA will revisit this definition.

For the reasons above, EPA approves all revisions and additions to this section of the WQS except for the 3Q2 design flow for conventional and nontoxic substances. EPA approves the following new definitions in the 1996 WQS because they are based on Federal guidance; definitions (1) and (10) have been adopted from the 1991 EPA TSD; definition (6) has been adopted from an EPA Federal Register notice (51 FR 33992), and definition (39) is consistent with EPA regional guidance for this term. EPA approves definition (2) because it is derived from a scientific process used by the State to designate waters important to anadromous fish. Definitions (27), (32), and (47) are reasonable and consistent with the CWA and are approved.

Alaska's mixing zone regulation also provides for a 3Q2 design flow for conventional and nontoxic substances. Alaska has not submitted information demonstrating that a 3Q2 design flow is protective of aquatic life for conventional and nontoxic substances. See the following paragraphs for EPA's justification for disapproval of the 3Q2 design flow and discussion of the type of information that is needed to evaluate the scientific defensibility of a 3Q2 design flow.

Disapproved Mixing Zone Provisions

At this time EPA is unable to determine whether Alaska's 3Q2 design flow for conventional and non-toxic substances at 18 AAC 70.032.(f)(3)(B)(ii) is protective of aquatic life. EPA's regulations at 40 CFR 131.11(b) require States and Tribes to adopt criteria based on: EPA's § 304(a) criteria, § 304(a) criteria modified to reflect site-specific conditions, or other scientifically defensible methods. Alaska's adoption of a 3Q2 for conventional appears to be less protective than EPA's § 304(a) criteria, which rely on a 1Q10 and 7Q10 for protection of aquatic life. Alaska has not submitted information demonstrating that a 3Q2 is sufficient to protect aquatic life in Alaska. EPA's regulations at 40 CFR 131.21(a)(2) require that new or revised standards be accompanied by supporting analysis. EPA cannot approve a 3Q2 for conventional and non-toxic substances without a scientifically defensible analysis demonstrating that it is protective of aquatic life.

18 AAC 70.032.(f)(3)(B)(ii) specifies that the lowest average 3 consecutive day flow with a recurrence frequency of once in two years (3Q2) be used for the volume of receiving water available for dilution when calculating the size of a mixing zone and maximum pollutant discharge limitations. EPA's ambient water quality criteria, which are incorporated by reference in Alaska's WQS regulations as Note 5 to 18 AAC 70.020.(b) are derived to be protective of aquatic life under certain conditions. One of those conditions is that the duration of exposure not exceed 4 days for protection from chronic effects or 1 hour for protection from acute effects. Another condition is that the criteria not be exceeded more than once every 3 years on average (50 FR 30784). These conditions are referred to as a 4B3 for protection from chronic effects and a 1B3 for protection from acute effects. For purposes of implementing ambient water quality criteria, EPA correlates a 4B3 biologic flow to a 7Q10 hydrologic flow for protecting aquatic life from chronic effects, and a 1B3 biologic flow to a 1Q10 hydrologic flow for protecting aquatic life from acute effects (see Appendix D to EPA's *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001).

The duration and allowable frequency of exceedences are integral components of ambient water quality criteria and represent EPA's best scientific judgement. EPA believes that attainment of the 4-day averaging period and once-in-three year excursion frequency is sufficiently protective of aquatic ecosystems, but recognizes that these provisions are not always necessary to achieve adequate protection. Consequently, EPA will approve alternative, less stringent duration and frequency

provisions if States or Tribes can demonstrate that they are scientifically defensible, per 40 CFR 131.11(b). This may be done on a state-wide, pollutant-specific, or stream-specific basis.

There are several areas that Alaska could address in an analysis to demonstrate that a 3Q2 is protective of native aquatic life. One area is a hydrologic analysis of lotic systems in Alaska to determine when low flows most frequently occur. This information would be useful to evaluate any overlap in the intervals of low flow with the intervals of sensitive life stages (e.g., salmonid spawning) for aquatic life native to Alaska. Another area to evaluate would be the sensitivity of aquatic life in Alaska to conventional and non-toxic stressors (e.g., ammonia, chlorine, and dissolved oxygen), particularly for sensitive life stages. Other information of interest is how the 3Q2 hydrologic flow correlates to the 1B3 and 4B3 biologic flows. Does Alaska's latitude or length of seasons affect lotic communities ability to recover from exceedences? Another area is the prevalence of refugia in Alaska's lotic systems.

The areas identified above are meant to provide Alaska with examples of the type of information that would be helpful for EPA to evaluate the scientific defensibility of a 3Q2 for conventional and non-toxics in Alaska. For additional guidance see Appendix D to EPA's *Technical Support Document for Water Quality-based Toxics Control* (EPA/505/2-90-001) and pages 102-103 of the *Water Quality Guidance for the Great Lakes System: Supplementary Information Document (SID)* (EPA-820-B-95-001). EPA staff are also available for assistance.

Future Development of Implementation Procedures

Implementation procedures for general policies are not required to be in regulation. They can be adequately addressed in State policy or guidance. We strongly suggest that the State develop a description of Alaska's methodology for specifying the location, boundaries, size, shape, and in-zone quality of mixing zones. The methodology should be sufficiently precise to support consistent regulatory actions. The procedures should be explained with a sufficient level of detail to ensure consistency when used to derive NPDES permit limits and best management practices (BMP) for nonpoint sources. Implementation procedures should clearly identify the issues and decisions that are left to the discretion and best professional judgement of Alaska Department of Environmental Conservation staff as part of the § 401 certification. Implementation procedures should clearly set forth the considerations, guidelines, and default assumptions that will be utilized in making case-by-case decisions.

We realize that the 1994 mixing zone regulations are undergoing public review and comment at this time. We have provided comments on these proposed revisions with an emphasis on clarification of regulatory language to avoid future implementation problems. Alaska has recently clarified that a policy exists to use a 10 year, 1-day (1Q10) critical design flow for acute criteria. Now that Alaska has adopted a point of application for acute aquatic life criteria, 18 AAC 70.032(b), EPA suggests that the State clarify, in regulation, the 1Q10 design flow for acute aquatic life criteria.

Our first comment addresses the section of your mixing zone proposals which prescribes mixing zones for an effluent unless evidence demonstrates that a variety of impacts from the discharge could occur. According to these regulations, impacts are allowable up to a level that is "significantly adverse", "expected to cause... effects", or a "hazard". Implementation procedures for determining whether or not effluent would exceed these levels are not included; this leads to necessary interpretation of these provisions at the state level on a permit by permit basis. So as not to confuse

roles and responsibilities during permit development, EPA permit writers will not propose mixing zones for pollutants covered under this section without a formal assessment and mixing zone authorization from the state. We would like to point out that your current language effectively prohibits mixing zones for carcinogens and possibly mutagens under any circumstances. (See our specific comments to your mixing zone proposals, below.)

18 AAC.70.990 - Definitions

The 1994 and 1996 Alaska WQS contain the following new or revised definitions at 18 AAC 70.990: 1, 2, 3, 6, 10, 17, 20, 25, 27, 32, 34, 35, 39, 41, 45, 47, 51, 52, 53, 55, 57, and 58. Discussion and approval of the following definitions are addressed in the specific sections to which they apply: 55 is in 18 AAC 70.010 - General; 20 and 25 are in 18 AAC 70.011 - Antidegradation Policy; 45 is in 18 AAC 70.020 - Protected Water Classes, Water Quality Standards Table, Sediment; 51 and 52 are in 18 AAC 70.020 - Protected Water Classes, Water Quality Standards Table, Petroleum Hydrocarbons; 34 is in 18 AAC 70.025 - Site-Specific Criteria; and 1, 2, 6, 10, 27, 32, 39, and 47 are in 18 AAC 70.032 - Mixing Zones.

The remaining definitions are used throughout the WQS regulations and are not found in specific sections or they are not part of a revised section. EPA approves the following 1996 WQS revisions to 18 AAC 70.990 because they are based on Federal guidance; definition (58) complies with the definition found in 40 CFR § 122.2 and definition (17) has been adopted from 40 CFR 131.3. EPA approves the following definitions because they are derived from standard scientific methods or explanations. Definition (3) represents a variation of the way this term is described in the EPA Red Book and matches the narrative description of this phrase found in *Standard Methods for the Examination Water and Wastewater*. Definition (35) is from another portion of Alaska regulations and it complies with the terminology found in *Standard Methods for the Examination Water and Wastewater*. EPA approves definitions (41), (53) and (57), although they are adopted from other portions of Alaska regulations, because they are comprehensive and consistent with the CWA.

