



**ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT FACT SHEET – Final**

Permit Number: AKG370000

Mechanical Placer Miners General Permit

**DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Wastewater Discharge Authorization Program
610 University Avenue
Fairbanks, AK 99709**

Public Comment Period Start Date: February 19, 2021

Public Comment Period Expiration Date: March 22, 2021

Alaska Online Public Notice System: <https://aws.state.ak.us/OnlinePublicNotices/>

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Proposed reissuance of an Alaska Pollutant Discharge Elimination System (APDES) general permit for:

MECHANICAL PLACER MINERS

The Alaska Department of Environmental Conservation (hereinafter referred to as the Department or DEC) proposes to reissue an APDES general permit (hereinafter referred to as permit or GP) for mechanical placer miners. The permit authorizes and sets conditions on the discharge of pollutants from mechanical placer mines to waters of the United States. To ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from mechanical placer mines and outlines best management practices that must be adhered to.

This fact sheet explains the nature of potential discharges from mechanical placer mines and the development of the permit including:

- information on appeal procedures;
- a description of the industry;
- a listing of effluent limitations, monitoring, and other conditions; and
- technical material supporting the conditions in the permit.

Final Permit

The Department has both an informal review process and a formal administrative appeal process for final APDES permit decisions. An informal review request must be delivered within 20 days after receiving the Department's decision to the Director of the Division of Water at the following address:

Director, Division of Water
Alaska Department of Environmental Conservation
PO Box 111800
Juneau, AK 99811-1800

Office Location: 410 Willoughby St., Suite 303, Juneau, AK

Interested persons can review 18 AAC 15.185 for the procedures and substantive requirements regarding a request for an informal Department review. See <https://dec.alaska.gov/commish/review-guidance/informal-reviews> for information regarding informal reviews of Department decisions.

An adjudicatory hearing request must be delivered to the Commissioner of the Department within 30 days of the permit decision or a decision issued under the informal review process. An adjudicatory hearing will be conducted by an administrative law judge in the Office of Administrative Hearings within the Department of Administration. A written request for an adjudicatory hearing shall be delivered to the Commissioner at the following address:

Commissioner
Alaska Department of Environmental Conservation
PO Box 111800
Juneau, AK 99811-1800

Interested persons can review 18 AAC 15.200 for the procedures and substantive requirements regarding a request for an adjudicatory hearing. See <https://dec.alaska.gov/commish/review-guidance/adjudicatory-hearing-guidance/> for information regarding appeals of Department decisions.

Documents are Available

The permit, fact sheet, and related documents can be obtained by visiting or contacting DEC between 8:00 a.m. and 4:30 p.m. Monday through Friday at the addresses below. The permit, fact sheet, and other information are located on the Department's Wastewater Discharge Authorization Program website: <https://dec.alaska.gov/water/wastewater/>.

Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 555 Cordova Street Anchorage, AK 99501 (907) 269-6285	Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 610 University Avenue Fairbanks, AK 99709 (907) 451-2136
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1.0 PERMIT COVERAGE

1.1 Coverage and Eligibility

Section 301(a) of the Clean Water Act (CWA) and the Alaska Administrative Code (AAC) 18 AAC 83.015 provide that the discharge of pollutants is unlawful except in accordance with an APDES permit. Although such permits are usually issued to individual dischargers, DEC regulations at 18 AAC 83.205 also authorize the issuance of "general permits" to categories of discharges when a number of point sources all

- occur within the same geographic area;
- involve the same or substantially similar types of operations;
- discharge the same types of wastes;
- require the same effluent limitations or operating conditions;
- require the same or similar monitoring requirements; and
- in the opinion of the Department, are more appropriately controlled under a general permit than under individual permits.

The Department finds that discharges from mechanical placer mines in Alaska meet the qualifications above and are appropriately covered under a general permit.

Permit Part 1.1 summarizes coverage and eligibility requirements for existing facilities, new or recommencing facilities, and moving or expanding facilities. The permit provides statewide coverage for discharges to fresh waters of the U.S. located in the State of Alaska with certain limitations. A proposed discharge to marine waters would require consideration of factors beyond the scope of this general permit and would require an individual permit.

1.2 Authorized Placer Mining Operations

Permit Part 1.2 describes discharges authorized under the permit. Authorized operations include mechanical mines (i.e., open cut or mechanical dredges) that process gold placer ores and rely on beneficiation processes based on gravity separation. See Fact Sheet Section 3.0 for an industry description. Authorized discharges are those wastewater streams that would be found at a typical mechanical placer mine and include process wastewater and drainage waters as defined within Permit Appendix C and based on regulations at 40 CFR 440.141.

APDES regulations state that "a general permit must specify when a discharger that is eligible for coverage under the permit and has submitted a complete and timely notice of intent in compliance with the general permit, is authorized to discharge under the permit. The permit may allow discharge to begin upon the department's receipt of the notice of intent, after a waiting period specified in the general permit, on a date specified in the general permit, or when the department notifies the discharger that it is covered under the general permit" [18 AAC 83.210(f)]. Authorization to discharge under this permit requires written notification from the Department that coverage has been granted.

Fee regulations for authorizations under APDES general permits became effective on October 22, 2016. To remain covered under the permit, dischargers must complete payment of the annual authorization fee, as defined in Wastewater Disposal regulations at 18 AAC 72. Authorizations delinquent over 90-days in fee payment may be subject to termination at the discretion of the Department (Permit Parts 1.2.2 & 2.2.5).

1.3 Limitations on Coverage

Permit Part 1.3 describes discharges that are either not authorized or subject to additional requirements prior to authorization under the permit. Operations that are not authorized must gain coverage under another applicable general permit or apply for and obtain an individual permit. Coverage limitations are retained from the prior permit and included because the discharges potentially contain pollutants that require monitoring beyond the scope of the permit; are from operations that are not appropriately controlled under this permit; are subject to additional water quality standards and regulatory requirements; or occur in protected waters. Additionally, the 2021 permit clarifies that diffuse uncontrolled discharges of seepage, such as that occurring through a leaking berm directly into a waterbody, are not authorized (Permit Part 1.3.1.5). Because diffuse seepage dilutes immediately in the receiving water and cannot be adequately monitored for compliance with effluent limitations, it is not permissible under the permit. Controlled seepage that is collected through a conveyance, such as a channel or pipe, and allows for sampling is authorized provided that it is minimized (Permit Part 3.2.7).

The permit provides coverage for operations in National Parks System Units (i.e., Parks and Preserves), National Monuments, National Sanctuaries, National Wildlife Refuges, National Conservation Areas, National Wilderness Areas, and National Critical Habitat Areas provided that the Department receives approval or a statement of non-objection from the federal agency with jurisdiction over the area. If the Department determines the discharge is not appropriately controlled under the general permit, an individual permit would be required.

To ensure the Department is notified of and has an opportunity to review proposed discharges that contain flocculants, coagulants, or dye from dye tests, the permit requires the applicant to submit mine plan information and requires written approval prior to usage. Based on the nature of the discharge, the Department may request additional information and include additional requirements, such as recording of flocculant use, within the authorization (Permit Part 1.3.3).

The Department has received requests and mine plans from permittees wishing to manage site water through the use of dewatering wells. Such wells would be located upgradient from the excavation area and preemptively remove ground water that would otherwise enter the mine cut or other locations within the site. Because the water would be intercepted prior to site infiltration, the discharge would contain less sediment and be easier to treat, facilitating compliance with permit limits. Such discharges would not be expected to contain constituents beyond those normally occurring within typical placer mine discharges. To ensure dewatering well discharges are properly managed, the permit requires the applicant to submit additional information detailing the well plans and requires written approval prior to implementation (Permit Part 1.3.4). Approved dewatering well discharges are considered mine drainage, which falls under the permit definition of process wastewater (Permit Appendix C) and must meet all permit conditions applicable to process waters. Based on the scale of the proposal, such discharges may be subject to additional requirements within the authorization. Discharges the Department determines are not appropriately covered under the general permit would be required to obtain coverage under individual permits (Fact Sheet Section 1.4).

1.4 Operations Requiring an Individual Permit

As outlined in APDES regulations, “the department may terminate or revoke any discharger’s coverage under a general permit, and may require the discharger to apply for and obtain an individual APDES permit” or “an interested person may petition the department to take action” under certain situations (18 AAC 83.215). For example, an individual permit may be required

when 1) the permittee is not in compliance with the conditions of the general permit; 2) a change has occurred in the availability of demonstrated technology or practices for the control of pollutants applicable to the facility; 3) effluent limitations guidelines are promulgated for facilities covered by the general permit; or 4) circumstances have changed so that the permittee is no longer appropriately controlled under the general permit. The permit cites the regulation by reference under Permit Part 1.4.

1.5 Notification Requirements

Applicants with operations eligible for permit coverage must submit a Notice of Intent (NOI) (18 AAC 83.210). An APMA submitted to DNR will be accepted as an NOI if all the required information is included. The notification requirements, outlined in Permit Part 1.5, also 1) require permittees to provide notification of any changes to contact information and 2) clarify that permittees are responsible for notifying the Department once permit coverage is no longer needed.

Under 18 AAC 83.210(a), a permit may be administered according to the individual permit regulations found in 18 AAC 83.115 and 18 AAC 83.120. Therefore, if the permit is not reissued prior to its expiration date, the permit will continue in force and effect until a new permit is issued. A permittee who submits a new NOI within one year prior to the permit expiration date will be covered by the administratively extended permit. Regulations at 18 AAC 83.105(b) require that a permittee submit a new application, or NOI, at least 180 days before the existing permit expires, unless the Department grants the permittee permission to apply on a later date (Permit Appendix A, Part 1.3). To incorporate flexibility into the reapplication process, the Department has granted permittees permission to submit applications up to the expiration date of the general permit (Permit Part 1.5.5). However, the Department cannot grant coverage under an administratively extended permit if an NOI is submitted after the general permit's expiration date.

2.0 REGULATORY HISTORY OF PLACER MINING IN ALASKA

Regulation of discharges from gold placer mining operations in Alaska has been a matter of controversy since enactment of the Clean Water Act. Starting in 1976 and 1977, the U.S. Environmental Protection Agency (EPA) issued approximately 170 individual National Pollutant Discharge Elimination System (NPDES) permits to Alaskan gold placer miners. Those permits were challenged administratively. Some parties argued that the permits were not stringent enough. Others argued that the permits were too stringent. EPA issued an additional 269 individual NPDES permits for gold placer mining in 1983. All of those permits were challenged judicially in *Trustees for Alaska v. EPA*, 749 F.2d 549 (9th Cir. 1984).

EPA issued a new round of individual permits (446 in total) in 1984 to replace expiring permits and to incorporate new promulgated regulations. In 1985, EPA modified the 1984 permits, based on the Trustees for Alaska decision, and issued 93 additional permits. In 1987, EPA issued an additional 368 new permits. The 1987 permits were the subject of litigation based on allegations that EPA and the State unreasonably delayed acting on requests for hearings on those permits in *Stein v. Kelso*, Case No. F89-21 Civil (D. Alaska) (litigation against EPA). The case against EPA was eventually dismissed as moot on April 12, 1990.

The permits EPA issued in 1985 and 1987 were challenged administratively, and ultimately judicially, in *Ackels v. EPA*, 7 F.3d 862 (9th Cir. 1993). A decision by the State of Alaska to

certify the 1985 permits was ultimately resolved by the Alaska Supreme Court in *Miners Advocacy Council, Inc. v. State of Alaska, Department of Environmental Conservation*, 778 P.2d 1126 (Alaska 1989), cert. denied, 493 U.S. 1077 (1990). The State's certification of the 1987 permits was also challenged in *Stein v. Kelso*, 846 P.2d 123 (Alaska 1993).

EPA also was sued in the United States District Court for the District of Alaska in 1986. That case raised a variety of statutory and constitutional issues that were ultimately dismissed or resolved in the federal courts. One of the concerns raised in the 1986 litigation, whether EPA had a duty to promulgate national effluent limitations guidelines for the gold placer mining point source category, was eventually resolved when EPA published such guidelines in 1988 [40 CFR Part 440, Subpart M, as adopted by reference at 18 AAC 83.010(g)(3)]. Those guidelines were the subject of litigation in *Rybachek v. EPA*, 904 F.2d 1276 (9th Cir. 1990).

On June 30, 1992, EPA received a notice of citizen suit alleging that EPA failed to perform a non-discretionary duty to regulate suction dredge gold placer mining operations in Alaska. At that time, EPA decided it would issue individual permits for mechanical placer mining operations (for the 1993 mining season) and propose a general permit for suction dredge operations. On January 14, 1994, EPA proposed a general permit that extended coverage to mechanical, as well as suction dredge operations (59 FR 2504). After responding to public comment, EPA issued the final general permit on May 13, 1994 (59 FR 28079). On September 28, 1994, two environmental groups filed a petition for review of the general permit in the Ninth Circuit Court of Appeals.

On November 18, 1996, EPA and the two environmental groups entered into a settlement agreement to resolve the challenge to the general permit. Pursuant to the agreement, EPA agreed to issue three separate general permits to modify and supersede the original general permit challenged by the environmental groups in 1994. The settlement agreement also required EPA to complete two studies related to the impact of placer mining on the natural environment in Alaska. One study was to address the discharge of metals by placer mining operations and the other was to address the impact of suction dredge mining.

EPA issued three modified general permits on December 6, 1996: one for mechanical operations, one for medium-size suction dredge operations, and one for small suction dredges (61 FR 64796). On April 4, 1997, three environmental groups challenged these permits, No. 97-70365 (9th Cir). In a separate action, the Alaska Miners Association (AMA) also challenged the general permits, No. 97-70379 (9th Cir.). These cases were consolidated on May 5, 1997. The challenge by the AMA was dismissed on January 21, 1999.

During the summers of 1997 and 1998, EPA staff and EPA contractors collected data at 31 placer mine sites and several suction dredge sites. These data were analyzed and presented in three final reports: one entitled *Alaska Placer Mining Metals Study* (EPA 1998), a second entitled *Alaska Placer Mining Metals Study - Year Two* (EPA 1999a), and a third entitled *Impact of Suction Dredging on Water Quality, Benthic Habitat, and Biota in the Fortymile River, Resurrection Creek, and Chatanika River, Alaska* (Prussian et al. 1999). The environmental groups believed that the suction dredge report did not address all of the required elements as set out in the 1996 settlement agreement.

To avoid further litigation over the general permits, EPA and the environmental groups entered into another settlement agreement. Pursuant to the agreement, EPA agreed that further study was necessary to quantify the full impact of suction dredge mining on the natural environment and that further research should be conducted before conclusions are reached about the impact of

suction dredge mining on Alaska streams. EPA further agreed that by January 7, 2000, it would transmit to the *Federal Register* any necessary revisions to the modified general permits to address the results of the placer mining metals study (EPA 1998, 1999a). As a result, the environmental groups' petition to review the three general permits was dismissed on August 31, 1999 upon publication of the reissued general permits.

On October 31, 2008, EPA approved the State's application to administer the NPDES Program. The State's program is called the Alaska Pollutant Discharge Elimination Program (APDES). According to the Memorandum of Agreement between EPA and DEC (DEC 2008), authority to administer the APDES Program would transfer in phases over four years. Under this phased approach, mining permits transferred in year three on October 31, 2010. The transfer of mining permits included the administratively extended 2005 *Mechanical Placer Miners General Permit* and all administratively extended authorizations for facilities that re-applied prior to the permit expiration. Prior to the transfer of authority of the mining sector, EPA completed the draft 2012 permit and provided it to DEC for public notice and the final issuance. DEC issued the permit on March 7, 2012 with an expiration date of October 31, 2014. DEC subsequently reissued the permit on June 22, 2015.

As of July 31, 2020, 298 operations had active coverage under the 2015 permit. Seventeen of the active facilities had authorized mixing zones. Ninety-six facilities submitted NOIs prior to the expiration of the 2015 permit and are considered eligible for automatic coverage upon issuance of the 2021 permit. Appendix D of the permit contains 17 facilities with existing mixing zones covered under the extended 2015 permit and one facility with a new mixing zone. The Department observed an approximate 40% reduction in active authorizations from the prior 2012 permit issuance. This was likely the result of fee regulations that became effective October 22, 2016. Prior to the 2016 fee regulations, most discharges from placer operations were not subject to permit fees. However, following fee implementation, many permittees with inactive operations contacted the Department and terminated discharge coverage. The terminations resulted in a smaller, but more relevant, authorization inventory.

Table 1 summarizes permit-related dates for the *Mechanical Placer Miners General Permit*.

Table 1: AKG370000 Permit Dates						
Agency	Issuance Year	Public Notice		Signed Date	Effective Date	Expiration Date
		Start Date	End Date			
EPA	1994	01/14/1994	02/14/1994	05/13/1994	06/30/1994	06/30/1999
EPA	1996 ^a	01/31/1996	04/18/1996	11/18/1996	04/07/1997	06/30/1999
EPA	1998 ^a	07/27/1998	08/26/1998	10/20/1998	11/27/1998	06/30/1999
EPA	2000	01/14/2000	03/14/2000	08/23/2000	10/02/2000	10/03/2005
EPA	2005	04/21/2005	06/6/2005	08/24/2005	10/07/2005	10/07/2010
DEC	2012	12/09/2011	01/11/2012	03/07/2012	04/06/2012	10/31/2014
DEC	2015	03/10/2015	04/10/2015	06/22/2015	08/01/2015	07/31/2020
Notes:						
a. Modification						

3.0 INDUSTRY DESCRIPTION

Placer mining involves the mining and extraction of gold or other heavy metals and minerals primarily from alluvial deposits. These deposits may be in existing stream beds or ancient, often buried, stream deposits, i.e., paleo or fossil placers. Many Alaskan placer deposits consist of unconsolidated clay, sand, gravel, cobble and boulders that contain very small amounts of native gold or other precious metals. Most are stream deposits that occur along present stream valleys or on benches or terraces above existing streams. Beach placer deposits have been and continue to be important producers in Alaska. These deposits, most notable near Nome, include both submerged and elevated beach placer deposits.

Essential components of placer mining include overburden removal, mining of the gold placer gravels, and processing (gold recovery).

3.1 Overburden Removal

Types of overburden may include barren alluvial gravels, broken slide rock, or glacial deposits. In some parts of Alaska, the pay gravels are overlaid by silty, organic-rich deposits of barren, frozen material generally comprised of wind-blown particles (loess). Particularly high ice content is common. Most facilities utilize mechanical methods for removal of overburden because they generally use the same excavating equipment for mining.

Overburden can also be removed by hydraulicking. Hydraulicking consists of the loosening of material by water delivered under high pressure through water cannons, also known as giants or monitors.

3.2 Mining Methods

Placer mining methods to extract gold bearing material (ore) from a deposit include both dredging systems and open-cut mining.

Dredging systems are classified as hydraulic (e.g., suction dredges) or mechanical (e.g., bucket dredging), depending on the methods of digging. Dredges consist of a supporting hull with a mining control system, excavating and lifting mechanism, gold recovery circuits, and waste disposal system. All floating dredges are designed to work as a unit to dig, classify, beneficiate ores and dispose of waste.

Open-cut methods commonly used in Alaska involve the use of heavy equipment (e.g., bulldozers, loaders, and backhoes) to remove overburden, move pay dirt to wash plants, stack tailings, and construct ditches, ponds, and roads.

3.3 Processing Methods

After overburden removal and extraction, the ore is then hauled by trucks to a wash plant consisting of a combination of equipment used to size and concentrate the material. A typical wash plant includes a grizzly, where initial sizing takes place and extreme oversize material is rejected. Following the grizzly, a trommel or shaker box with a series of screens sizes the remainder of the plant feed. Undersized material is retained and then washed into a sluice system where gold and other heavy minerals concentrate and settle behind metal riffles and onto matting. The gold remains in the sluice matting, while the tailings and wash water exit the sluice and into a settling pond system. The number and configuration of settling ponds varies depending on site specific conditions. After settling to reduce sediment load, pond water is either recycled back to the wash plant or discharged (if there is an excess) to a receiving water, such as a nearby stream. Periodically (on the order of one to two days) the wash plant is shut down and the gold is removed during a “clean up”. The concentrate may then undergo further, more refined concentration, with gravity separation techniques such as jigs, shaking tables and pinched sluices, and possibly magnetic separation if magnetite is present, to produce a high grade concentrate suitable for refining.

4.0 RECEIVING WATERBODY

The permit authorizes discharges to fresh waters of the U.S., as defined in 18 AAC 83.990(77), statewide with certain limitations (Permit Part 1.0).

4.1 Water Quality Standards

Regulations in 18 AAC 70 require that permit conditions ensure compliance with the Alaska *Water Quality Standards* (WQS). The state’s WQS are composed of use classifications, water quality criteria (either numeric or narrative), and an antidegradation policy. The use classification system designates the beneficial uses that each waterbody is expected to achieve. Protected use classifications include water supply for drinking, culinary, food processing, agriculture, aquaculture, and industrial; water recreation, both contact and secondary; growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life. The water quality criteria are established at levels deemed necessary by the State to support the beneficial use classification of each waterbody. The antidegradation policy ensures that the beneficial uses and existing water quality are maintained.

Waterbodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230(e). Some waterbodies in Alaska also have site-specific water quality criterion per 18 AAC 70.235, such as those listed under 18 AAC 70.236(b).

Receiving waters that have been reclassified as industrial use only include Franklin Creek; Isabell Creek (upper); Lillian Creek; Lucille Creek; Nolan Creek and all its tributaries, excluding Acme Creek near Wiseman; Olive Creek (upper); and Ruth Creek near Livengood.

This permit will be available for dischargers in reclassified waters. The water quality-based effluent limits in this permit are more stringent than would be applied in an individual permit in these locations. A facility located on any of the above receiving waters may apply to DEC for revised limits based on the most stringent criteria applicable to the reclassified waterbody, or an individual APDES permit. The Department will consider permit applications on a case-by-case basis and make the final determination as to which permit the applicant should receive. An authorization containing limits or conditions modified for a reclassified waterbody will be subject to public notice, wherein, the public is provided reasonable notice of, and an opportunity to comment on, the modified conditions, including site-specific assessments used to determine the conditions.

4.2 Mixing Zone Analysis

State regulations grant the Department the authority to authorize a mixing zone in a permit (18 AAC 70.240, as approved for CWA purposes on September 30, 2019). An authorized mixing zone must ensure that WQS will be met at all points outside of the mixing zone.

Dischargers under the permit may request a site-specific mixing zone for turbidity (Permit Part 2.2). The permit is intended to cover various locations throughout the state; therefore, the locations of potential discharges are not known until applications are received. The Department will consider mixing zone requests on a case-by-case basis and will only authorize a mixing zone after a site-specific review to ensure the mixing zone is sized and limited appropriately. In locations where there is inadequate dilution for the discharge to meet water quality criteria, such as on a receiving water with low flow or on a water that is listed as impaired for sediment or turbidity within *Alaska's Integrated Water Quality Monitoring and Assessment Report* (Integrated Report), a mixing zone will not be authorized under the general permit. The most current Integrated Report is available at <http://dec.alaska.gov/water/water-quality/integrated-report/>.

The permit contains technology-based effluent limits for settleable solids and water quality-based effluent limits for turbidity and arsenic. Mixing zones may only be issued for water quality-based effluent limits and are not applied to technology-based effluent limits [40 CFR § 125.3(e), as adopted by reference at 18 AAC 83.010(c)(1)]. For this permit reissuance, DEC may authorize a mixing zone for turbidity; however, DEC will not consider authorizing a mixing zone for arsenic.

Mixing zones are developed and authorized through a multi-step process. Because most placer mines are located in remote areas and very little hydrological information is available for the receiving waters, the Department uses a spreadsheet model to determine low flows, maximum flows, and stream dimensions (Fact Sheet Appendix C). The spreadsheet model, developed in coordination with ADF&G and based on prior hydrological studies (Ashton and Carlson 1984; Bray 1982; and Carlson 1987), considers regional factors such as runoff coefficients and local factors such as watershed area, forested area, and stream slope. The model, in turn, outputs the

necessary hydrological information to determine the available dilution and mixing zone dimensions. Finally, the model incorporates the mass-balance equation (Fact Sheet Appendix A.2.1) to determine a modified effluent limit for turbidity. The model conservatively assumes a background turbidity level of zero NTU and bases dilution on the lowest seven-day stream flow that would be expected to occur once in ten years (7Q10). Procedures in earlier permits, established 1,500 NTU as the maximum effluent limit for turbidity that would be authorized for a mixing zone. However, because many handheld turbidimeters have a practical field range of 1,000 NTU, DEC, in practice, uses this value as the maximum limit when authorizing a mixing zone.

Prior to the public notice period and final authorization, the spreadsheet is submitted to ADF&G for review. ADF&G considers any impacts on anadromous or resident fish and sets seasonal limitations as necessary. In the event inadequate dilution is available or ADF&G determines that there are significant habitat impacts, the Department may not authorize a mixing zone.

Following development of a modified turbidity limit and ADF&G review, the mixing zone is subject to public notice, wherein, the public is provided reasonable notice of, and an opportunity to comment on, the modified turbidity limit and associated mixing zone, including site-specific assessments used to calculate the limit and mixing zone size. The department, at its discretion, may modify the mixing zone turbidity and flow limits without additional public notice provided the mixing zone retains the same length and overall mass-balance of the original authorization. See Appendix A.2.1 for a summary of the mass-balance equation. Additionally, a mixing zone that falls within a standard size, as discussed below, may be exempted from the public notice requirement.

Based on analysis detailed in the 2015 fact sheet and to streamline the authorization process, mixing zones that are considered small-scale and of low environmental or human health risk are eligible for expedited authorization, without additional public notice, provided the mixing zone falls within a standard set of parameters after modeling. For expedited authorizations, the mixing zone length is limited to 1,500 feet and the authorization may not include a turbidity limit greater than 25 NTU in fish-bearing waters or 100 NTU in non-fish-bearing waters. As the freshwater turbidity standard for aquatic life is 25 NTU, such a mixing zone remains protective of resident and anadromous fish. The 100 NTU limit allows a higher threshold in non-fish-bearing streams of lower risk. A mixing zone eligible for expedited authorization must undergo ADF&G review and would be subject to length and discharge limitations applicable to the specific operation and waterbody.

Modified turbidity limits are based on the dilution ratio of the receiving water flow to the effluent flow. A large effluent flow results in a lower effluent turbidity limit and a smaller effluent flow results in a higher effluent limit. Mixing zone authorizations establish flow and turbidity limits based on the maximum anticipated effluent flow rate provided in the NOI and the available dilution. However, many operations discharge at different flow rates throughout the season depending on infiltration, precipitation and other factors. To incorporate flexibility into authorizations and allow a permittee to discharge at a higher flow rate with a proportionally lower turbidity limit, the 2015 permit adopted the concept of a turbidity load, a product of the turbidity limit and flow limit. Because the flow rate is only allowed to increase relative to the turbidity limit, consideration of turbidity load retains the overall mass-balance and available dilution and, thus, retains an equal level of protection of the receiving water as the prior permit. See Appendix A.2.1 for a summary of the mass-balance equation.

Fact Sheet Appendix B, Mixing Zone Analysis Checklist, outlines criteria that must be considered when the Department analyzes an applicant's request for a mixing zone. These criteria include appropriateness and size of the mixing zone; human health, aquatic life, and wildlife; treatment technology; threatened and endangered species; human consumption; and spawning areas. All criteria must be met in order to authorize a mixing zone (18 AAC 70.240, as approved for CWA purposes on September 30, 2019). The following summarizes this analysis:

4.2.1 Appropriateness and Size Determination [18 AAC 70.240(b), (c)(2) – (4), (k), & (l)]

Mixing zones must be appropriately sized to ensure that existing uses of the waterbody outside the mixing zone are maintained and protected. The permit reissuance does not propose any changes that would likely result in a lower quality effluent or alterations to previously authorized mixing zones. The Department will use a spreadsheet model and procedures specifically developed to calculate low flow, dilution, and size of the mixing zone for each facility, as appropriate (Fact Sheet Appendix C).

4.2.2 Human Health, Aquatic Life, and Wildlife [18 AAC 70.240(c) - (d)]

Authorized mixing zones must be protective of human health, aquatic life, and wildlife. Discharges from the placer mines covered under this permit add no additional chemicals during the beneficiation process. The parameters of concern are settleable solids, turbidity, and arsenic. Settleable solids and arsenic must meet the most stringent WQS and technology-based effluent limits at the outfall without a mixing zone. The permit allows mixing authorizations for turbidity; however, turbidity is generally not considered a concern for human health and the placer mixing zone model is specifically designed to calculate limits protective of aquatic life.

4.2.3 Treatment Technology [18 AAC 70.240(c)(1)]

The Department may only authorize a mixing zone if the Department finds that the most effective technological and economical methods, consistent with the highest statutory and regulatory treatment requirements, are used to remove, reduce, and disperse pollutants. The permit implements technology-based effluent limits and best management practices (Fact Sheet Section 5.2.1). To meet the technology-based effluent limits, permittees must therefore install the best available technology that is considered economically attainable. Properly designed and operated settling ponds are necessitated under APDES regulations [40 CFR Part 440, Subpart M, as adopted by reference at 18 AAC 83.010(g)(3)] and have been determined to be the best available technology economically achievable used to treat wastewater and reduce pollution prior to discharge for the facilities covered under this permit.

4.2.4 Threatened or Endangered Species [18 AAC 70.240(c)(4)(F)]

The Department may not authorize a mixing zone that will adversely affect threatened or endangered species as listed under the Endangered Species Act (ESA). Most ESA-listed species in Alaska occur in or near marine waters. Due to the permit prohibition against discharge to marine waters and the inland locations of most placer operations in Alaska, authorized discharges under this permit are unlikely to adversely affect ESA-listed species (Fact Sheet Section 10.1). In the event an authorized mixing zone poses a risk to threatened or endangered species, the Department retains the ability to consult with the

National Marine Fisheries Service and the U.S. Fish and Wildlife Service and either include additional site-specific requirements, such as seasonal limitations, in the permit authorization or deny the mixing zone.

4.2.5 Human Consumption [18 AAC 70.240(c)(4)(C) & (d)(6)]

The Department must reduce in size or deny a mixing zone if the pollutants discharged produce objectionable color, taste, or odor in aquatic resources harvested for human consumption; nor can the discharge preclude or limit established processing activities or commercial, sport, personal use, or subsistence fish and shellfish harvesting. The permit prohibits discharges to marine waters where the majority of commercial harvest occurs. Furthermore, ADF&G is provided an opportunity to review and comment on individual mixing zones as part of the authorization process.

4.2.6 Spawning Areas [18 AAC 70.240(e) – (j)]

A mixing zone may not be authorized in a known spawning area of any of the five species of anadromous Pacific salmon found within Alaska. A mixing zone in a spawning area of other fish would only be authorized following consultation with ADF&G and a determination that discharged pollutant would not exceed water quality criteria for growth and propagation of aquatic life and would not adversely affect the capability of the area to support future spawning, incubation, and rearing. As part of the mixing zone authorization process, ADF&G completes a section in the spreadsheet model (Fact Sheet Appendix C). ADF&G review includes input related to spawning areas, as well as fish passage, migratory corridors, timing restrictions, and other receiving water characteristics. ADF&G input into the model is essential to the calculations for the mixing zone and ensures protection for the fish and other aquatic life.

5.0 EFFLUENT LIMITATIONS

5.1 Basis for Permit Effluent Limits

The CWA requires that the limits for a particular pollutant be the more stringent of either technology-based effluent limits or water quality-based effluent limits. Technology-based effluent limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the WQS for a waterbody are met. Water quality-based effluent limits may be more stringent than technology-based effluent limits. The final permit limits reflect whichever requirements (technology-based or water quality-based) are more stringent (Fact Sheet Appendix A, Basis for Effluent Limits).

5.2 Standard Discharges

For the purpose of this permit, discharged wastewater consists of process waters and drainage waters (see Permit Appendix C for definitions and regulatory citations).

5.2.1 Technology-Based Effluent Limits

EPA promulgated effluent limitation guidelines (ELGs) for the gold placer mining point source category in 1988 [40 CFR Part 440, Subpart M, as adopted by reference at 18 AAC 83.010(g)(3)]. The ELGs specify the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT); the best

available technology economically achievable (BAT); and New Source Performance Standards (NSPS). The ELGs also established best management practices (Fact Sheet Section 7.2). BPT, BAT, and NSPS requirements are described in the following sections.

5.2.1.1 **BPT / BAT / NSPS**

The concentration of settleable solids in wastewater discharged from an open-cut mine plant or a dredge plant site must not exceed an instantaneous maximum of 0.2 ml/L (Permit Part 2.1).

The effect of this requirement is to ensure that permittees implement treatment technologies capable of removing settleable solids to maximum of 0.2 ml/L. Properly designed and operated settling ponds are considered to be the best available technology used to remove settleable solids from placer mine wastewater. See Appendix A (Basis for Effluent Limitations) for additional discussion.

5.2.1.2 **BAT / NSPS**

The volume of wastewater that may be discharged from an open-cut mine plant or dredge plant site must not exceed the volume of infiltration, drainage and mine drainage waters that is in excess of the make-up water required for operation of the beneficiation process (Permit Part 2.1).

The effect of this requirement is to prohibit the discharge of any wastewater during periods when new water is allowed to enter the plant site and reduce the overall volume of wastewater that must be treated.

5.2.2 **Water Quality-Based Effluent Limits**

DEC concluded, based on application of the WQS and review of available sampling data, that turbidity and arsenic must be limited in order to meet State WQS.

5.2.2.1 **Turbidity**

The most restrictive turbidity criterion within WQS applies to fresh water sources protected for water contact recreation uses. This criterion states that turbidity "may not exceed 5 NTU above natural conditions when the natural turbidity is 50 NTU or less, and may not have more than 10% increase in turbidity when the natural turbidity is more than 50 NTU, not to exceed a maximum increase of 15 NTU" [18 AAC 70.020(b)(12)(B)(i)]. The criterion for Water Supply, Drinking, Culinary and Food Processing is identical except that the maximum increase is 25 NTU [18 AAC 70.020(12)(A)(i)].

The permit contains a turbidity limit that ensures compliance with WQS under worst case conditions. That is, the turbidity in the effluent must not be more than 5 NTUs above the background turbidity level in the receiving stream. This condition accounts for naturally occurring turbidity in the receiving water and allows the effluent to contain an additional 5 NTUs of turbidity where the receiving water is naturally turbid. The permit condition does not account for those situations where naturally occurring turbidity would allow an increase of up to 15 NTUs, nor does it account for the dilution effects of the receiving stream. Because most streams where placer mining occurs have natural

turbidity conditions much less than 50 NTUs the exclusion of conditions for situations when turbidity is greater than 50 NTUs does not significantly impact most placer mines. Permittees discharging to waterbodies listed as impaired for sediment or turbidity may be subject to turbidity limits based on natural conditions established within Total Maximum Daily Load documents (Fact Sheet Section 7.4). Discharges to waterbodies impaired for sediment or turbidity where natural conditions have not been established within a TMDL are limited to 5 NTU regardless of upstream conditions. Water quality criteria for turbidity are based on natural conditions, typically established by taking an upstream sample. Upstream samples on impaired waters may not reflect natural conditions, thus the permit includes a fixed 5 NTU limit ensuring protection of the most stringent water quality criterion for turbidity. The 5 NTU limit for such waterbodies applies until a TMDL is established or a waterbody specific limit based on natural conditions is authorized in the permit.

Although the permit assumes worst case conditions, DEC, upon application, may modify turbidity limits on case-by-case bases to account for the dilution effects of the receiving water. DEC will grant a turbidity modification upon authorization of a mixing zone (Fact Sheet Section 4.2).

5.2.2.2 Arsenic

This permit retains the effluent limitation for arsenic from the 2012 permit issuance. During that issuance, the effluent limitation for arsenic was reduced from an instantaneous maximum limit of 50 µg/L to an instantaneous maximum limit of 10 µg/L (Fact Sheet Appendix A). This was based on the primary drinking water maximum contaminant level (MCL) applicable through the *Alaska Water Quality Criteria Manual for Toxic and other Deleterious Organic and Inorganic Substances* [18 AAC 70.020(b)(11)(A)]. DEC Drinking Water regulations define the MCL as “the maximum permissible level of a contaminant in water that is delivered to any user of a public water system” [18 AAC 80.1990(79)]; therefore, it is included as an instantaneous maximum limit.

5.3 Storm Exemptions

During earlier permit cycles, an increasing number of NOIs and annual reports indicated that facilities are “non-discharging”, except in the case of a precipitation related event. A review of Annual Reports from 2007 through 2013 indicated that approximately 95% of those reporting stated that there was no discharge from their facility.

Because, in the event of a precipitation-related event, ELGs allow for a storm exemption from the technology-based limits for settleable solids and the receiving water is expected to be similarly affected by the precipitation event, DEC determined that numeric effluent limitations for settleable solids are not necessary during such a discharge [40 CFR Part 440, Subpart M, as adopted by reference at 18 AAC 83.010(g)(3)]. Thus, a storm exemption is included in the permit. The storm exemption requires adherence to best management practices (BMPs) and responses to the non-compliance event, including ceasing all operations that contribute sediment directly to the discharge and reporting the discharge to DEC within 24 hours (Permit Part 2.5). The BMPs ensure that the plant site will be maintained in a manner that will limit any discharge and runoff from precipitation events.

Prior permit issuances distinguished facilities as either “discharging” or “non-discharging.” Because facilities that claimed “non-discharging” status on NOIs often demonstrated to have standard discharges, the 2015 permit removed the “discharging” and “non-discharging” distinction and instead included the storm exemption for all facilities. If discharge occurs during dry weather or does not otherwise qualify for a storm exemption, the permittee must adhere to the standard discharge limitations and monitoring conditions within the permit.

6.0 MONITORING REQUIREMENTS

APDES regulations require that permits include monitoring to determine compliance with permit requirements (18 AAC 83.455). Monitoring may also be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results to DEC.

6.1 Standard Discharges

6.1.1 Flow, Turbidity, and Arsenic

The permit requires instantaneous flow monitoring of the effluent each day of discharge. Flow monitoring must be a measurement or technical evaluation of the discharge based on a calculation of estimated discharge volume over time. Monitoring methods of determining flow may include, but are not limited to, pump capacity calculations, water meter measurements, or batch discharge volume measurements (e.g., calculating the time required to fill a five-gallon bucket).

Turbidity samples of the effluent and upstream receiving water are required three times per week during a discharge. The effluent turbidity limit is based on an upstream value; therefore, upstream and effluent turbidity samples must be representative of the discharge and taken within a reasonable timeframe of each other, with a maximum separation of six-hours between samples. An arsenic sample of the effluent is required once per season. Although the permit does not require an upstream arsenic sample, the permit provides a method for facilities to collect and submit an optional sample. The upstream sample does not relieve facilities from effluent limits for arsenic; however, the sample results may be submitted as a method to assist the Department in considering all factors involved when determining compliance with effluent limits.

The data collected between 1997 and 1998 for EPA’s Metals Study (EPA 1998, EPA 1999a) were reviewed for the preparation of a recommendation paper entitled *Permit Recommendations Resulting from EPA’s Metals Study* (EPA 1999b). In this paper, EPA recognized that turbidity can be used as a surrogate for metals levels in the effluent of placer mines. However, arsenic, a metalloid, occurs primarily in dissolved form and did not correlate strongly with turbidity. To use turbidity as an effective surrogate for metals, other than arsenic, the monitoring frequency was increased to three times per week in the 2000 permit and has been retained in subsequent permits.

6.1.2 Settleable Solids

The 2012 permit required one settleable solids sample of the effluent daily during discharge. The daily monitoring frequency was first implemented in the 1994 permit and based on ELGs established for the placer mining industry in 1988. Turbidity monitoring was required once per season in the 1994 permit, increased to approximately once per

month in the 1996 modification, and finally increased to three times per week in the 2000 permit. Although turbidity monitoring frequency increased from once per season to three times per week, settleable solids monitoring frequency remained as a daily requirement.

A 2015 analysis, conducted by DEC, evaluated sample results from four historical studies (EPA 1997, EPA 1998 & 1999a, R&M 1982, and S&W 1985) and sample results from two active placer mines. The analysis included review of 1,206 sample events where turbidity and settleable solids were collected concurrently from either the receiving water, the final effluent, or one of various stages in the treatment process. Turbidity values in the samples ranged from 0.05 NTU to 50,000 NTU. Of the 496 samples that fell in a range below 80 NTU, only one sample exceeded the 0.2 ml/L settleable solids limit. The remainder of samples below 80 NTU measured as either zero, non-detectable, or trace settleable solids. In the range from 80 NTU to 1,500 NTU, 173 (77%) of the 224 settleable solids samples fell within the 0.2 ml/L limit. In the range above 1,500 NTU, 156 (32%) of the 486 settleable solids samples fell within the 0.2 ml/L limit.

Although the results of the 2015 evaluation support the results from similar studies suggesting that it is difficult to predict a settleable solids value based on a correlating turbidity value, the results demonstrate that there is a maximum settleable solids value that can be anticipated at a given turbidity level. Furthermore, during the 2012 permit cycle, DEC received no sample results from an active placer mine where the settleable solids limit was exceeded during standard discharge conditions. The 2015 analysis strongly indicated that the current permit limits and monitoring for turbidity provide adequate control for settleable solids levels. As most placer mine operations occur on upland streams with coarse substrate and background turbidity levels that typically range from zero to five NTU, a facility that is in compliance with the 5 NTU above background turbidity limit would rarely, if ever, exceed the 0.2 ml/L settleable solids limit. Although prior permits allowed authorization of mixing zones with modified turbidity limits up to 1,500 NTU, analysis indicated that even in the upper turbidity ranges (1,000 – 1,500 NTU), approximately 70% of samples met the 0.2 ml/L settleable solids limit.

Site visits and outreach efforts conducted by DEC also indicated that the monitoring location on a typical placer mine sites is often a considerable distance from the location where operation may be occurring. In such a situation, settleable solids monitoring may consume up to an hour out of each day when monitoring is required. Because a majority of operations (57%) have only one or two operators onsite (McDowell 2014), daily settleable solids monitoring consumes a relatively large percentage of labor hours that may be dedicated to other water management practices such as visual inspections and proper implementation of BMPs.

Based on the 2015 analysis of sampling data and information obtained from site visits and outreach efforts, the 2015 permit included a provision that reduced the settleable solids frequency to three times per week if ten consecutive samples met the 0.2 ml/L permit limit. To streamline permit conditions, the 2021 permit removes the ten consecutive sample requirement and modifies the settleable solids frequency to three times per week. The modified conditions align the sampling schedule with turbidity sampling allowing for clearer permit conditions. Turbidity limits and monitoring (Permit Part 2.1), daily inspections and visual monitoring for turbidity (Permit Part 3.1), and BMPs (Permit Part 3.2) will control the discharge and continue to ensure compliance with the technology-based limit for settleable solids.

6.2 Storm Exemptions

The 2000, 2005, and 2012 permits included a storm exemption [40 CFR 440.141(b)] for the technology-based effluent limit for settleable solids and required associated daily monitoring for settleable solids (effluent) and flow (effluent) during the precipitation discharge event. Turbidity samples (effluent and upstream) and one arsenic sample (effluent) were also required once per each precipitation discharge event. According to the fact sheet for the 2000 permit, the frequency of effluent monitoring during precipitation discharges would indicate whether the design size requirement should be re-evaluated in future permitting actions.

During the 2011 to 2014 mining seasons, DEC Division of Water conducted placer mine site visits, facility inspections, and outreach events. Frequently, site visits and facility inspections occurred during precipitation related discharges, and due to record rainfall in Alaska during the 2014 mining season (Morrow 2015), DEC witnessed more precipitation related discharges than in any previous year.

Site visits during precipitation events and feedback from permittees during outreach events resulted in the following observations. First, many permittees are able to operate for multiple years under normal conditions without a discharge; however, when a rare discharge occurs from a large storm-event, the operators are generally unprepared to collect a suite of water quality measurements. Second, during such an event, the treatment system is often overwhelmed, the discharge is difficult to control, and the ability to meet permit limits may be beyond the permittees control. Third, because the system is overwhelmed, it can be assumed the discharge may occasionally exceed background levels during such an event; however, additional monitoring data is not necessary to confirm or refute this supposition provided the operator takes immediate response action to the discharge. Finally, because the permit did not contain remediation requirements many operators continued to mine and process material when discharge from a precipitation event was occurring.

Based on the observations, the Department determined the most efficient and productive way to manage water quality during a precipitation related discharge event, as defined in 40 CFR 440.141(b), was to remove the associated water quality monitoring requirement, and implement additional response requirements during the discharge event to facilitate a more timely return to compliance. Therefore, the 2015 permit removed the storm exemption monitoring requirements and outlined two response actions. First, operators, upon becoming aware of the discharge, must immediately cease operations, including sluicing, that contribute sediment directly to the discharge and take action to control the discharge. Operation may resume once the discharge has ceased or the permittee begins routine sampling and confirms the discharge complies with all permit limits for settleable solids, turbidity, and flow; because arsenic samples must be sent for laboratory analysis, a task difficult for many remote facilities, operation may resume without the results of the arsenic sample analysis. Second, the permittee has the burden of proof of demonstrating that the discharge qualifies for a storm exemption and must provide supporting information such as photographic evidence or site inspection records. The permit retains the 24-hour notification requirement and the frequency of notifications as a means to alert the Department of the need to re-evaluate design size requirements. To ensure the Department retains an ability to assess the overall water quality of impaired waters, operations on waters listed as impaired for sediment or turbidity on the currently approved Integrated Report, (<http://dec.alaska.gov/water/water-quality/integrated-report/>), must monitor for settleable solids, turbidity, and flow during the discharge per the standard schedule in Permit Table 2.

The required daily facility inspection confirms compliance with BMPs, alerts the permittee of any unanticipated discharges, and ensures that the facility will discharge only in those instances when infiltration or precipitation is excessive (Permit Part 3.1).

7.0 OTHER PERMIT CONDITIONS

7.1 Inspection Program

The permit requires that facilities institute a self-inspection program to facilitate proper operation and maintenance of the recycle system and the wastewater treatment system. The inspection includes an assessment of the mine site and requires visual examination of turbidity upstream, adjacent to, and downstream of the operation (Permit Part 3.1). Permittees must conduct the inspection daily and maintain records of all inspections. If, during the inspection, the receiving water adjacent to or downstream of the operation appears more turbid than upstream, the permittee must take measures to determine the source and ensure compliance with discharge limits and best management practices.

7.2 Best Management Practices (BMPs)

BMPs are measures that are intended to prevent or minimize the generation and the potential for the release of pollutants from industrial facilities to the waters of the U.S. through normal operations and ancillary activities. APDES permits must include BMPs to control or abate the discharge of pollutants when 1) numeric effluent limitations are infeasible or 2) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA [18 AAC 83.475(3) – (4)].

Pursuant to Section 301(b)(2) of the CWA, EPA, in 1988, promulgated ELGs for the gold placer mining point source category that included BMPs [40 CFR Part 440, Subpart M, as adopted by reference at 18 AAC 83.010(g)(3)]. This permit contains BMPs based on the EPA-promulgated ELGs (Fact Sheet Sections 7.2.1 and 7.2.3 – 7.2.6), as well as additional BMPs that the Department considers reasonably necessary to control or abate the discharge of pollutants (Fact Sheet Sections 7.2.2 and 7.2.7 – 7.2.10). The required BMPs and rational are as follows:

- 7.2.1 The flow of surface waters into the plant site shall be interrupted and these waters diverted around and away from incursion into the plant site.

The intent of this regulatory BMP is to avoid contamination of non-process water, reduce the volume of water requiring treatment and maximize the retention time and the capacity of the settling ponds. The diversion must totally circumvent any gold recovery units, treatment facilities, etc.

- 7.2.2 Drainage waters within the plant site must be collected in treatment ponds or otherwise prevented from discharging pollutants into waters of the U.S. Drainage waters that cannot be practicably contained within the plant site must be managed with storm water controls, such as check dams, silt fences, and coir logs, to reduce erosion and control sediment. See the *Alaska Storm Water Guide* (<https://dec.alaska.gov/water/wastewater/stormwater/guidance/>) for storm water control examples. Facilities that cannot adequately manage drainage waters through containment and basic stormwater controls may be required to obtain additional permit coverage under an APDES Storm Water Permit

The intent of this BMP is to ensure that incidental surface waters from diverse sources, such as rainfall, snow melt or permafrost melt, within the plant site are either treated in settling ponds or managed to prevent discharge of sediment into the receiving water. Because certain locations within the plant site, such as road depressions, may preclude the direction of drainage waters into treatment ponds, the permit requires the use storm controls to reduce erosion and control sediment in certain situations. Operations unable to manage drainage waters under conditions in this permit may be required, at the discretion of the Department, to obtain coverage under a storm water permit.

- 7.2.3 Berms, including any pond walls, dikes, low dams, and similar water retention structures shall be constructed in a manner such that they are reasonably expected to reject the passage of water.

This regulatory BMP ensures that water retention devices are constructed appropriately. This may be achieved by utilizing on-site material in a manner that fine sealing materials (such as clays) are mixed in the berms with coarser materials. Berms should be toed into the underlying earth, constructed in layers or lifts and each layer thoroughly compacted to ensure mechanical and watertight integrity. Other impermeable material, such as plastic sheets or membranes, may be used inside the berms when sealing fines are unavailable or in short supply. The side slope of berms should not be greater than the natural angle of repose of the materials used in the berms or a slope of 2:1, whichever is flatter.

- 7.2.4 Measures shall be taken to assure that pollutant materials removed from the process water and wastewater streams will be retained in storage areas and not discharged or released to the waters of the U.S.

The intent of this regulatory BMP is to ensure that the investment in pollution control pays the maximum benefit in terms of reduced pollutant volumes reaching water of the U.S. These measures may include location of the storage ponds and storage areas to assure that they will not be washed out by reasonably predictable flooding or by the return of a relocated stream to its original stream bed. Materials removed from settling ponds should be placed in bermed areas where liquids from the materials cannot flow overland to waters of the U.S. It may be necessary, in some cases, to collect such liquids and pump or divert them back to the settling pond for treatment. This requirement applies both during the active mining season and at all other times until reclamation is completed.

- 7.2.5 The amount of new water allowed to enter the plant site for use in material processing shall be limited to the minimum amount required as makeup water for processing operations.

This regulatory requirement provides some of the same benefits as diverting the waters discussed in Fact Sheet Section 7.2.1. It reduces the volume of water requiring treatment, maximizes the capacity of the settling ponds, and assures that the amount of wastewater that is discharged is kept to a minimum.

- 7.2.6 All water control devices such as diversion structures and berms and all solids retention structures such as berms, dikes, pond structures, and dams shall be reasonably maintained to continue their effectiveness and to protect from failure.

The provisions of this regulatory BMP will ensure that water control devices are adequately maintained. This specifies that structures should be inspected on a regular basis for any signs of structural weakness or incipient failure. Whenever such weakness or incipient failure becomes evident, repair or augmentation of the structure to reasonably ensure against catastrophic failure must be made immediately. "Reasonably maintained" means that structures must be maintained to standards necessary to protect against conditions typically encountered at a placer location; this does not include actions taken to protect from extreme hydrologic, geological, or other natural events when taking such actions poses a danger to human health or a safety hazard.

- 7.2.7 Discharges must be controlled through a pipe, weir, constructed ditch, or similar conveyance that allows for effluent sampling and a reasonable estimation of flow rate. Any discharge of from seepage waters must be controlled and minimized to the greatest extent practicable; diffuse uncontrolled discharges of seepage are not authorized per Permit Part 1.3.1.5.

The permit requires effluent sampling and monitoring for flow rate when discharges occur. Additionally, the permit implements a flow rate limit when a mixing zone is authorized. To facilitate sampling and ensure the flow rate can be adequately monitored, particularly when a mixing zone is authorized, this BMP requires that the outfall is designed and constructed to allow for sampling and a reasonable estimation of flow rate. Because flow that occurs through seepage is difficult to control and monitor, seepage must be reduced to the greatest extent practicable. However, diffuse uncontrolled releases of seepage into waters of the U.S. is not authorized.

- 7.2.8 Discharges must be managed to prevent resuspension of sediments, excessive erosion of the streambank or streambed, and downstream flooding.

This BMP helps ensure that the discharge, after leaving the outfall, does not increase the sediment load in the receiving water and cause secondary impacts downstream as a result of sediment resuspension, erosion, or flooding.

- 7.2.9 The permittee shall take whatever reasonable steps are appropriate to ensure that, after the mining season, all unreclaimed mine areas, including ponds, are in a condition that will not cause degradation to the receiving waters over those resulting from natural causes.

The purpose of this requirement is to assure that all reasonable measures are taken to decrease the amount of pollutants being discharged to waters of the U.S.

- 7.2.10 Petroleum products must be properly managed during storage, refueling, and operation to prevent spillage into surface waters or groundwater. Any spills must be cleaned up using materials, such as sorbent pads and booms, and reported, per Permit Part 4.3.

This BMP ensures that petroleum contamination from fuel storage, refueling, or operation is prevented or mitigated. The reporting requirement is included based on DEC regulations requiring a person in charge of a facility or operation to provide notification of spills or releases (18 AAC 75.300).

7.3 Separation Requirements

Permit Part 3.3 implements a 300 feet separate distance between all active discharges. If a facility has an authorized mixing zone, the separation distance is based on the mixing zone

boundary. The separation requirement establishes buffer areas between operations to protect the quality of the waterbody as a whole and to ensure habitat is available for fish and the invertebrates upon which they prey. The requirement also prevents the overlap of mixing zones and reduces possible cumulative effects of multiple mixing zones [18 AAC 70.240(b)(3), as approved for CWA purposes on September 30, 2019].

7.4 Total Maximum Daily Load Requirements

The CWA mandates that states monitor and report on the quality of their waters. Section 305(b) requires that the quality of all waterbodies be characterized, and Section 303(d) requires that states list any waterbodies that do not meet WQS. DEC develops and publishes an Integrated Report every two years, and the most recent report is available at <https://dec.alaska.gov/water/water-quality/integrated-report/>.

Waters that do not meet the numeric and/or narrative criteria for their use designations are listed as impaired, in compliance with the CWA and state rules. A Total Maximum Daily Load (TMDL) is a calculation of the maximum amount of a pollutant that a waterbody can receive, referred to as a pollutant allocation, and still meet WQS. The Department identifies and prioritizes the waters on the Section 303(d) list and then develops TMDLs necessary to achieve the applicable WQS. TMDLs may apply to an entire watershed or an individual impaired water on the Section 303(d) list. A TMDL may recommend implementation activities that include certain narrative provisions such as specific control measures; specified inspection, discharge monitoring or characterization, education, tracking or reporting requirements; or some combination of these or other conditions. In certain instances, a TMDL may specifically identify each discharger contributing, or potentially contributing, pollutants to the waterbody and the necessary controls for each discharger to meet a wasteload allocation. For industrial activities, a TMDL will commonly identify a category of dischargers and will identify the types of controls necessary to meet the cumulative wasteload allocation for the group of dischargers. If a TMDL specifically identifies measures or controls, the permittee must implement them as detailed within the permit authorization.

To support TMDL implementation, the permit establishes site-specific turbidity limits for permittees on certain impaired waters with TMDLs (Permit Part 2.4). The list is not inclusive of all impaired waterbodies with TMDLs and is limited to waterbodies impaired for sediment or turbidity. Detailed limits are included for waterbodies where placer mining has historically occurred or is expected to occur. The list and site-specific turbidity limits are derived from TMDL documents for the Upper Birch Creek watershed near Central, AK (EPA 1996); Crooked Creek watershed near Central, AK (DEC 2019); and Upper Goldstream Creek watershed near Fairbanks, AK (DEC 2015). The TMDL documents establish turbidity criteria based on the natural conditions of the watersheds. Permittees discharging to creeks within the TMDL watersheds must meet the turbidity limits in Permit Table 3 in lieu of the standard turbidity limit in Permit Table 2. Table 3 includes seasonal periods for the turbidity limits as established within the respective TMDL documents. As an exception to the other TMDL documents, the Upper Goldstream Creek TMDL establishes flow regime specific limits for turbidity. Because there is not a stream gauge on upper Goldstream Creek, or other practicable way for permittees, particularly those on tributaries, to measure stream flow in Goldstream Creek, the permit implements a conservative turbidity limit of 9 NTU based on a “dry” flow regime ensuring that turbidity discharges meet or exceed natural conditions during 90% of stream flows.

Based on information collected in the NOI and available in the TMDL, the Department will determine if there are remaining wasteload allocations allowing for the discharge and if the facility qualifies for coverage on the waterbody. When determining if the discharge will be consistent with the TMDL, the Department may consider documents accompanying the TMDL, such as an implementation plan, or other documents that indicate the TMDL's intent to allocate a wasteload for an individual discharger or for a class of dischargers. TMDLs vary in the complexity of their assumptions and quantification. Therefore, to determine if a discharge is consistent with the TMDL, the Department may request additional information from the applicant.

The Department may include requirements within a permit authorization to implement control measures ensuring that the discharge of pollutants from the site is consistent with the assumptions and requirements of an applicable TMDL. Authorizations requiring effluent limitations or conditions beyond those in the public-noticed TMDL document may be subject to an additional public notice period. If the Department determines that a TMDL cannot be properly administered under the General Permit, coverage under an individual permit (Permit Part 1.4) will be required.

7.5 Recording and Reporting Requirements

Per regulations at 18 AAC 83.455, Permit Part 4.0 contains recording and reporting requirements that are either based on standard regulatory language (Fact Sheet Section 7.6) or are specific to the general permit. The permit requires the facility to maintain daily records and submit an annual report to DEC by January 31 for the previous calendar year. Specific report requirements are outlined under Permit Part 4.2.

Additionally, Permit Appendix A, Part 3.4 (Twenty-four Hour Reporting), requires reports of any noncompliance event that may endanger health or the environment to be submitted orally within 24 hours after the permittee becomes aware of the circumstances and in writing within five days after the permittee becomes aware of the circumstances.

The twenty-four hour reporting requirement is based on State regulations and must be contained in all APDES permits [18 AAC 83.410(f)]. The State regulation is based on the CWA and federal regulations. The regulation does not consider the logistical or communication difficulties present in many remote locations in Alaska. DEC has received requests to modify Permit Appendix A, Part 3.4 to consider logistical and communication difficulties of remote sites. However, DEC is unable to modify permit requirements that are based on State regulations. Although DEC is aware of the logistical difficulties of remote operations and recognizes that some operators may have difficulties meeting the 24-hour noncompliance reporting requirement, operators are still required to notify DEC of any noncompliance. DEC encourages permittees who report after the deadlines, due to the remoteness of the activities, to also include a separate statement that explains the reason for any late reports.

7.6 Standard Conditions

Appendix A of the permit contains standard regulatory language that must be included in all APDES permits. These requirements are based on the regulations and cannot be challenged in the context of an APDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general provisions.

8.0 ANTIBACKSLIDING

Anti-backsliding requirements found in 18 AAC 83.480(a) prohibit relaxation of effluent limitations, standards, or conditions when a permit is reissued, except under prescribed circumstances. 18 AAC 83.480(c) also states that a permit may not be reissued “to contain an effluent limitation that is less stringent than required by effluent guidelines in effect at the time the permit is renewed or reissued.” This reissued permit does not contain effluent limitations that are less stringent than the previous permit, therefore, antibacksliding analysis is unwarranted.

9.0 ANTIDegradation

The antidegradation policy of the Alaska *Water Quality Standards* requires that the existing water uses and the level of water quality necessary to protect existing uses must be maintained and protected; and if the quality of water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality must be maintained and protected (18 AAC 70.015). The Department will authorize a reduction in water quality only after the applicant submits evidence in support of the application and the Department finds that specific requirements of the antidegradation policy are satisfied.

The Department’s approach to implementing the antidegradation policy is found in 18 AAC 70.016 (Antidegradation implementation methods for discharges authorized under the federal Clean Water Act). Using these requirements and policies, the Department determines whether a waterbody or portion of a waterbody is classified as Tier 1, Tier 2, or Tier 3. A higher tier indicates a greater level of water quality protection. Antidegradation analyses generally conservatively presume that all operations under a general permit will be in Tier 2 waters [18 AAC 70.016(c)(1)]. The permit specifically excludes coverage in Tier 3 waters (Permit Part 1.3).

At this time, the Department has not designated any Tier 3 waters in Alaska. However, if an applicant applies for authorization under the permit to discharge to a marine water or water designated as wild under the Wild and Scenic Rivers Act, the Department will decline general permit coverage and require an application for an individual permit. An operation proposed for a National Park, National Wildlife Refuge, or similar protected area requires additional approval from the lead agency with jurisdiction over the area and may be subject to additional site-specific requirements in the authorization (Permit Part 1.3).

Antidegradation implementation methods at 18 AAC 70.016(c)(3) state that “the Department will not conduct a Tier 2 antidegradation analysis for (A) reissuance of a license or general or individual permit for a discharge that the applicant is not proposing to expand; (B) issuance of a license or general or individual permit for an existing discharge that did not previously require authorization and that the applicant is not proposing to expand; or (C) reissuance of an administratively extended license or permit, if the applicant is not proposing an expanded discharge.” Because the reissued general permit does not propose expansion of discharge coverage, a Tier 2 antidegradation analysis has not been conducted for this issuance.

10.0 OTHER LEGAL CONSIDERATIONS

10.1 Endangered Species Act

The Endangered Species Act of 1973 (ESA) was signed on December 28, 1973 and provides for the conservation of species that are listed as endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend. The National Marine Fisheries Service (NMFS) is responsible for ESA administration for listed cetaceans, seals, sea lions, sea turtles, anadromous fish, marine fish, marine plants, and corals. All other species (including polar bears, walrus, and sea otters) are administered by the U.S. Fish and Wildlife Service (USFWS). The ESA requires federal agencies to consult with NMFS and USFWS (collectively referred to as the Services) if their actions could beneficially or adversely affect any threatened or endangered species. As a state agency, DEC is not required to consult with the Services regarding permitting actions. However, the Department values input from the Services and interacts voluntarily with these federal agencies to obtain listings of threatened and endangered species and critical habitat.

Based on communications with NMFS during prior permit issues and review of the NMFS protected species directory (<https://www.fisheries.noaa.gov/species-directory>), the following endangered species (final and proposed listings) may occur in or near the permit coverage area: beluga whale; blue whale; bowhead whale; chinook, coho, and sockeye salmon (non-Alaska populations); fin whale; humpback whale (certain populations); North Pacific right whale; sei whale; sperm whale; steelhead trout (non-Alaska populations); and Steller sea lion. Additionally, the following threatened species (final and proposed listings) may occur in or near the permit coverage area: bearded seal; chinook, chum, coho, and sockeye salmon (non-Alaska populations); eulachon (non-Alaska population); green sturgeon (southern DPS), Guadalupe fur seal; humpback whale (certain populations); ringed seal; steelhead trout (non-Alaska populations); and yelloweye rockfish (non-Alaska population). All listed species under NMFS jurisdiction in Alaska occur in marine or coastal areas and are unlikely to occur near most operations covered under this permit.

Based on communications with USFWS during prior permit issues and review of the USFWS *Information for Planning and Consultation* (IPaC) website (<http://ecos.fws.gov/ipac/>), the Department determined that six threatened and endangered species may occur in the statewide coverage area. Threatened species include the spectacled eider, Steller's eider, northern sea otter, and polar bear. Endangered species include the short-tailed albatross and Aleutian shield fern. Critical habitat is designated for the spectacled eider, Steller's eider, northern sea otter, and polar bear. All listed species under USFWS jurisdiction in Alaska occur in remote marine or coastal areas and are unlikely to occur near most operations covered under this permit.

Because 1) the general permit only authorizes discharges to freshwater, 2) most placer mine discharges occur in upland areas considerable distances from marine water, and 3) the permit does not include substantial changes from the prior issuance affecting water quality, the Department does not anticipate adverse effects on threatened and endangered species that fall under NMFS or USFWS jurisdiction. If additional comments are submitted, DEC will consider them prior to final issuance of the permit.

10.2 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act or MSA), first enacted in 1976, designates Essential Fish Habitat (EFH) in waters used by

anadromous salmon and various life stages of marine fish under NMFS jurisdiction. EFH refers to those waters and substrates (sediments, etc.) necessary to fish from commercially-fished species to spawn, breed, feed, or grow to maturity. NMFS describes freshwater EFH for Alaskan stocks of Pacific Salmon as “those waters identified in ADF&G’s *Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fish Species* ... and wherever there are spawning substrates” (ADF&G 1998, NMFS 2005). Freshwater EFH applies to eggs, larval and juvenile stages, and adult salmon. The Anadromous Waters Catalog may be viewed on the ADF&G website at <https://www.adfg.alaska.gov/sf/sarr/awc/>.

The Magnuson-Stevens Act requires federal agencies to consult with NMFS when any activity proposed to be permitted, funded, or undertaken by a federal agency may adversely affect (reduce quality and/or quantity of) EFH. As a state agency, DEC is not required to consult with NMFS regarding permitting actions. However, the Department values NMFS input and interacts voluntarily with NMFS to identify EFH.

Based on communications with NMFS during prior permit issuances, DEC determined that the most likely harm to come to fish as a result of placer mining is sediment loading or decreased light penetration caused by elevated instream turbidity; however, actions authorized by the general permit would not adversely affect EFH since a facility in compliance with the permit conditions would not be expected to cause significantly elevated sediment loads or instream turbidity. Furthermore, operations with mixing zones must adhere to seasonal limitations based on ADF&G review. ADF&G also requires placer operations on streams that contain anadromous or resident fish to obtain a Fish Habitat Permit. If additional comments are submitted, DEC will consider them prior to final issuance of the permit.

11.0 REFERENCES

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APPENDIX A. BASIS FOR EFFLUENT LIMITATIONS

A.1 Technology-Based Effluent Limits

The Clean Water Act (CWA) requires industries to apply treatment technology representing best available technology economically achievable (BAT) that is economically achievable. The BAT and the New Source Performance Standards (NSPS) requirements necessitate the use of settling ponds and recirculation of process wastewater as the selected treatment technology [40 CFR Part 440, Subpart M, as adopted by reference at 18 AAC 83.010(g)(3)]. The regulation 1) limits the volume of process wastewater that may be discharged to the volume of infiltration, drainage and mine drainage waters which is in excess of the make-up water required for operation of the beneficiation process and 2) limits the concentration of settleable solids in the discharge to 0.2 ml/L. In the event of discharge from a qualifying precipitation event (rain or snow), the regulation allows for a storm exemption from the settleable solids limit provided certain conditions are met.

Effluent limitations guidelines for the placer mining industry provide the basis for technology-based effluent limits and exclude 1) open-cut mines that process less than 1,500 cubic yards of placer ore per year and 2) mechanical gold dredges that process less than 50,000 cubic yards of placer ore per mining year. Thus, operations that fall within those categories are eligible for exemption from the settleable solids limits and associated monitoring under the permit. Operations with low processing volumes remain subject to all other effluent limitations within the permit.

A.2 Water Quality-Based Effluent Limits

The CWA requires the imposition of ". . . any more stringent limitation, including those necessary to meet water quality standards, . . . or required to implement any applicable water quality standard established pursuant to this Act" by July 1, 1977 [Section 301(b)(1)(c)]. All discharges to state waters must comply with the Alaska *Water Quality Standards* (WQS), including the State's antidegradation policy.

Alaska Pollutant Discharge Elimination System regulations require that permits include conditions necessary to "achieve water quality standards established under 33 U.S.C. 1313, including state narrative criteria for water quality" [18 AAC 83.435(a)(1)].

The Alaska Department of Environmental Conservation (DEC) has concluded, based on application of the WQS and review of available sampling data, that turbidity and arsenic must be limited in order to meet the State WQS. The water quality-based effluent limits for turbidity, and arsenic, within the permit ensure compliance with WQS and are relevant for all operations regardless of process volume. Therefore, DEC has retained water quality-based turbidity and arsenic effluent limits for all operations under the permit.

A.2.1 Turbidity

The most stringent turbidity standard is 5 NTUs above the natural condition and protects for the drinking, culinary and food supply use [18 AAC 70.020(b)(12)(A)(i)]. The WQS allow for a mixing zone approved by DEC.

The basic form of this equation, known as the mass-balance equation, is as follows:

$$Q_1C_1 + Q_2C_2 = Q_3C_3$$

where C_1 = upstream turbidity;
 C_2 = effluent turbidity;
 C_3 = downstream turbidity after mixing where the allowable increase is 5 NTU above background ($C_1 + 5$ NTU);
 Q_1 = stream flow downstream from any diversion and upstream from the discharge;
 Q_2 = effluent flow; and
 Q_3 = total stream flow downstream from discharge after complete mixing ($Q_1 + Q_2$).

An example follows below:

where $C_1 = 0$ NTUs;
 C_2 = effluent turbidity;
 $C_3 = 5$ NTUs
 $Q_1 = 10$ CFS (4,488 GPM);
 $Q_2 = 100$ GPM; and
 $Q_3 = 4,588$ GPM.

Solving for C_2 :

$$C_2 = (Q_3C_3 - Q_1C_1)/Q_2$$

$$C_2 = \frac{(4588 \text{ GPM} \times 5 \text{ NTUs}) - (4448 \text{ GPM} \times 0 \text{ NTUs})}{100 \text{ GPM}}$$

$$C_2 = 229 \text{ NTUs}$$

Therefore, the modified effluent limit becomes 229 NTUs.

The mixing size and timing depends on multiple factors and is determined during the authorization process.

A.2.2 Arsenic

DEC announced proposed revisions to 18 AAC 70 and the *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* on December 12, 2008. DEC accepted written public comments on the revisions from December 16, 2008, through February 6, 2009, and held two public workshops in January 2009. In these revisions, the arsenic drinking water maximum contaminant level (MCL) was proposed to be updated from 50 ug/L to 10 ug/L. This change was based on the drinking water levels for arsenic promulgated by EPA in January 2001 (66 FR 6976).

The revisions were adopted by order and signed by Commissioner Larry Hartig on August 10, 2009, certified by the Alaska Department of Law on August 11, 2009, and filed by Alaska Lieutenant Governor Craig Campbell on August 20, 2009. DEC submitted these revisions to EPA for review and approval on August 24, 2009. EPA approved the arsenic revision on September 17, 2009 (letter to DEC, Michael A. Bussell, Director, Office of Water and Watersheds). The new standard of 10 ug/L was incorporated into the 2012 permit as an instantaneous maximum limit and has been retained in subsequent permits.

A.3 Best Management Practices

Pursuant to Section 301(b)(2) of the CWA and 18 AAC 83.475, best management practices (BMPs) are included in the permit. These practices are reasonably necessary to carry out the CWA goal of eliminating the discharge of pollutants as much as practicable and to maintain water quality. The BMPs within the permit ensure wastewater is properly managed and are relevant for all operations regardless of process volume. Therefore, DEC has retained BMP requirements for all operations under the permit.

APPENDIX B. MIXING ZONE ANALYSIS CHECKLIST

Mixing Zone Authorization Checklist

based on Alaska *Water Quality Standards* (18 AAC 70.240, as approved for CWA purposes on September 30, 2019)

The purpose of the Mixing Zone Checklist is to guide the permit writer through the mixing zone (MZ) regulatory requirements to determine if all the mixing zone criteria at 18 AAC 70.240 are satisfied, as well as provide justification to establish a mixing zone in an APDES permit. In order to establish a mixing zone, all criteria must be met. If the permit writer determines that one criterion cannot be met, then a mixing zone is prohibited.

Criteria	Description	Resources	Regulation	Y/N
Size	Is the mixing zone as small as practicable? - Applicant collects and submits water quality ambient data for the discharge and receiving waterbody (e.g. flow and flushing rates) - Permit writer performs modeling exercise and documents analysis in the Mixing Zone Analysis Spreadsheet.	<ul style="list-style-type: none"> • <i>Technical Support Document for Water Quality Based Toxics Control</i> • Fact Sheet Appendix C 	18 AAC 70.240(b) 18 AAC 70.240(d)(7)-(8) 18 AAC 70.240(k)-(l)	Y
Low Flow Design	For river, streams, and other flowing fresh waters. - Determine low flow calculations or documentation for the applicable parameters. Document analysis in the Mixing Zone Analysis Spreadsheet.	<ul style="list-style-type: none"> • Fact Sheet Appendix C 	18 AAC 70.240(l)	
Technology	Were the most effective technological and economical methods used to disperse, treat, remove, and reduce pollutants? If no, then mixing zone prohibited.	<ul style="list-style-type: none"> • Notice of Intent (NOI) • Permit 	18 AAC 70.240(c)(1)	Y
Existing use	Does the mixing zone...			
	(1) partially or completely eliminate an existing use of the waterbody outside the mixing zone? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • NOI 	18 AAC 70.240(c)(2)&(4)	N

Criteria	Description	Resources	Regulation	Y/N
	(2) impair overall biological integrity of the waterbody? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • NOI • Alaska Department of Fish and Game (ADF&G) 	18 AAC 70.240(c)(3)	N
	(3) provide for adequate flushing of the waterbody to ensure full protection of uses of the waterbody outside the proposed mixing zone? If no, then mixing zone prohibited.	<ul style="list-style-type: none"> • Spreadsheet Model 	18 AAC 70.240(b)(1)	Y
	(4) cause an environmental effect or damage to the ecosystem that the Department considers to be so adverse that a mixing zone is not appropriate? If yes, then mixing zone prohibited.	<ul style="list-style-type: none"> • Spreadsheet Model 	18 AAC 70.240(m)	N
Human consumption	Does the mixing zone...			
	(1) produce objectionable color, taste, or odor in aquatic resources harvested for human consumption? If yes, mixing zone may be reduced in size or prohibited.	<ul style="list-style-type: none"> • NOI • ADF&G 	18 AAC 70.240(d)(6)	N
	(2) preclude or limit established processing activities of commercial, sport, personal use, or subsistence shellfish harvesting? If yes, mixing zone may be reduced in size or prohibited.	<ul style="list-style-type: none"> • NOI • ADF&G 	18 AAC 70.240(c)(4)(C)	N
Spawning Areas	Does the mixing zone...			
	(1) discharge in a spawning area for anadromous fish or Arctic grayling, northern pike, rainbow trout, lake trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked coho, king, and sockeye salmon? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • ADF&G 	18 AAC 70.240(e)-(f)	N

Criteria	Description	Resources	Regulation	Y/N
Human Health	Does the mixing zone...			
	(1) contain bioaccumulating, bioconcentrating, or persistent chemical above natural or significantly adverse levels? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • NOI • Permit 	18 AAC 70.240(d)(1)-(2)	N
	(2) contain chemicals expected to cause carcinogenic, mutagenic, tetragenic, or otherwise harmful effects to human health? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • NOI • Permit 		N
	(3) Create a public health hazard through encroachment on water supply or through contact recreation? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • NOI 	18 AAC 70.240(c)(4)(B)	N
	(4) meet human health and aquatic life quality criteria at the boundary of the mixing zone? If no, mixing zone prohibited.	<ul style="list-style-type: none"> • NOI 	18 AAC 70.240	Y
	(5) occur in a location where the Department determines that a public health hazard reasonably could be expected? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • NOI 	18 AAC 70.240(k)(4)	N
Aquatic Life	Does the mixing zone...			
	(1) create a significant adverse effect to anadromous fish spawning, incubation, or rearing? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • ADF&G 	18 AAC 70.240(e)(2)	N
	(2) form a barrier to migratory species or fish passage? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • ADF&G 	18 AAC 70.240(c)(4)(G)	N
	(3) result in undesirable or nuisance aquatic life? If yes, mixing zone prohibited.	<ul style="list-style-type: none"> • ADF&G 	18 AAC 70.240(d)(5)	N

Criteria	Description	Resources	Regulation	Y/N
	(4) result in permanent or irreparable displacement of indigenous organisms? If yes, mixing zone prohibited.	• ADF&G	18 AAC 70.240(c)(4)(C)	N
	(5) result in a reduction in fish or shellfish population levels? If yes, mixing zone prohibited.	• ADF&G	18 AAC 70.240(c)(4)(D)	N
	(6) prevent lethality to passing organisms by reducing the size of the acute zone? If no, mixing zone prohibited.	• Spreadsheet Model	18 AAC 70.240(d)(7)-(8)	Y
	(7) cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone? If yes, mixing zone prohibited.	• NOI • Permit	18 AAC 70.240(c)(4)(A)	N
Endangered Species	Are there threatened or endangered species (T/E spp) at the location of the mixing zone? If yes, are there likely to be adverse effects to T/E spp based on comments received from USFWS or NOAA. If yes, will conservation measures be included in the permit to avoid adverse effects? If yes, explain conservation measures in Fact Sheet. If no, mixing zone prohibited.	• Permit writer requests list of T/E spp from USFWS prior to drafting permit conditions.	Program Description, 6.4.1 #5 18 AAC 70.240(c)(4)(F)	N

APPENDIX C. MIXING ZONE ANALYSIS SPREADSHEET

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

18 AAC 70.250 -- 70.260 Mixing Zone Calculations

Region

OPERATOR
 Effluent Disch. (gpm)
 Receiving Waterbody
 USGS Quadrangle

APMA
 APDES

HYDROLOGY
 Upstream Drainage Area square miles
 Annual Precipitation (in.) from USGS Water Resources Investigations Report 93-4179
 % Watershed Forested digitized from 1:63,360 USGS Quadrangle
 Channel Slope (ft./ft.) digitized from 1:63,360 USGS Quadrangle

Agency: Calculated By:

RECEIVING WATERBODY CHARACTERISTICS
AS 16 Response Type: .841 (Fish Passage)
 .871 (Anadromous Fish)
 5 AAC 95.060 (Special Areas)
 No Known Fish / No Permit Required
 No Survey / No Permit Required At This Time

Source: Reviewer:
 Anadromous Fish Spawning (Y/N)
 Resident Fish Spawning Redds (Y/N)
 Fish Migratory Corridor (Y/N)
 Spawning/Incubation Window:
 Escapement Index/Weit/Tower (Y/N)
 MZs Allowable (Y/N/Conditioned)
 Authorized Period:

Fish Species Present / Decision Rationale

STREAM DISCHARGE REGRESSION (cfs)
 (Ashton & Carlson 1984) 7Q10 low flow
 July - Aug.
 July - Aug. 1Q2 high flow

CALC. END-OF-PIPE NTU LIMIT
 (Calculate using 7Q10 Low Flow)
 Is Calculated Limit >1,500 NTU?
APPROVED END-OF-PIPE NTU LIMIT

GENERALIZED HYDRAULIC CHANNEL MORPHOLOGY (Bray 1982) - 1Q2 BANKFULL
 Channel Width (feet) $r^2=0.962$ Width = $2.38 * \text{discharge (cfs)} ^{0.53}$
 Channel Depth (feet) $r^2=0.871$ Depth = $0.266 * \text{discharge (cfs)} ^{0.33}$
 Mean Channel Vel. (fps) $r^2=0.499$ Velocity = $1.58 * \text{discharge (cfs)} ^{0.14}$

GENERALIZED HYDRAULIC CHANNEL MORPHOLOGY (Bray 1982) - 7Q10 LOW FLOW
 Channel Width (feet) $r^2=0.962$ Width = $2.38 * \text{discharge (cfs)} ^{0.53}$
 Channel Depth (feet) $r^2=0.871$ Depth = $0.266 * \text{discharge (cfs)} ^{0.33}$
 Mean Channel Vel. (fps) $r^2=0.499$ Velocity = $1.58 * \text{discharge (cfs)} ^{0.14}$

CALC. DOWNSTREAM LOCATION OF 95% COMPLETE MIXING (1Q2 High Flow)
 $(0.45 * \text{Width}^2 * \text{Mean Vel.}) / (0.6 * \text{Depth} * (32 * \text{Depth} * \text{Slope})^{0.5})$ Std. Dev. = +/- 30%

- EXPLANATIONS/COMMENTS**
1. End-of-pipe limit (C2) = $((\text{stream discharge} / \text{effluent discharge}) + 1) * 5$ NTU; assumes 0 NTU background.
 2. Std. Error of the 7Q10 Low Flow Discharge Estimate: +32% / -24%.
 3. Std. Error of the 1Q2 High Flow Discharge Estimate: +21% / -17%.
 4. Regional hydrograph regressions may generate negative numbers. In those cases assume zero flow and set end-of-pipe limits at AK WQS.