# Antidegradation Form 2G

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION (DEC)

Wastewater Discharge Authorization Program

555 Cordova Street, AK 99501

907-269-6285

Form 2G must be completed by all applicants. The applicant shall submit sufficient information for the department to complete an antidegradation analysis and make findings under 18 AAC 70.016 (b), (c), and (d). DEC may request additional information as necessary.

Antidegradation analysis is tier-specific and the department findings for Tier 1 and Tier 2 are on a parameter-by-parameter basis. Analysis and department findings for Tier 3 water are on a basis of a designated water.

The antidegradation review procedure is based on:

- The level of protection (i.e. Tier 1, 2, or 3) assigned to the pollutants of concern within the receiving water,
- The type of receiving water,
- Existing water quality of the receiving water,
- The necessity of degradation, and
- The social and economic importance of the regulated activity.

All discharges that require a permit under 18 AAC 83 Alaska Pollutant Discharge Elimination System (APDES) or an application for state certification of a federal permit under Section 401 of the Clean Water Act (CWA) are subject to antidegradation regulatory requirements under 18 AAC 70.016. [18 AAC 70.016(a)(1)(A & B)]

Submit completed form to DEC Division of Water to the address above, or via email to either of the following email addresses depending on the type of permit:

- 401 Certification for 404 CWA, or other federal permits: DEC-401Cert@alaska.gov
- APDES Permits: DEC.Water.WQPermit@alaska.gov
- Or, via other means as coordinated with DEC Division of Water.

## Section 1- Facility Information [18 AAC 70.016(a)(5)(A – G)]

**Facility Name**: Kotzebue Water Treatment Plant **Permit Number**: Not applicable

1. Provide a list of Parameters of Concern in the discharge, the respective concentrations, persistence, and potential impacts to the receiving water.
2. Identify which Tier protection level should apply for each Parameter of Concern.

***(For multiple parameters or if additional space is needed, attach separate sheet)***

Receiving Waterbody or Wetland:

Swan Lake, Kotzebue Slough

| Parameter of Concern: | Respective Concentrations: | Tier* Protection Level: *(*Note, complete this entry after completing the rest of the form)* |
|---|---|---|
| Manganese, pH | Manganese <=300 ug/L; pH maximum 8.7 | Tier 2 |

Persistence:

Manganese is elevated in the source water and will be removed to provide safe drinking water. Most of the Mn removed will be discharged to the wastewater system, but some may remain in nanofiltration (NF) reject water. Effluent pH is typically in the range of 6.5 to 8.5, but minor exceedences of up to 8.7 pH units have been documented in both the source water and the existing plant effluent in the past.

Potential Impacts:

Please see original NOI and mixing zone application for additional information. There is no indication that the NF reject water from the new Kotzebue Water Treatment Plant (WTP) will result in significant negative impacts to the receiving water environment of Swan Lake/Kotzebue Slough. The discharge is not expected to affect Swan Lake's existing uses either inside or outside of the small mixing zone being requested, nor will it result in any biological or chemical impairment; negatively affect the physical, biological, or chemical characteristics; or influence the flushing and mixing of the waterbody. There are no anticipated impacts in terms of anadromous fish, nor will the discharge impose a migratory barrier, impede a zone of passage, or have an adverse effect on any threatened or endangered species. As there are no other mixing zones or point-source discharges into Swan Lake, no cumulative affects of multiple inputs to Swan Lake are anticipated. Bioaccumulation, bioconcentration, and persistence above natural levels is not anticipated due to the NF reject water discharge; there are no known carcinogenic, mutagenic, or teratogenic risks; and no public health hazards will result. Finally, the discharge will not result in undesirable or nuisance aquatic life; produce objectionable color, taste, or odor in consumable resources; or preclude fish and shellfish harvesting which are not known to occur in Swan Lake.

If applicable, data is attached on the parameters that may alter the effects of the discharge to the receiving water. ☐ Yes, ☐ No, ☑ N/A

## Section 2- Baseline Water Quality Provisions [18 AAC 70.016(a)(6)(A – C)]

If determined necessary and requested by the Department, submit sufficient and credible baseline water quality information for the receiving water which meets the requirements of 18 AAC 70.016(a)(6)(A – C).

## Section 3- Tier 1 Protection Level and Analysis [18 AAC 70.016(b)]

1. Does a discharge of any parameter identified in Section 1 occur to a Category 4 [305(b)] or Category 5 [303(d)] waterbody listed in the current approved Alaska's Integrated Water Quality Monitoring and Assessment Report?
   *See http://dec.alaska.gov/water/water-quality/impaired-waters.aspx for the most recently approved integrated report and category listings.*

   ☐ Yes ☑ No

   a. If yes, list parameters from Section 1 that are present in the proposed discharge that will be included in the Tier 1 analysis in the following table.

| **Receiving Water and Wetlands Information** (if additional space is needed, attach separate sheet): | | | | | | | |
|---|---|---|---|---|---|---|---|
| **a.** Name of waterbodies or wetlands to which you discharge: | **Impaired Waters** | | | | | | |
| | **b.** Is the proposed discharge(s) directly to any segment of a Category 4 or 5 waterbody? | | If you answered yes to b, then answer the following three questions (c, d, and e). | | | | |
| | | | **c.** What parameter(s) are causing the Category 4 or 5 water degradation? | **d.** Are the parameter(s) causing the degradation present in the proposed discharge? | | **e.** Is the discharge consistent with the assumptions and requirements of applicable EPA approved or established Total Maximum Daily Load (TMDL)? | |
| | Yes | No | | Yes | No | Yes | No |
| | ☐ | ☐ | | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | | ☐ | ☐ | ☐ | ☐ |

## Section 4- Tier 2 Protection Level and Analysis [18 AAC 70.016(c)]

*If not identified as requiring only Tier 1 level of protection, Tier 2 is presumed for all water as the default protection level for all parameters [18 AAC 70.016(c)(1)].*

1. Is the application for a *(Check all that apply)*:
   ☑ New Discharge* ☐ Existing Discharge ☐ Expanded Discharge*

   *Note: "new or expanded," with respect to discharges means discharges that are regulated for the first time or discharges that are expanded such that they could result in an increase in permitted parameter load or concentration or other changes in discharge characteristics that could lower water quality or have other adverse environmental impacts.

2. Does a discharge of any parameter identified in Section 1 – Facility Information require Tier 2 analysis as defined under 18 AAC 70.016(c)(2)(A) – (E)?

   ☑ **Yes**, proceed to **Question 3**

   ☐ **No**, please **explain below** and proceed to **Section 5**

3. For each parameter requiring a Tier 2 analysis, provide a description per discharge (e.g., parameter specific per outfall) and analysis of a range of practicable alternatives that have the potential to prevent or lessen the degradation associated with the proposed discharge [18 AAC 70.016(c)(4)] (*if additional space is needed, attach separate sheet*). Include:

   A. Identification of receiving water quality and accompanying environmental impacts on the receiving water for each of the practicable alternatives;

Two parameters in the WTP's NF reject water may fail at times to meet Alaska Water Quality Standards (AWQS) or GP requirements at end of pipe and require a mixing zone authorization to allow a limited reduction in water quality in the ambient receiving waters of Swan Lake: manganese and pH, both of which have been documented to be present in the raw source waters in Vortac Lake and Devil's Lake.

Manganese (Mn) levels of up to and possibly greater than 500 ug/L have been documented in the raw source water. This element will be removed through the treatment processes to meet secondary drinking water standards. Estimates based on past treatment and pilot study results indicate that the proposed discharge could possibly have Mn concentrations of up to 300 ug/L, which exceeds the AWQS 100 ug/L criterion for Mn in marine waters (based on the most restrictive criteria for human health for consumption of aquatic organisms).

Sampling in Swan Lake in September 2021 indicated total recoverable Mn concentrations of 48 and 92 ug/L in the near-surface and near-bottom waters, respectively. Swan Lake's estuarine/marine waters exchange freely with Kotzebue Slough and then with Kotzebue Sound and the Chukchi Sea, so the assimilative capacity of the lake is expected to be reasonably large, even during ice-covered months when water level fluctuations will continue to drive flushing of both the lake and slough. As such, no impacts to receiving water quality are anticipated from this discharge.

The pH of the source water normally ranges from 6.5-8.5 standard units (SU) but has been documented as high as 8.7 SU, slightly in excess of the standard of 6.5-8.5 SU for marine waters. Swan Lake pH levels have not been documented but levels are expected to be in the 7.8-8.0 SU range. While a mixing zone has been applied for concerning this parameter, it is not anticipated that slightly high pH levels in the proposed discharge will have any impacts on receiving water quality.

The only practicable alternatives identified for disposal of the NF effluent are: 1) Discharge to the City's wastewater system, or 2) discharge to another receiving water location.

B. Evaluation of the cost for each of the practicable alternatives, relative to the degree of water quality degradation;

Potential water treatment methods were evaluated in the preliminary engineering report (PER; GV Jones/R&M Consultants, 2011) addressing the Kotzebue WTP improvements along with the Environmental Report (ER; R&M Consultants, 2011). The PER recommended the new WTP design utilizing membrane filtration with nano-filtration following micro- or ultra-filtration membranes. This process has been shown to be effective in producing high-quality drinking water in Alaska with a variety of source waters and operating conditions, such as those encountered in Kotzebue. One component of this process is the discharge of relatively clean reject water from the nano-filtration process. This water is has already passed through the micro- or ultra-filtration process and meets most water quality standards with possible exceptions noted in 3a.

The previously approved alternative of discharge to the City's wastewater system will increase wastewater flows by approximately 18%. As the City's annual wastewater budget is over $500k with a significant amount being proportional to the volume of wastewater being pumped, increasing the volume by 18% will have a measurable increase on those costs. In addition, this would result in the following: 1) Exacerbation of annual flooding issues when the City's sewer system is overloaded during spring breakup, and 2) the sewage treatment lagoon will reach its capacity at an earlier date, which would result in costly engineering alternatives to address the issue.

A second alternative is to discharge the NF reject water to another location such as Kotzebue Slough or Kotzebue Sound, with no additional environmental benefit. Each of these potential alternative discharge locations would be more costly to design and install due to issues with dealing with high currents, waves, and ice, obtaining the necessary land use easements, and additional construction costs.

C. Identification of a proposed practicable alternative that prevents or lessens water quality degradation while also considering accompanying cross-media environmental impacts. (*If the applicant has selected a non-degrading alternative, the social or economic importance analysis in Question 4 is not required.*

At the present time, there are no practicable alternatives to the discharge of NF reject water to Swan Lake.

The existing WTP discharges conventional filtration backwash to the City's wastewater collection and treatment system. This backwash water is of significantly lower quality than the proposed NF reject water, and its discharge exacerbates flooding and capacity issues in the wastewater system. Discharge of the higher quality of the NF reject water to Swan Lake will reduce operating costs and increase the effectiveness and service life of the wastewater system.

Discharge to the larger water bodies of Kotzebue Slough or Sound could be contemplated, but considering the small Swan Lake mixing zone required for the two parameters of concern (Mn and pH) in the NF concentrate, the extensive installation of piping and an outfall to allow for discharge to these more distant areas would be significantly more expensive in terms of both construction and maintenance, with no additional environmental benefit.

**4. Social or Economic Importance** [18 AAC 70.016(c)(5)]

Provide information that demonstrates the accommodation of important social or economic development. The applicant shall complete either a social OR economic importance analysis (or both) identifying each affected community in the area where the receiving water for the proposed discharge is located. *(if additional space is needed, attach separate sheet)*

| **(A) Social Importance Analysis**: *(select one or more areas, and describe below)* | **(B) Economic Importance Analysis**: *(select one or more areas, and describe below)*: |
|---|---|
| ☑ community services provided;<br>☑ public health or safety improvements;<br>☑ infrastructure improvements;<br>☐ education and training;<br>☐ cultural amenities;<br>☐ recreational opportunities | ☐ employment, job availability, and salary impacts;<br>☐ tax base impacts;<br>☐ expanded leases and royalties;<br>☑ commercial activities;<br>☐ access to resources;<br>☑ access to a transportation network |

**Describe** (checked items above or attach as separate document)

As per 18 AAC 70.015(a)(2)(A), allowing the lowering of water quality is necessary to accommodate important economic or social development in the area of the City of Kotzebue. Issuance of the WTP's permit and mixing zone will allow for reliable long-term potable water delivery to the City's approximate 3100 residents, which is fundamental to Kotzebue's role as a transportation crossroads, governmental center, and regional commercial and healthcare hub to ten satellite villages in the Northwest Arctic Borough. It will also provide capacity for future population growth in the city itself. The existing WTP and built in the 1970s and comprises deficiencies and inefficiencies that currently pose health and safety concerns to local residents and has been non-compliant with water quality and treatment requirements in the past. In addition, the existing WTP's discharge of filter backwash to the City's aging wastewater system has exacerbated flooding issues during spring breakup causing potential additional negative impacts on human health in Kotzebue. Permitting of the new WTP with a discharge of NF reject water will allow for delivery of a consistently higher quality of potable water while reducing impacts on the City's wastewater system. In addition to its positive effect on the public health, it will allow for population growth, continued commercial and economic viability, and allow the City to implement its planned upgrade to other utility systems.

**Section 5- Tier 3 Protection Level and Analysis** [18 AAC 70.016(d)]

1. Is the discharge to a designated Tier 3 water? ☐ Yes ☑ No

*(Currently, the State of Alaska has not designated any Tier 3 waters).*

*See http://dec.alaska.gov/water/water-quality/standards/antidegradation.aspx for Tier 3 for further information.)*

## Section 6. Certification Information

An Alaska Pollutant Discharge Elimination System (APDES) permit application must be signed by an individual with the appropriate authority per 18 AAC 83.385 or for 401 certification of 404 permits or other federal permits per 18 AAC 15.030.

| | |
|---|---|
| **APDES Permits** | |
| Corporate Executive Officer<br>18 AAC 83.385 (a)(1)(A) | For a corporation, a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation. |
| Corporate Operations Manager<br>18 AAC 83.385 (a)(1)(B) | For a corporation, the manager of one or more manufacturing, production, or operating facilities, if<br>(i) the manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental statutes and regulations;<br>(ii) the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and<br>(iii) authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. |
| Sole Proprietor or General Partner<br>18 AAC 83.385 (a)(2) | For a partnership or sole proprietorship, the general partner or the proprietor respectively. |
| Public Agency, Chief Executive Officer<br>18 AAC 83.385 (a)(3)(A) | For a municipality, state, or other public agency, the chief executive officer of the agency. |
| Public Agency, Senior Executive Officer<br>18 AAC 83.385 (a)(3)(B) | For a municipality, state, or other public agency, a senior executive officer having responsibility for the overall operations of a principal geographic unit or division of the agency. |
| **401 Certifications** | |
| Corporations<br>18 AAC 15.030(1) | In the case of corporations, by a principal executive officer of at least the level of vice president or his duly authorized representative, if the representative is responsible for the overall management of the project or operation. |
| Partnerships<br>18 AAC 15.030(2) | in the case of a partnership, by a general partner |
| Proprietorship<br>18 AAC 15.030(3) | in the case of a sole proprietorship, by the proprietor |
| Public Agency<br>18 AAC 15.030(4) | in the case of a municipal, state, federal or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee. |

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

| Organization: | Name: | Title: |
|---|---|---|
| City of Kotzebue | Matthew Lazarus | Water Plant Supervisor |

| Phone: | Fax (optional): | Email: |
|---|---|---|
| 907-442-5209 | 907-442-2344 | MLazarus@Kotzebue.org |

| Mailing Address: | Street (PO Box): | | |
|---|---|---|---|
| | 602A Grayling Street | | |
| | City: | State: | Zip: |
| | Kotzebue | Alaska | 99752 |

Matthew F. Lazarus
Signature/Responsible Official

2-22-22
Date

## Section 7. Form 2G Preparer *(Complete if Form 2G was prepared by someone other than the certifier.)*

| Organization: | Name: | Title: |
|---|---|---|
| Kinnetic Environmental, Inc. | Mark Savoie | Principal |

| Phone: | Fax (optional): | Email: |
|---|---|---|
| 907-276-6178 | | msavoie@kinneticenv.com |

| Mailing Address:<br>☐ Check if same as Certifiers Information | Street (PO Box): | | |
|---|---|---|---|
| | 704 West 2nd Avenue | | |
| | City: | State: | Zip: |
| | Anchorage | Alaska | 99501 |