ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT FACT SHEET –PRELIMINARY DRAFT

Permit Number: AK0053481

Kodiak Island Borough Landfill Leachate Treatment Facility

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501

Public Comment Period Start Date: DRAFT
Public Comment Period Expiration Date: DRAFT
Alaska Online Public Notice System

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Proposed issuance of an Alaska Pollutant Discharge Elimination System (APDES) permit to:

KODIAK ISLAND BOROUGH

For wastewater discharges from

Kodiak Island Borough Landfill Leachate Treatment Facility
1203 Monashka Bay Road
Kodiak, AK 99615

The Alaska Department of Environmental Conservation (the Department or DEC) proposes to reissue an APDES individual permit (permit) to the Kodiak Island Borough (KIB). The permit authorizes and sets conditions on the discharge of pollutants from this facility to waters of the United States. In order 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 the facility and outlines best management practices to which the facility must adhere.

This fact sheet explains the nature of potential discharges from the KIB Landfill Leachate Treatment Facility and the development of the permit including:

- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions
- technical material supporting the conditions in the permit
- proposed monitoring requirements in the permit

Public Comment

Persons wishing to comment on or request a public hearing for the draft permit for this facility, may do so in writing by the expiration date of the public comment period.

Commenters are requested to submit a concise statement on the permit condition(s) and the relevant facts upon which the comments are based. Commenters are encouraged to cite specific permit requirements or conditions in their submittals.

A request for a public hearing must state the nature of the issues to be raised, as well as the requester's name, address, and telephone number. The Department will hold a public hearing whenever the Department finds, on the basis of requests, a significant degree of public interest in a draft permit. The Department may also hold a public hearing if a hearing might clarify one or more issues involved in a permit decision or for other good reason, in the Department's discretion. A public hearing will be held at the closest practicable location to the site of the operation. If the Department holds a public hearing, the Director will appoint a designee to preside at the hearing. The public may also submit written testimony in lieu of or in addition to providing oral testimony at the hearing. A hearing will be tape recorded. If there is sufficient public interest in a hearing, the comment period will be extended to allow time to public notice the hearing. Details about the time and location of the hearing will be provided in a separate notice.

All comments and requests for public hearings must be in writing and should be submitted to the Department at the technical contact address, fax, or email identified above (see also the public comments section of the attached public notice). Mailed comments and requests must be postmarked on or before the expiration date of the public comment period.

After the close of the public comment period and after a public hearing, if applicable, the Department will review the comments received on the draft permit. The Department will respond to the comments received in a Response to Comments document that will be made available to the public. If no substantive comments are received, the tentative conditions in the draft permit will become the proposed final permit.

The proposed final permit will be made publicly available for a five-day applicant review. The applicant may waive this review period. After the close of the proposed final permit review period, the Department will make a final decision regarding permit issuance. A final permit will become effective 30 days after the Department's decision, in accordance with the state's appeals process at 18 Alaska Administrative Code (AAC) 15.185.

The Department will transmit the final permit, fact sheet (amended as appropriate), and the Response to Comments to anyone who provided comments during the public comment period or who requested to be notified of the Department's final decision.

Appeals Process

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
Mail: P.O. Box 11180
Juneau, AK 99811

In Person: 410 Willoughby Avenue, Suite 303
Juneau, AK 99811

Interested persons can review 18 AAC 15.185 for the procedures and substantive requirements regarding a request for an informal Department review.

See http://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
Mail: P.O. Box 11180
Juneau, AK 99811
In Person: 555 Cordova Street
Anchorage, AK 99501

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

Documents are Available

The permit, fact sheet, application, 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, application, and other information are located on the Department's Wastewater Discharge Authorization Program website: http://dec.alaska.gov/water/wastewater.aspx.

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 **Mail**: P.O. Box 111800 **In Person**: 410 Willoughby Avenue, Suite 303 Juneau, AK 99811-1800 (907) 465-5180
Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 610 University Avenue Fairbanks, AK 99709 (907) 451-2183	

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1.0 INTRODUCTION

1.1 Applicant

This fact sheet provides information on the APDES permit for the following entity:

Name of Facility:	Kodiak Island Borough Landfill Leachate Treatment Facility
APDES Permit Number:	AK0053481
Facility Location:	1203 Monashka Bay Road, Kodiak, AK 99615
Mailing Address:	710 Mill Bay Road, Kodiak, AK 99615
Facility Contact:	Mr. David Conrad

1.2 Authority

Section 301(a) of the Clean Water Act (CWA) and AAC 18 AAC 83.015 provide that the discharge of pollutants to water of the U.S. is unlawful except in accordance with an APDES permit. The individual permit reissuance is being developed per 18 AAC 83. A violation of a condition contained in the Permit constitutes a violation of the CWA and subjects the permittee of the facility with the permitted discharge to the penalties specified in Alaska Statutes (AS) 46.03.760 and AS 46.03.761.

1.3 Permit History

The KIB submitted a National Pollutant Discharge Elimination System (NPDES) permit application to the Environmental Protection Agency (EPA) in 2007 that proposed the discharge of treated landfill leachate and baler squeezings to a wetland treatment system. The 2007 NPDES permit application did not result in the issuance of an NPDES permit.

DEC issued the KIB an APDES permit for the landfill leachate discharge in 2015. The permit expired on August 31, 2020. Under the Administrative Procedures Act and state regulations at 18 AAC 83.155(c), an APDES permit may be administratively extended (i.e., continues in force and effect) provided that the permittee submits a timely and complete application for a new permit prior to the expiration of the current permit. A timely application for a new permit was submitted by KIB on March 4, 2020; therefore, the 2015 permit is administratively extended until such time a new permit is reissued.

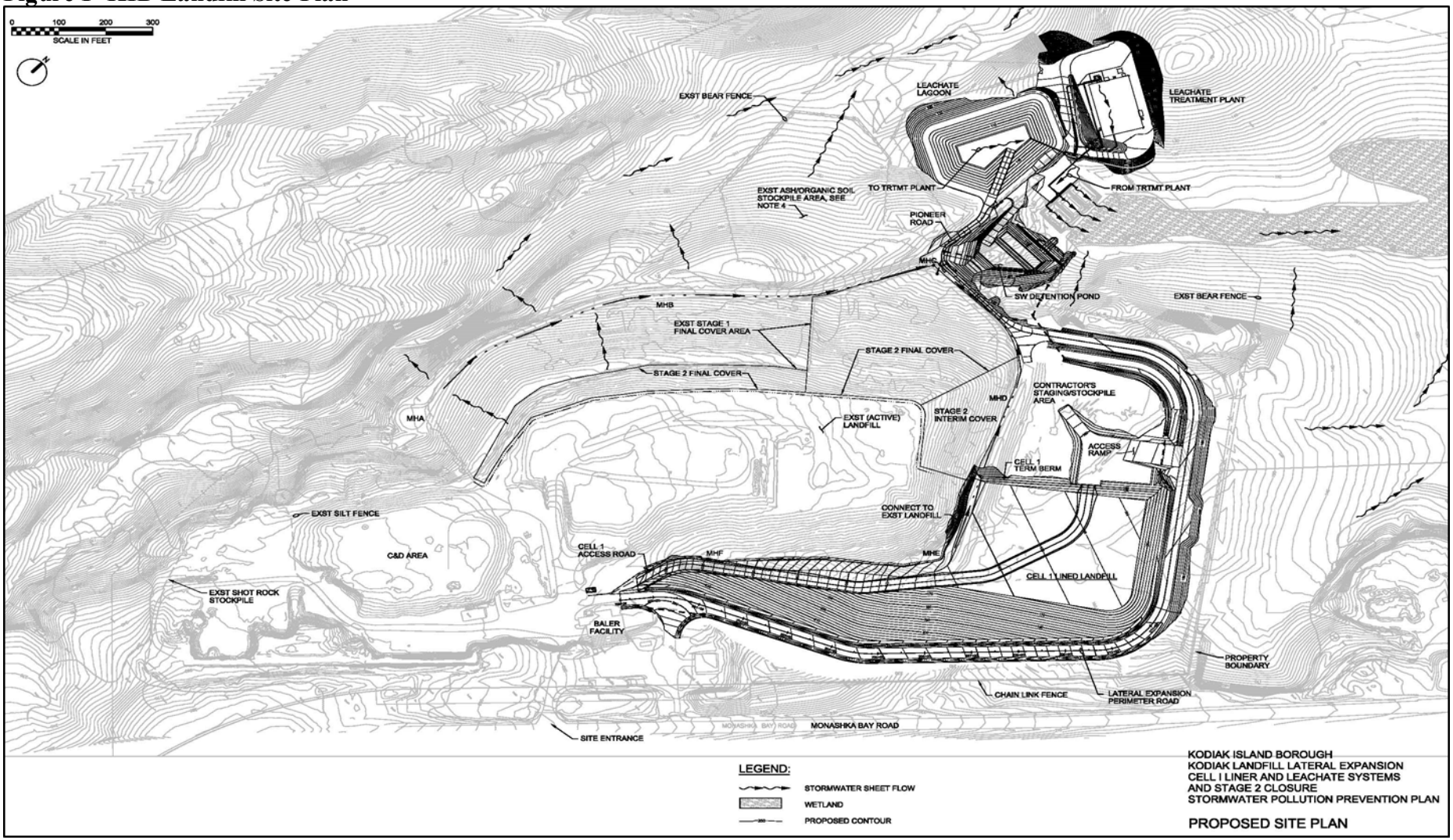
2.0 BACKGROUND

2.1 Facility Information

The KIB owns and maintains the KIB Landfill, located approximately 6 miles northwest of Kodiak, AK. The KIB Landfill started as an ad hoc dump in the 1960s and since then has developed into a Class One landfill consisting of approximately 30.2 acres. Solid waste disposed at the landfill includes municipal solid waste, baled waste from industrial, commercial, and institutional sources, construction, demolition, landscaping, fishing and boat debris. In order to accommodate an additional 40 years of use and growth, the KIB has been expanding the landfill site. In 2015 construction of a leachate collection and conveyance system, installation of a liner in an expanded cell, and leachate treatment plant were completed. Future upgrades include construction of an addition cell and expansion in the southwestern area of the landfill to accommodate the disposal of inert construction, demolition, and landscaping debris.

Figure 1 illustrates the layout of the KIB Landfill.

Figure 1- KIB Landfill Site Plan



2.2 Wastewater Treatment

The KIB landfill leachate treatment facility discharges up to 288,000 gallons per day (gpd) of treated landfill leachate from lined and unlined landfill cells, baler squeezings, and baler building washdown. Baler squeezings are liquids squeezed out of the waste during the baling process. Baler washdown is water produced by washing the baler and the baler building. Leachate is liquid (rain or snow melt) that has passed through or emerged from solid waste and contains soluble, suspended, or miscible materials removed from the solid waste.

Materials that are disposed of at the KIB Landfill include baled municipal solid waste, baled waste from the industrial, commercial, and institutional sector, asbestos-containing materials, construction, demolition, and landscaping debris, tree stumps, and fishing and boat debris.

Compacted waste bales are hauled to the working face of the landfill and stacked in rows. Waste bales are covered daily with fill. Biosolids from the City of Kodiak Wastewater Treatment Plant are composted at the landfill and used for inert fill and erosion control. Septic waste from the baler building and the leachate treatment facility are collected in tanks and hauled to the City of Kodiak Wastewater Treatment Plant.

In 2015, the northeastern end of the landfill footprint was expanded with the construction of an engineered lining system that contains an impermeable liner system (geomembrane and geosynthetic clay liner) and a leachate collection/conveyance system. Once collected in the landfill's collection system, leachate and baler waste streams are channeled to a leachate storage lagoon. The function of the leachate storage lagoon is to equalize pollutant loadings and flow rates. From the storage lagoon, wastewater flows to a pumping station. The pumping station conveys the wastewater through fine screens. The screenings fall into a dumpster and are disposed of in the landfill.

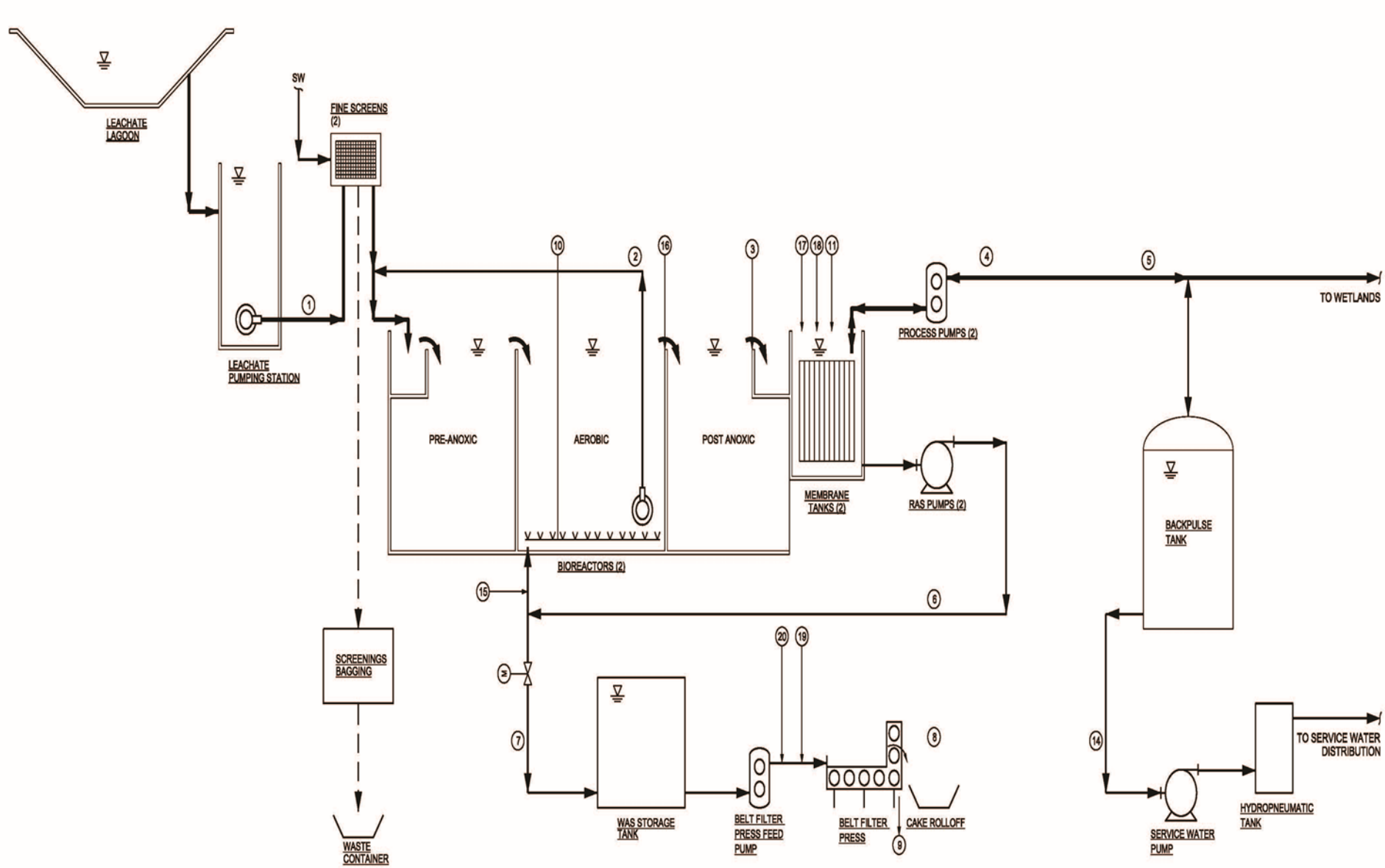
After screening, the wastewater enters an anoxic tank (an environment without free oxygen) where denitrification and alkalinity recovery occur. The wastewater then travels to an aerobic tank to undergo nitrification and five-day biochemical oxygen demand (BOD_5) removal. Fine bubble diffusers are used for aeration. The wastewater then flows to another tank with a post-anoxic zone for additional denitrification. After the post-anoxic zone, the wastewater reaches a final aerated tank that contains a membrane bioreactor system (MBR). The MBR system is a biological treatment process that also provides a physical barrier to pollutants. The KIB treatment process includes two MBRs to provide redundancy for cleaning, maintenance, and variable flows. Waste activated sludge from the bioreactors is thickened with a belt filter press and the filtrate is returned to the leachate storage lagoon.

Denitrification requires sufficient BOD_5 in the anoxic tanks to convert nitrate to nitrogen gas. A supplemental carbon source may be necessary to meet effluent limits when the influent ammonia load is high and the influent BOD_5 concentration is low. Per design conditions, carbon addition is required in the post-anoxic zone to achieve sufficient denitrification. Actual usage depends on influent nitrogen and BOD_5 loads.

Design analysis of flow has determined that to treat the leachate, most of the time, an average flow rate of 40 gallons per minute (gpm) is required. During precipitation events, or to provide storm capacity by draining down the lagoon, the system has been designed for a maximum flow rate of 200 gpm (288,000 gpd). Leachate flows were estimated using historical rainfall information, measured flow at the end of the existing leachate system, and an estimated portion of rainfall infiltrating over the landfill area. Precipitation is heavy year-round in Kodiak, averaging 75 inches per year, though less rain falls in the summer months than in the winter.

Figure 2 illustrates the KIB Landfill Treatment Facility treatment process.

Figure 2- KIB Landfill Leachate Treatment Process



2.3 Pollutants of Concern

Landfill leachate varies from site to site based on a number of factors such as the types of waste accepted, operating practices, fill depth, waste compaction, annual precipitation, and landfill age. The main contaminants in the leachate wastewater are derived from the materials deposited at the fill that may contain metals and other toxic pollutants. Pollutants that were detected in the landfill leachate between February 2016, when construction of the leachate treatment plant was completed and discharge of treated leachate commenced, and August 2020 and their corresponding water quality criteria, or permit limit are depicted in Table 1.

Table 1- Pollutants Detected in Outfall 001A February 2016- August 2020

Pollutant	Units	Maximum Observed Concentration	Water Quality Criteria [a] or Permit Limit
Ammonia	milligrams per liter (mg/L)	130	34 (acute) 6.8 (chronic)
BOD_5	mg/L	159	140 (daily maximum technology-based effluent limit (TBEL))
Phenol	micrograms per liter (µg/L)	68	26 (daily maximum TBEL)
Copper	µg/L	5.4	3.2 (acute) 2.5 (chronic)
Lead	µg/L	1.8	11 (acute) 0.4 (chronic)
Mercury	µg/L	0.2	2.4 (acute) 0.012 (chronic)
Nickel	µg/L	41	125 (acute) 14 (chronic)
Selenium	µg/L	6	20 (acute) 5.0 (chronic)
Zinc	µg/L	25	32 (acute and chronic)
Nitrate as Nitrogen (N)	mg/L	4,240	10 (drinking water)
Total Nitrate and Nitrite as N	mg/L	165	10 (drinking water)
Total Residual Chlorine (TRC)	µg/L	980	19 (acute) 11 (chronic)
a. aquatic life criteria, unless otherwise noted			

2.4 Compliance History

DEC reviewed Discharge Monitoring Reports (DMRs) from September 2015 to August 2020 to determine the facility's compliance with permit effluent limits. Table 2 summarizes permit limit exceedances.

Table 2- Permit Limit Exceedances

Parameter	Units	Basis	Permit Limit	Number of Exceedances	Maximum Reported Value	Date of Maximum Reported Value
Benzoic Acid	µg/L	Monthly Average	71	1	72	May 2017
BOD_5	mg/L	Monthly Average	37	1	129.9	February 2019
BOD_5	mg/L	Daily Maximum	140	1	159	February 2019
BOD_5	pounds per day (lbs/day)	Monthly Average	88.9	1	113.9	February 2019
Ammonia, as N	mg/L	Monthly Average	10	12	130	February 2018
Ammonia, as N	mg/L	Daily Maximum	4.9	16	130	February 2018
Ammonia, as N	lbs/day	Monthly Average	11.8	10	102.3	December 2019
Ammonia, as N	lbs/day	Daily Maximum	24	9	102.3	December 2019
Phenol	µg/L	Monthly Average	15	1	35.5	December 2018
Phenol	µg/L	Daily Maximum	26	2	68	December 2018
Total Suspended Solids (TSS)	mg/L	Monthly Average	27	1	45.3	May 2018

Table 3 summarizes DEC Compliance and Enforcement actions at the KIB Landfill.

Table 3- Compliance and Enforcement Actions

Date	Activity	Summary
March 13, 2017	Routine Inspection	Observations included numerous record-keeping and permit-required submittal deficiencies, incorrect DMR completion, and bear damage to the leachate pond liner.
April 24, 2017	Notice of Violation (NOV)	Violations included failure to conduct and submit metals, priority pollutant, and WET monitoring results, noncompliance with ammonia limits, failure to report ammonia limits noncompliance, failure to maintain operation and maintenance records, and failure to notify DEC the completion of the facility's QAPP and BMP Plan.
November 20, 2018	Unannounced Inspection	Observations included the revelation that the KIB LTP was treating leachate at only 30% design capacity due to calcification of the LTP membranes. Bypass of untreated landfill leachate was performed in spite of the availability of two onsite 10,000-gallon storage tanks.
December 3, 2018	CWA Section 308 Information Letter	DEC requires KIB to provide daily photos to document the level of leachate in the lagoon, past operation and maintenance records related to sludge removal, previous monitoring data, information related to the calcification of the LTP and records related to the injection of phosphoric acid at the LTP. KIB must also submit to DEC a weekly update regarding progress towards resolving calcification and ammonia issues and status of the leachate lagoon discharge.
December 14, 2018	NOV	Failure to notify DEC in advance of anticipated non-compliance, bypass of the LTP, failure to properly

Date	Activity	Summary
		operate and maintain treatment facility, failure to comply with ammonia effluent limits, failure to provide non-compliance notifications for six ammonia and one TSS effluent limit exceedances.
October 4, 2019	Offer to Confer	DEC informs KIB that DEC intends to pursue enforcement action against KIB for violations of the CWA and provides KIB the opportunity to discuss the matter with DEC prior to the filing of the complaint.
October 29, 2019	Document Request	DEC request for WET monitoring results, documentation of TRC effluent monitoring when membranes were cleaned with sodium hypochlorite, copy of QAPP, documentation of annual BMP Plan review, pH monitoring equipment specifications and location of the pH monitor, cost, rental dates and number of 10,000-gallon storage tanks rented for leachate storage in November 2018, approximate transportation cost of effluent samples to lab.
November 8, 2019	NOV	Unauthorized discharge of untreated leachate, failure to provide 10-day notice of the anticipated bypass, repeat bypass violation and failure to provide 10-day notice of the anticipated bypass, failure to provide permit-required documents within DEC's October 29, 2019 requested information timeline.

3.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS

3.1 Basis for Permit Effluent Limits

Per 18 AAC 83.015, the Department prohibits the discharge of pollutants to waters of the U.S. unless the permittee has first obtained a permit issued by the APDES Program that meet the purposes of AS 46.03 and is in accordance with the CWA Section 402. Per these statutory and regulatory provisions, the Permit includes effluent limits that require the discharger to (1) meet standards reflecting levels of technological capability, (2) comply with 18 AAC 70 – Water Quality Standards (WQS), and (3) comply with other state requirements that may be more stringent.

The CWA requires that the limits for a particular pollutant be the more stringent of either TBELs or water quality-based effluent limits (WQBELs). TBELs are set according to the level of treatment that is achievable using available technology. A WQBEL is designed to ensure that the WQS of a waterbody are met. WQBELs may be more stringent than TBELs.

The permit contains both TBELs and WQBELs. The applicable TBELs are based on EPA Effluent Limit Guideline (ELG) found at 40 Code of Federal Regulations (CFR) Part 445, Subpart B-Resource Conservation and Recovery Act (RCRA) Subtitle D Non-Hazardous Landfill, New Source Performance Standards. A detailed discussion of the basis for the effluent limits contained in the permit is provided in Appendix A.

3.2 Basis for Effluent and Receiving Water Monitoring

In accordance with AS 46.03.110(d), the Department may specify in a permit the terms and conditions under which waste material may be disposed. Monitoring in a permit is required to determine compliance with effluent limits. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limits are required and/or to monitor effluent impact on the receiving waterbody quality. The permittee is responsible for conducting the monitoring and for reporting results on NetDMR or with the application for reissuance, as appropriate, to the Department. Fact Sheet Sections 3.3 through 3.5 summarizes monitoring requirements DEC has determined necessary to implement in the permit.

3.3 Effluent Limits and Monitoring Requirements

Monitoring is required to determine compliance with effluent limitations and/or for use in future reasonable potential analyses. The permit requires monitoring of the treated landfill leachate that is discharged through Outfall 001A. Effluent limits for the KIB Landfill Leachate must be met at the end of the pipe.

Monitoring frequencies are based on the nature and effect of a pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples must be used in calculations and used for averaging if they are conducted using Department-approved test methods (generally found in 18 AAC 70 and 40 CFR Part 136 [adopted by reference in 18 AAC 83.010]) and if the method detection limits are less than the effluent limits.

Table 4 contains Outfall 001A landfill leachate limits and monitoring requirements. Table 5 contains effluent limits and monitoring requirement changes from the last permit issuance

Table 4- Outfall 001A Effluent Limits and Monitoring Requirements

Parameter [a]	Effluent Limits				Monitoring Requirements	
	Units [b]	Daily Minimum	Monthly Average	Daily Maximum	Sample Frequency	Sample Type
Total Discharge Flow	gpd	N/A[b]	N/A	288,000	Continuous	Recorded
Total Ammonia, as N	mg/L	N/A	4.9	10	1/Quarter [c]	Grab
	lbs/day		12	24		Calculated [d]
Total Suspended Solids (TSS)	mg/L	N/A	27	88	1/Quarter	Grab
	lbs/day	N/A	65	210		Calculated
5-Day Biochemical Oxygen Demand (BOD_5)	mg/L	N/A	37	140	1/Quarter	Grab
	lbs/day	N/A	89	340		Calculated
Alpha-Terpineol	µg/L	N/A	16	33	1/Quarter	Grab
	lbs/day		0.038	0.079		Calculated
Benzoic Acid	µg/L	N/A	71	120	1/Quarter	Grab
	lbs/day		0.17	0.288		Calculated
Phenol	µg/L	N/A	15	26	1/Quarter	Grab
	lbs/day		0.036	0.062		Calculated
P-Cresol	µg/L	N/A	14	25	1/Quarter	Grab
	lbs/day		0.034	0.060		Calculated

Parameter [a]	Effluent Limits				Monitoring Requirements	
	Units [b]	Daily Minimum	Monthly Average	Daily Maximum	Sample Frequency	Sample Type
Zinc	µg/L	N/A	32	32	1/Quarter	Grab
	lbs/day		0.077	0.077		Calculated
pH	SU	6.5	N/A	8.5	1/Quarter	Grab
TRC [e]	mg/L	N/A	.011	.019	1/Month [f, g]	Grab
	lbs/day		.026	.046		Calculated
Nitrate, as N	mg/L	N/A	N/A	10	1/Month [f, g]	Grab
	lbs/day			24		Calculated
Total Nitrate and Nitrite, as N	mg/L	N/A	N/A	10	1/Month [f, g]	Grab
	lbs/day			24		Calculated
Copper	µg/L	N/A	2.46	3.2	1/Month [f, g]	Grab
	lbs/day		0.591	0.0077		Calculated
Lead	µg/L	N/A	0.44	11.2	1/Month [f, g]	Grab
	lbs/day		0.0011	0.0269		Calculated
Mercury	µg/L	N/A	0.012	2.4	1/Month [f, g]	Grab
	lbs/day		0.000029	0.0058		Calculated
Nickel	µg/L	N/A	13.93	125.3	1/Month [f, g]	Grab
	lbs/day		0.0335	0.301		Calculated
Selenium	µg/L	N/A	5	20	1/Month [f, g]	Grab
	lbs/day		0.01	0.048		Calculated
WET	TUc	N/A	N/A	1.0	2/Year [f, h]	Grab
Metals [i, j]	µg/L	N/A	N/A	Report	1/Quarter	Grab

Footnotes:

a. Report metals as total recoverable
b. gpd = gallons per day, mg/L = milligram per liter, lbs/day = pounds per day, µg/L= microgram per liter, SU.= standard pH units, TUc = chronic toxic units
c. Quarterly is the time period of three months based on the calendar year beginning with January.
d. lbs/day = [(concentration (mg/L) x (flow in mgd)) x 8.34 (lbs/gal)]
e. The TRC effluent limits are not quantifiable using EPA-approved analytical methods. DEC will use the ML of 0.1 mg/L as the compliance evaluation level for this parameter.
f. While the Schedule of Compliance in Permit Section 1.3 is in effect, or until compliance with the effluent limits in Table 2 are achieved, report monitoring results only.
g. Monitoring shall occur 1/quarter in years one through four of the permit and 1/month beginning the first month of the fifth year after the effective date of the final permit.
h. Twice per year means one sample taken between May 1 and September 30, and one sample taken between October 1 and April 30.
i. Metals are those pollutants identified as Compound Nos. 1-13 by the National Toxics Rule at 40 CFR 131.36. To the extent applicable, monitoring results collected to satisfy the requirements in Table 2, above, may be used to satisfy metals monitoring requirements.
j. Metals monitoring shall occur on the same day as WET and Priority Pollutant monitoring (See Permit Section 1.4).

Table 5- Effluent and Monitoring Changes from Prior Permit

Parameter	Units	Monthly Average		Daily Maximum	
		2013 Permit	2021 Permit	2013 Permit	2021 Permit
Total Ammonia, as N	lbs/day	11.8	12	24	No change
TSS	lbs/day	64.9	65	211.4	210
BOD_5	lbs/day	88.9	89	336.3	340
Alpha-Terpineol	lbs/day	0.04	0.038	0.08	0.079
Benzoic Acid	lbs/day	0.17	No change	0.29	0.288
Phenol	lbs/day	0.04	0.036	0.06	0.062
P-Cresol	lbs/day	0.03	0.034	0.06	0.060
Zinc	lbs/day	0.07	0.077	0.07	0.077
TRC	mg/L	N/A	.011	Report	.019
	lbs/day	N/A	.026	Report	.046
Nitrate, as N	mg/L	N/A	N/A	Report	10
	lbs/day	N/A	N/A	Report	24
Total Nitrate and Nitrite, as N	mg/L	N/A	N/A	Report	10
	lbs/day	N/A	N/A	Report	24
Copper	µg/L	N/A	2.46	Report	3.2
	lbs/day	N/A	0.591	Report	0.0077
Lead	µg/L	N/A	0.44	Report	11.2
	lbs/day	N/A	0.0011	Report	0.0269
Mercury	µg/L	N/A	0.012	Report	2.4
	lbs/day	N/A	0.000029	Report	0.0058
Nickel	µg/L	N/A	13.93	Report	125.3
	lbs/day	N/A	0.0335	Report	0.301
Selenium	µg/L	N/A	5	Report	20
	lbs/day	N/A	0.01	Report	0.048
WET	TUc	N/A	N/A	Report	1.0

3.4 Whole Effluent Toxicity Monitoring

Alaska WQS at 18 AAC 70.030 require that an effluent discharged to a water may not impart chronic toxicity to aquatic organisms, expressed as 1.0 chronic toxic unit (TUc), at the point of discharge, or if the Department authorizes a mixing zone in a permit, approval, or certification, at or beyond the mixing zone boundary, based on the minimum effluent dilution achieved in the mixing zone.

Whole Effluent Toxicity (WET) tests are laboratory tests that measure the total toxic effect of an effluent on living organisms. WET tests use small vertebrate and invertebrate species and/or plants to measure the aggregate toxicity of an effluent. There are two different durations of toxicity test: acute and chronic. Acute toxicity tests measure survival over a 96-hour exposure. Chronic toxicity tests measure reductions in survival, growth, and reproduction over a 7-day exposure. State regulation 18 AAC 83.335 recommends chronic testing for facilities with dilution factors less than 100:1 at the boundary of the mixing zone, acute testing for facilities with dilution factors greater than 1000:1 at the boundary of the mixing zone, and either acute or chronic for dilution factors between 100:1 and 1000:1 at the boundary of the mixing zone.

According to 18 AAC 70.030, an effluent may not impart chronic toxicity to aquatic organisms, expressed as 1.0 TUc, at the point of discharge, or if the department authorizes a mixing zone in a permit, approval, or certification, at or beyond the mixing zone boundary, based on the minimum effluent dilution achieved in the mixing zone. A mixing zone is not authorized for the KIB Landfill leachate discharge; therefore, the permittee must meet the WET water quality criteria of 1.0 TUc at the end of the pipe.

The previous permit required biannual chronic toxicity testing using an effluent dilution concentration series of 100%, 75%, 50%, 25%, and a control. KIB conducted seven chronic toxicity tests at 65%, 30%, 13%, 9.1%, 5% effluent and a control. All test results were reported as 1.54 TUc.

The WET water quality criteria of 1.0 TUc is included in the Schedule of Compliance as the final WET effluent limit that must be met as soon as possible, but no later than five years after the effective date of the final permit. In the interim, the permittee will report chronic WET testing results as required in the previous permit. The chronic toxic trigger of 1.0 TUc is also carried over from the previous permit. If toxicity is greater than 1.0 TUc in any test, the permittee must notify DEC within 14 days of the exceedance and describe any actions that have been taken or that will occur to investigate and correct the cause(s) of toxicity and if no actions have been taken, reason for not taking action.

During the first year of discharge, the permittee must conduct short-term tests with the water flea, *Ceriodaphnia dubia*, (survival and reproduction) and the fathead minnow (*Pimephales promelas*), (larval survival and growth). For all subsequent tests, testing shall be conducted using the more sensitive species. At a minimum, the permit requires an effluent dilution concentration of 100%, 62.5%, 50%, 25%, 12.5%, and a control.

3.5 Additional Effluent Monitoring Requirements

3.5.1 The discharge from Outfall 001A must be monitored in the second year of the permit between May 1 and September 30 and in the fourth year of the permit between October 1st and April 30th for priority pollutants. Priority pollutants are those pollutants identified as Compound Nos. 1-126 by the National Toxics Rule at 40 CFR Part 131.36. Monitoring results must be included with the application for permit reissuance and will be used as a screening tool to identify pollutants that may exceed State WQS.

3.5.2 The permittee must perform the additional effluent testing in APDES application Form 2C for existing manufacturing, commercial, mining and silvicultural operations. Monitoring results must be included with the application for permit reissuance and will be used as a screening tool to identify pollutants that may exceed State WQS.

4.0 RECEIVING WATERBODY

4.1 Description of Receiving Waterbody

Effluent from the KIB Landfill discharges into a natural freshwater wetland system. These wetlands drain to Leachate Creek which in turn flows to Monashka Bay. The distance from the outfall to Monashka Bay is approximately one-half mile.

4.2 Outfall Description

The KIB Landfill outfall, designated as Outfall 001A, is located at 57° 48' 49" north latitude and 152° 24' 27" west longitude. The discharge exits the treatment plant into wetland cells filled with rock. At the end of the wetland cells, the discharge passes over a horizontal weir, then flows to the head of an unnamed freshwater wetland system.

4.3 Water Quality Standards

Section 301(b)(1)(C) of the CWA required the development of limits in permits necessary to meet water quality standards by July 1, 1977. Per 18 AAC 83.435, APDES permits must include conditions to ensure compliance with WQS. Additionally, regulations in 18 AAC 70 require that the conditions in permits ensure compliance with the WQS. The State's WQS are composed of waterbody use classifications, numeric and/or narrative water quality criteria, and an Antidegradation Policy. The use classification system identifies the designated uses that each waterbody is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the state to support the designated use classification of each waterbody. The antidegradation policy ensures that the existing uses and the level of water quality necessary to protect the uses are maintained and protected.

Waterbodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230 as listed under 18 AAC 70.230(e). Some water bodies in Alaska can also have site–specific water quality criterion per 18 AAC 70.235, such as those listed under 18 AAC 70.236(b). The receiving water for the discharge, an unnamed wetland, has not been reclassified, nor have site-specific water quality criteria been established. Therefore, the wetland must be protected for all freshwater use classes listed in 18 AAC 70.020(a)(1). These freshwater designated use classes consist of the following: water supply for drinking, culinary, and food processing, agriculture, aquaculture, and industrial; contact and secondary recreation; and growth and propagation of fish, shellfish, other aquatic life, and wildlife.

4.4 Water Quality Status of Receiving Water

Any part of a waterbody for which the water quality does not or is not expected to meet applicable WQS is defined as a "water quality limited segment" and placed on the state's impaired waterbody list. For an impaired waterbody, Section 303(d) of the CWA requires states to develop a Total Maximum Daily Load (TMDL) management plan for a waterbody determined to be water quality limited. The TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's WQS and allocates that load to known point sources and nonpoint sources. The unnamed wetlands are not included in Alaska's 2018 Integrated Water Quality Monitoring and Assessment Report.

5.0 ANTIBACKSLIDING

18 AAC 83.480 requires that "interim effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit."
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."

Effluent limitations may be relaxed under 18 AAC 83.480, CWA Section 402(o) and CWA Section 303(d)(4). 18 AAC 83.480(b) allows relaxed limitations in renewed, reissued, or modified permits when there have bee

material and substantial alterations or additions to the permitted facility that justify the relaxation, or where new information is available that justifies the relaxation, or if the Department determines that technical mistakes were made.

DEC determined that technical mistakes had occurred in the last permit. The last permit contained some mass-based effluent limits with incorrect number of significant figures. DEC made corrections as appropriate which resulted in limits that are both more stringent and less stringent. Ammonia, TSS, BOD_5, phenol, p-Cresol, and zinc contain mass-based effluent limits that are slightly less stringent than the previous permit. See Table 6 for further details.

All other permit effluent limits, standards, and conditions are as stringent as in the previously issued permit and are consistent with 18 AAC 83.480. Accordingly, no further backsliding analysis is required for this permit reissuance.

6.0 ANTIDEGRADATION

Section 303(d)(4) of the CWA states that, for waterbodies where the water quality meets or exceeds the level necessary to support the water body's designated uses, WQBELs may be revised as long as the revision is consistent with the State's Antidegradation policy. The State's Antidegradation policy is found in the 18 AAC 70 WQS regulations at 18 AAC 70.015. 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 CWA*. Both the Antidegradation policy and the implementation methods are consistent with 40 CFR 131.12 and approved by EPA. This section analyzes and provides rationale for the Department's decisions in the permit issuance with respect to the Antidegradation policy and implementation methods.

Using the policy and corresponding implementation methods, the Department determines a tier protection level, whereby a higher numbered tier indicates a greater level of water quality protection. Tier 1 and Tier 2 classification and protection level are on a parameter by parameter basis. A Tier 3 protection level applies to a designated water. At this time, no Tier 3 waters have been designated in Alaska.

18 AAC 70.015(a)(1) states that the existing water uses and the level of water quality necessary to protect existing uses must be maintained and protected (Tier 1 protection level).

The unnamed wetlands are not listed as impaired (Category 4 or 5) in Alaska's 2018 Integrated Water Quality Monitoring and Assessment Report; therefore, this antidegradation analysis conservatively assumes that the Tier 2 protection level applies to all parameters, consistent with 18 AAC 70.016(c)(1).

18 AAC 70.015(a)(2) states that 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, unless the Department authorizes a reduction in water quality (Tier 2 protection level).

The Department may allow a reduction of water quality only after the specific analysis and requirements under 18 AAC 70.016(b)(5)(A-C), 18 AAC 70.016(c)(7)(A-F), and 18 AAC 70.016(d) are met. The Department's findings are as follows:

18 AAC 70.016(b)(5)

> ***(A)*** *existing uses and the water quality necessary for protection of existing uses have been identified based on available evidence, including water quality and use related data, information submitted by the applicant, and water quality and use related data and information received during public comment;*
>
> *(B) existing uses will be maintained and protected; and*
>
> ***(C)*** *the discharge will not cause water quality to be lowered further where the department finds that the parameter already exceeds applicable criteria in 18 AAC 70.020(b), 18 AAC 70.030, or 18 AAC 70.236(b).*

18 AAC 70.020 and 18 AAC 70.050 specify the protected water use classes for the State; therefore, the most stringent water quality criteria found in 18 AAC 70.020 and in the *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (DEC 2008) apply and were evaluated. This will ensure existing uses and the water quality necessary for protection of existing uses of the receiving waterbody are fully maintained and protected.

The permit places limits and conditions on the discharge of pollutants. The limits and conditions are established after comparing TBELs and WQBELs and applying the more restrictive of these limits. The water quality criteria, upon which the permit effluent limits are based, serve the specific purpose of protecting the existing and designated uses of the receiving water. WQBELs are set equal to the most stringent water quality criteria available for any of the protected water use classes. This also ensures that the resulting water quality at and beyond the boundary of any authorized mixing zone will fully protect all existing and designated uses of the receiving waterbody as a whole. The permit also requires receiving waterbody monitoring to establish facility-specific WQBELs.

The Department concludes the terms and conditions of the permit will be adequate to fully protect and maintain the existing uses of the water and that the findings under 18 AAC 70.016(b)(5) are met.

18 AAC 70.016(c)(7)(A –F) *if, after review of available evidence, the department finds that the proposed discharge will lower water quality in the receiving water, the department will not authorize a discharge unless the department finds that*

18 AAC 70.016(c)(7)(A) *the reduction of water quality meets the applicable criteria of 18 AAC 70.020(b), 18 AAC 70.030, or 18 AAC 70.236(b), unless allowed under 18 AAC 70.200, 18 AAC 70.210, or 18 AAC 70.240;*

Discharge allowed by the permit at Outfall 001A conforms to the requirements of 18 AAC 70.020 and 18 AAC 70.030. A mixing zone is not authorized for the KIB Landfill Leachate discharge; therefore, water quality criteria must be met at the end of the pipe, prior to discharge to the unnamed wetlands. DEC determined that the facility currently has reasonable potential to exceed water quality criteria at the end of the pipe; therefore DEC has established a compliance schedule in the permit whereby the permittee must comply with the final effluent limits in the permit as soon as possible, but no later than 5 years after the effective date of the final permit. The final effluent limits in the permit are the most stringent water quality criteria at 18 AAC 70.020(b) and 18 AAC 70.030; therefore, the final effluent limits will not result in a reduction of water quality.

There are no site-specific criteria associated with 18 AAC 70.236(b).The permit does not authorize short term variances or zones of deposit under 18 AAC 70.200 or 18 AAC 70.210.

DEC determined that the reduction in water quality will not violate the criteria of 18 AAC 70.020(b), 18 AAC 70.030, or 18 AAC 70.236(b) and that the finding is met.

18 AAC 70.016(c)(7)(B) *each requirement under (b)(5) of this section for a discharge to a Tier 1 water is met;*

See 18 AAC 70.016(b)(5) analysis and findings above.

18 AAC 70.016(c)(7)(C) *point source and state-regulated nonpoint source discharges to the receiving water will meet requirements under 18 AAC 70.015(a)(2)(D); to make this finding the department will (i) identify point sources and state-regulated nonpoint sources that discharge to, or otherwise impact, the receiving water;* and *(ii) consider whether there are outstanding noncompliance issues with point source permits or required state-regulated nonpoint source best management practices, consider whether receiving water quality has improved or degraded over time, and, if necessary and appropriate, take actions that will achieve the requirements of 18 AAC 70.015(a)(2)(D); and (iii) coordinate with other state or federal agencies as necessary to comply with (i) and (ii) of this subparagraph;*

The requirements under 18 AAC 70.015(a)(2)(D) state:

(D) all wastes and other substances discharged will be treated and controlled to achieve

(i) for new and existing point sources, the highest statutory and regulatory requirements; and

(ii) for nonpoint sources, all cost-effective and reasonable best management practices;

The highest statutory and regulatory requirements are defined at 18 AAC 70.015(d):

(d) For purposes of (a) of this section, the highest statutory and regulatory requirements are

(1) any federal technology-based effluent limitation identified in 40 C.F.R. 122.29 and 125.3, revised as of July 1, 2017 and adopted by reference;

(2) any minimum treatment standards identified in 18 AAC 72.050;

(3) any treatment requirements imposed under another state law that is more stringent than a requirement of this chapter; and

(4) any water quality-based effluent limitations established in accordance with 33 U.S.C. 1311(b)(1)(C) (Clean Water Act, sec. 301(b)(1)(C)).

The first part of the definition includes all federal technology-based ELGs. The ELGs set standards of performance for existing and new sources. The TBELs in the KIB Landfill Permit are based on the ELGs for the landfill point new point source category at 40 CFR Part 445.

The second part of the definition references the minimum treatment standards found at 18 AAC 72.050, which refers to domestic wastewater discharges only. The permit does not authorize the discharge of domestic wastewater; therefore, a finding under this section is not applicable.

The third part of the definition refers to treatment requirements imposed under another state law that are more stringent than 18 AAC 70. The correct operation and maintenance of equipment and implementing BMPs, as well as other permit requirements, will control the discharge and satisfy all applicable federal and state requirements. The Department is not aware of other state regulations beyond 18 AAC 70 that apply to this permitting action and impose more stringent requirements than those found in 18 AAC 70.

The fourth part of the definition refers to WQBELs. A WQBEL is designed to ensure that the WQS of a waterbody are met and may be more stringent than TBELs. Section 301(b)(1)(C) of the CWA requires the development of limits in permits necessary to meet WQS by July 1, 1977. WQBELs included in APDES permits are derived from EPA-approved 18 AAC 70 WQS. APDES regulation 18 AAC 83.435(a)(1) requires that permits include WQBELs that can "achieve water quality standard established under CWA §303, including state narrative criteria for water quality."

The WQBEL for zinc is more stringent than the TBEL for zinc; therefore, DEC has applied the WQBEL for zinc in the permit. The permit contains a compliance schedule that requires KIB to comply with the final TRC, nitrate as N, total nitrate and nitrite as N, copper, lead, mercury, nickel, selenium, and WET effluent limits as soon as possible, but not later than five years after the effective date of the final permit. These effluent limits are the most stringent water-quality criteria found in 18 AAC 70.

The compliance schedule contains yearly milestones that KIB must achieve to assure that the final effluent limits will be met as required by the permit. The permittee must submit annual reports to DEC that outlines the progress made towards achieving compliance with the final effluent limits in the permit. If KIB has not achieved compliance with the final effluent limits after one year, they must submit a description of potential landfill upgrades that would be required to meet the final effluent limits and identify potential funding sources. If KIB has not achieved compliance with the final effluent limits after two years, they must submit a proposed construction schedule with dates for commencement and completion of construction milestones that will lead to compliance with the final effluent limits. If KIB has not achieved compliance with the final effluent limits after three years and upgrades are required for the permittee to achieve compliance with the final effluent limits, the permittee must submit engineered Kodiak Landfill upgrade plans to the Department's Permitting and Engineering Support and Plan Review Program. Construction must begin no later than four years after the effective date of the final permit. Construction, startup, and optimization of upgrade operations and compliance with the final effluent limits must be achieved by five years after the effective date of the final permit.

After review of the applicable statutory and regulatory requirements, including 18 AAC 70, 18 AAC 72, and 18 AAC 83, the Department finds that the discharge from the KIB Landfill meets the highest applicable statutory and regulatory requirements and that the finding is met.

18 AAC 70.016(c)(7)(D)(i-ii) *the alternatives analysis provided under (4)(C-F) of this subsection demonstrates that*

- *(i) a lowering of water quality under 18 AAC 70.015(a)(2)(A) is necessary; when one or more practicable alternatives that would prevent or lessen the degradation associated with the proposed discharge are identified, the department will select one of the alternatives for implementation; and*
- *(ii) the methods of pollution prevention, control, and treatment applied to all waste and other substances to be discharged are found by the department to be the most effective and practicable;*

The following is derived from KIB's Landfill Leachate Antidegradation Form 2G submittal which includes their practicable alternatives analysis to address (4)(C-F) of this subsection:

Form 2G Section 1 (Questions 1 and 2) - Facility Information (18 AAC 70.16(a)(5)(A-G)):

The receiving waterbody, the unnamed wetlands should have a Tier 2 protection level. Copper, lead, mercury, nickel, selenium, TRC, and nitrate/nitrite are the pollutants of concern in need of a Tier 2 analysis. KIB submitted data for the parameters that may alter the effects of the discharge to the receiving water. Data includes the range of observed concentrations and average concentration for each parameter in need of a Tier 2 analysis. Persistence varies depending on the parameter.

Form 2G Section 4 (Questions 1-3) – Tier 2 analysis of existing use protection (18 AAC 70.16(c)):

The antidegradation application is for an existing discharge that requires a Tier 2 analysis for parameters as defined under 18 AAC 70.16(c)(2)(A)-(E).

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

The immediate receiving water body is the unnamed wetland located east of the leachate treatment plant. Drainage from the wetland area is understood to be through a small, unnamed creek that flows to the northwest approximately 650 yards from the outfall. This unnamed creek merges with two other unnamed creeks to then flow north-northwest into the Monashka Bay. The tower portion of the unnamed creek has been classified as a Coho rearing stream but there are waterfalls between the upper and lower portions of this stream and KIB staff have never seen fish in the upper stream, Baseline water quality data is not available for the wetland or streams, and multiple potential contaminant sources exist from surrounding residential and industrial properties (including a former sawmill now accepting construction,' demolition debris and fill material for disposal, and the city of Kodiak composting facility). Based on the maximum and average results for total residual chlorine, nitrate/nitrite, copper, lead, mercury, nickel, and selenium, these parameters may have the potential to present acute or chronic impacts to freshwater species in the immediate receiving water.

Metals data are based on total metals, whereas the acute and chronic water quality limits are based on dissolved concentrations, Recent metals results since replacement of the membranes in late 2018 indicate all metal concentrations were reduced with the lower total suspended solids, and only the average nickel concentration remained above the chronic freshwater quality criteria. With the improving stabilization of the existing leachate treatment plant performance, maintenance of the membranes, and addition of the proposed aeration tank pretreatment, the concentrations and resulting impact of alt these parameters will be reduced. To supplement the biological treatment of total residual chlorine in the existing leachate treatment plant, practicable alternatives include: targeted waste collection events (e.g. for Covid-19 cleaning supplies), additional screening procedures at the landfill to remove chlorine containing household wastes from landfill disposal; and additional operational procedures to divert and recycle treated water following membrane cleaning with sodium hypochlorite.

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

Table 6- Practicable Alternative Analysis

Parameter of Potential Concern	Analysis/Findings	Practicable Alternatives	Relative Cost
TRC	1. Suggest audit of lab data for possible interferences like turbidity. 2. We would not expect any residual chlorine through a biological plants, but the data indicate that TRC is showing up in the influent leachate and is passing through the plant. Possible source is Covid-19 cleaning supplies. 3. TRC could be associated with the use of sodium hypochlorite for membrane cleaning.	1. Continue to maintain operation of biological plant which reduces TRC. 2. Invest source reduction measures including targeted waste collection events for household and Covid-19 cleaning supplies containing bleach, and increased screening at the landfill. 3. Modify existing plant to recirculate permeate after cleanings. Modifications include new valve and discharge hose to lagoon drain.	1. Low 2. Medium 3. High
Metals (copper, lead, mercury, nickel)	1. It is likely that data prior to January 2019 was impacted by elevated particulates. Total= particulates + dissolved. After membranes were replaced, the TSS and metals concentrations have been lower. 2. Proposed aeration pretreatment will result in additional precipitation.	1. Maintenance of membranes to reduce particulate metals in TSS. 2. Additional precipitation of metals via aeration pretreatment system.	1. Medium 2. High
Selenium	1. Selenium normally exists in waters/wastewaters as selenite (SeIV) or selenite (SeVI). Selenite can be effectively co-precipitated with iron. Selenate cannot. 2. No results have exceeded the 5 µg/L chronic water quality criteria.	1. Focus on improving the performance of existing anoxic zones in plant to biologically reduce SeIV and SeVI to elemental Se (SeO). 2. Add iron flock to co-precipitate.	1. Low 2. Medium
Nitrate/Nitrite	1. The existing plant is designed to remove these via biological denitrification. When good nitrification (ammonia treatment) is happening, denitrification should also happen. 2. Variable biological oxygen demand in	1. Adjust operation of existing plant to stabilize the food to biomass (F/M) ratio by adding supplemental food source when influent biological oxygen demand is low. Continue focus of effective nitrification (ammonia treatment) and	1. Medium

Parameter of Potential Concern	Analysis/Findings	Practicable Alternatives	Relative Cost
	influent is likely having an impact on this. 3. Note that the 10 mg/L is an MCL for protection of human health, and there is no criterion for protection of aquatic life.	the denitrification should follow.	

3.C. Identification of a proposed alternative that prevents or lessens water quality degradation while also considering accompanying cross-media environmental impacts.

The proposed practicable alternative is: implementation of improvements in operation and maintenance of the existing leachate treatment plant; addition of the proposed aeration tank pretreatment system; target waste collection events; additional screening procedures to remove chlorine-containing wastes from landfill disposal; and additional procedures to recycle permeate back through the biological plant following membrane cleaning with hypochlorite. Well-maintained membranes keep the total suspended solids below 1mg/L which reduces dissolved metals Concentrations. Total residual chlorine concentrations are reduced in the existing biological plant but further source reduction and recycle of cleaning solutions are recommended. Improved monitoring and maintenance of the anoxic zones in the existing leachate treatment plant will reduce selenium concentrations and improve the denitrification process to reduce nitrate/nitrite.

The KIB will be required, as per the permit's Compliance Schedule, to meet water quality criteria at the end of pipe as soon as possible, but no later than five years after the effective date of the final permit. In order to comply with the permit's final effluent limits, the KIB may need to modify the existing landfill leachate treatment system and/or use a combination of operational and maintenance practices outlined in KIB's alternative analysis. If modifications or upgrades are required to meet the final effluent limits in the permit, the KIB must submit engineered plans to DEC's Engineering and Plan Review Program no later than three years after the effective date of the final permit and begin construction no later than four years after the effective date of the final permit.

The methods of pollution prevention, control, and treatment applied to all waste and other substances to be discharged are found by the department to be the most effective and practicable. The KIB Landfill uses a variety of measures to prevent, control and treat the pollution that may be generated as a result of the facility's wastewater treatment operations. These measures include an BMP Plan that contains specific BMPs to ensure that all solids, sludge, or other pollutants removed in the course or control of water and wastewaters are disposed in a manner to prevent any pollutant from such materials from entering waters of the U.S. Each facility component must be examined for its waste minimization opportunities and it potential for causing a release of significant amounts of pollutants due to equipment failure, improper operation, or natural events such as rain or snowfall. All water control devices such as berms, must be maintained to continue their effectiveness and protect from unexpected failure.

Permit Section 3.4 requires that pollutants removed in the course of treatment such as screenings and grit be disposed of in accordance with Alaska Solid Waste Management Regulations at 18 AAC 60.

The Department has determined that the methods of pollution prevention, control, and treatment applied to all waste and other substances to be discharged are found by the department to be the most effective and practicable; therefore, the finding, 18 AAC 70.016(c)(7)(D)(i-ii) is met.

18 AAC 70.016(c)(7)(E) *except if not required under (4)(F) of this subsection, the social or economic importance analysis provided under (4)(G) and (5) of this subsection demonstrates that a lowering of water quality accommodates important social or economic development under 18 AAC 70.015(a)(2)(A);*

Form 2G Section 4 (Question 4)- Social or Economic Importance (18 AAC 70.016(c)(5))

The KIB Landfill where the leachate treatment plant is located provides an essential service to the local community. The landfill provides a safe and accessible, centralized location for disposal local residential and municipal solid wastes. Waste removal services prevent the buildup of refuse in other locations throughout the community and reduces illegal disposal of waste. The landfill and associated leachate treatment plant provides long-term, full-time local job opportunities for eight personnel, with additional temporary positions open during summer months. The unnamed wetland receiving waters do not serve any recreational purpose.

The Department has determined that the operation of the KIB Landfill and the discharges authorized by the permit demonstrates that a lowering of water quality accommodates important social or economic development; therefore, 18 AAC 70.016(c)(7)(E) finding is met.

18 AAC 70.016(c)(7)(F) *18 AAC 70.015 and this section have been applied consistent with 33 U.S.C. 1326 (Clean Water Act, sec. 316) with regard to potential thermal discharge impairments.*

Discharges authorized under the permit are not associated with a potential thermal discharge impairment; therefore, the finding is not applicable.

7.0 OTHER PERMIT CONDITIONS

7.1 Quality Assurance Project Plan

The permittee is required to develop procedures to ensure that the monitoring data submitted are accurate and to explain data anomalies if they occur. The permittee must review, update as necessary, and implement a Quality Assurance Project Plan (QAPP) within 180 days of the effective date of the final permit. The QAPP shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples; laboratory analysis; precision and accuracy requirements; data reporting, including method detection/reporting limits; and quality assurance/quality control criteria. The permittee is required to amend the QAPP whenever any procedure addressed by the QAPP is modified. The QAPP shall be retained electronically or physically at the facility's office of record and made available to the Department upon request.

7.2 Best Management Practices Plan

In accordance with AS 46.03.110 (d), the Department may specify in a permit the terms and conditions under which waste material may be disposed of. The permittee must review, update as necessary, and implement its BMP Plan within 180 days of the effective date of the permit. The BMP Plan shall prevent or minimize the potential for the release of pollutants to waters and lands of the State of Alaska through plant site runoff, spillage or leaks, or erosion. The permit contains certain BMP conditions that must be included in the BMP Plan. The BMP Plan shall be retained electronically or physically at the facility's office of record and made available to the Department upon request.

7.3 Electronic Discharge Monitoring Report

The permittee must submit DMR data electronically through NetDMR per Phase I of the E-Reporting Rule (40 CFR 127) upon the effective date of the permit. Authorized persons may access permit information by logging into the NetDMR Portal https://cdxnodengn.epa.gov/oeca-netdmr-web/action/login). DMRs submitted in compliance with the E-Reporting Rule are not required to be submitted as described in permit Appendix A – Standard Conditions unless requested or approved by the Department. Any DMR data required by the Permit that cannot be reported in a NetDMR field (e.g. mixing zone receiving water data, etc.), shall be included as

an attachment to the NetDMR submittal. DEC has established an e-Reporting Information website at http://dec.alaska.gov/water/compliance/electronic-reporting-rule that contains general information about this new reporting format. Training materials and webinars for NetDMR can be found at https://netdmr.zendesk.com/home.

Phase II of the E-Reporting rule will integrate electronic reporting for all other reports required by the Permit (e.g., Annual Reports and Certifications) and implementation is expected to begin December 2020. Permittees should monitor DEC's E-Reporting Information website (http://dec.alaska.gov/water/compliance/electronic-reporting-rule) for updates on Phase II of the E-Reporting Rule and will be notified when they must begin submitting all other reports electronically. Until such time, other reports required by the Permit may be submitted in accordance with Appendix A – Standard Conditions.

7.4 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 individual APDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements.

7.5 Schedules of Compliance

Schedules of compliance authorized under 18 AAC 83.560(b) require that if a permit establishes a schedule of compliance that exceeds one year, the schedule must set out interim requirements and dates for their achievement. If the time necessary to complete any interim requirement is more than one year, the schedule shall require reports on progress towards completion of the interim requirements.

A mixing zone is not authorized for the KIB Landfill Leachate discharge; therefore, water quality criteria must be met prior to discharge to the unnamed wetland. There is reasonable potential for TRC, nitrate as N, total nitrate and nitrite as N, copper, lead, mercury, nickel, selenium, and WET to exceed water-quality criteria at the end of the pipe. It is highly unlikely that the KIB will be able to comply with water-quality criteria effluent limits at the end of the pipe upon the effective date of the permit; therefore, DEC has delayed the implementation of water quality criteria effluent limits for TRC, nitrate as N, total nitrate and nitrite as N, copper, lead, mercury, nickel, selenium, and WET to as soon as possible, but no later than five years after the effective date of the final permit. Five years provides a reasonable and appropriate timeframe to achieve compliance with the water quality criteria effluent limits for these parameters. This will the KIB ample time to identify and make any necessary process modifications or upgrades at the landfill and leachate treatment facility.

Reports on progress made toward achieving compliance with the water-quality criteria effluent limits are due annually starting in the first year of the permit. While the schedule of compliance is in effect, the permittee must monitor and report the TRC, nitrate as N, total nitrate and nitrite as N, copper, lead, mercury, nickel, selenium, and WET results as specified in Table 2 of the permit.

8.0 OTHER LEGAL REQUIREMENTS

8.1 Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies to consult with the USFWS and NMFS to determine whether their authorized actions could beneficially or adversely affect any threatened and endangered species or habitats. NMFS is responsible for administration of the ESA 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 USFWS.

As a state agency, DEC is not required to consult with these federal agencies regarding permitting actions; however, DEC voluntarily contacts the agencies to notify them of the proposed permit issuance and to obtain listings of threatened and endangered species near the discharge.

On October 13,2020, DEC contacted USFWS and NMFS to provide them early notification of DEC's intent to reissue AK0053481 and to provide them the opportunity to share concerns with DEC regarding listed species.

At the permittee's request, a consultation with USFWS occurred in June 2012. The consultation with USFWS indicated that the North American breeding Steller's eider (*Polysticta stelleri*) and the southwest distinct population segment of northern sea otter (*Enhydra lutris kenyoni*) are found in the project area.

DEC reviewed USFWS and NMFS threatened and endangered species at https://www.fws.gov/endangered/?ref=topbar and at https://www.fisheries.noaa.gov/alaska/endangered-species-conservation/endangered-threatened-and-candidate-species-alaska and did not identify any additional species in the vicinity of the KIB Landfill Leachate wastewater discharge outfall.

This permit and fact sheet will be provided to the agencies for review during the public notice period. Any comments received from these agencies will be considered prior to issuance of the permit.

8.2 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) 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 associated river bottom substrates necessary for fish spawning, breeding, feeding, or growth to maturity—including aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish. Spawning, breeding, feeding, or growth to maturity covers a species' full life cycle necessary for fish from commercially-fished species to spawn, breed, feed, or grow to maturity.

The EFH regulations define an adverse effect as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Section 305(b) of the Magnuson-Stevens Act 916 USC 1855(b)) requires federal agencies to consult NMFS when any activity proposed to be permitted, funded, or undertaken by a federal agency may have an adverse effect on designated EFH as defined by the Act. As a State agency, DEC is not required to consult with NMFS regarding permitting actions, but voluntarily contacts NMFS to notify them of the proposed permit issuance and to obtain listings of EFH in the area.

On October 13, 2020, DEC contacted NMFS to provide them early notification of DEC's intent to reissue AK0053481 and to provide them the opportunity to share concerns with DEC regarding EFH.

On October 13, 2020, NMFS directed DEC to NMFS's EFH in Alaska website at https://www.fisheries.noaa.gov/alaska/habitat-conservation/essential-fish-habitat-efh-alaska and to the Alaska Department of Fish and Game's Anadromous Waters Catalog at https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=main.interactive.

DEC used these websites to determine that Leachate Creek, located downstream of the KIB Landfill wetland discharge area, is important for coho salmon rearing.

DEC will provide NMFS with copies of the permit and fact sheet during the public notice period. Any comments received from NMFS regarding EFH will be considered prior to issuance of the permit.

8.3 Permit Expiration

The permit will expire five years from the effective date of the permit.

9.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC), 2020. Integrated water quality monitoring and assessment report. https://dec.alaska.gov/water/water-quality/integrated-report#2018 Accessed November 12, 2020.

ADEC, 2018. 18 AAC 70, Water quality standards, as amended through April 6, 2018.

ADEC, 2014. Alaska Pollutant Discharge Elimination System permits reasonable potential analysis and effluent limits development guide.

ADEC, 2008. Alaska water quality criteria manual for toxic and other deleterious organic and inorganic substances, as amended through December 12, 2008.

Alaska Department of Fish and Game, 2020. Catalog of waters important for spawning, rearing, or migration of anadromous fishes-southwestern region, effective June 1, 2020.

National Oceanic and Atmospheric Administration (NOAA Fisheries), 2020. Endangered, threatened, and candidate species in Alaska. https://www.fisheries.noaa.gov/alaska/endangered-species-conservation/endangered-threatened-and-candidate-species-alaska Accessed October 14, 2020.

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U.S. Environmental Protection Agency. 1991. Technical support document for water quality-based toxics control, EPA/505/2-90-001, USEPA Office of Water, Washington D.C., March 1991.

U.S Fish & Wildlife Service. 2020. Endangered species. https://www.fws.gov/endangered/?ref=topbar Accessed October 14, 2020.

APPENDIX A- BASIS FOR EFFLUENT LIMITATIONS

The Clean Water Act (CWA) requires that the effluent limit for a particular pollutant be the more stringent of either technology-based effluent limits (TBELs) or water quality-based effluent limits (WQBELs). TBELs are established by the Environmental Protection Agency (EPA) for many industries in the form of Effluent Limitation Guidelines (ELG) and are based on available pollution control technology. The Alaska Department of Environmental Conservation (DEC or the Department) adopts the subject ELGs by reference in 18 Alaska Administrative Code (AAC) 83.010. TBELs are national in scope and establish performance standards for all facilities within an industrial category or subcategory. The Department may find, by analyzing the effect of an effluent discharge on the receiving waterbody, that TBELs are not sufficiently stringent to meet water quality standards (WQS). In such cases, the Department is required to develop more stringent WQBELs, which are designed to ensure that the WQS of the receiving waterbody are met.

When TBELs do not exist for a particular pollutant expected to be in the effluent, the Department must determine if the pollutant may cause or contribute to an exceedance of a WQS for the waterbody. If a pollutant causes or contributes to an exceedance of a WQS, a WQBEL for the pollutant must be established in the permit.

Landfill leachate varies from site to site based on a number of factors, including: the types of waste accepted, operating practices, depth of fill, compaction of wastes, annual precipitation, and landfill age. The main contaminants in the leachate wastewater are derived from the materials deposited as the fill. Accordingly, leachate may contain metals and other toxic pollutants.

TBELs have been developed for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), pH, ammonia, alpha-terpineol, benzoic acid, p-cresol, phenol, and zinc based on the promulgated ELG discussed in detail in Section A.2.2 below. When TBELs do not exist for a particular pollutant expected to be in the effluent, the Department must determine if the pollutant may cause or contribute to an exceedance of a WQS for the water body. If a pollutant may cause or contribute to an exceedance of a WQS, a WQBEL for the pollutant must be established in the permit.

Statutory and Regulatory Basis

18 AAC 70.010 prohibits conduct that causes or contributes to a violation of the WQS. 18 AAC 15.090 requires that permits include terms and conditions to ensure criteria are met, including operating, monitoring, and reporting requirements.

The regulations require the permitting authority to make this evaluation using procedures that account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving waterbody. The limits must be stringent enough to ensure that WQS are met and must be consistent with any available waste load allocation (WLA).

Technology Based Effluent Limitations

A.2.1 Mass-Based Limitations

Alaska Pollutant Discharge Elimination System (APDES) regulations at 18 AAC 83.540 require that effluent limits be expressed in terms of mass unless they cannot appropriately be expressed by mass, if it is infeasible, or if the limits can be expressed in terms of other units of measurement. Expressing limitations in terms of concentration as well as mass encourages the proper operation of a facility at all times. The mass-based limits are expressed in pounds per day (lbs/day) and are calculated as follows:

mass-based limit (pounds (lbs)/day) = concentration limit (milligrams per liter (mg/L)) × design flow (million gallons per day (mgd)) × 8.34 (lbs/gallon)

A.2.2 Effluent Limitation Guidelines

Section 301(b) of the CWA requires industrial dischargers to meet applicable TBELs established by the EPA. These are enforceable through their incorporation into an APDES permit. EPA promulgated ELGs for landfills point source categories at 40 Code of Federal Regulations (CFR) Part 445 in January 2000. The ELGs applicable to a new source are sources that have commenced construction after EPA promulgated the ELGs. The Kodiak Island Borough (KIB) Landfill is considered a new source. The ELG states that the New Source Performance Standards (NSPS) are the same as those specified at 40 CFR § 445.21 as Best Practicable Control Technology Currently Available (BPT). EPA has not identified any other demonstrated technologies or combinations of technologies for new sources that are different from those used to establish BPT, Best Conventional Pollutant Control Technology (BCT), and Best Available Technology Economically Achievable (BAT) for existing sources. Therefore, EPA established NSPS at 40 CFR § 445.21 that are identical to those promulgated in both subcategories for BPT, BCT, and BAT. Table A.1 lists the Non-Hazardous Waste Landfill Subcategory effluent limitations that are applicable to the KIB Landfill as a new source.

Table A.1- Outfall 001A Technology-Based Effluent Limits

Parameter	Units	Monthly Average	Daily Maximum
Total Ammonia as Nitrogen (N)	mg/L	4.9	10
TSS	mg/L	27	88
BOD_5	mg/L	37	140
Alpha-Terpineol	mg/L	0.016	0.033
Benzoic Acid	mg/L	0.071	0.12
p-Cresol	mg/L	0.014	0.025
Phenol	mg/L	0.015	0.026
Zinc	mg/L	0.11	0.2
pH	Significant Units (SU)	Within the range of 6.0-9.0	

A.3 Water Quality Based Effluent Limitations

WQBELs included in APDES permits are derived from WQS. APDES regulation 18 AAC 83.435(a)(2) requires that permits include WQBELs that can achieve WQS established under CWA Section 303, including state narrative criteria for water quality. The State's WQS are composed of use classifications, numeric and/or narrative water quality criteria, and an antidegradation policy (See Section 6.0, Antidegradation). The use classification system identifies the designated uses that each waterbody is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the state to support the designated use classification of each waterbody. Designated uses are those uses specified in WQS for each waterbody or segment whether or not they are being attained [40 CFR Section 131.3(f)]. Existing uses are those uses actually attained in a waterbody on or after November 28, 1975, whether or not they are included in the WQS [40 CFR Section 131.3].

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

The receiving water for the discharge, an unnamed wetland, has not been reclassified, nor have site specific water quality criteria been established. Therefore, the wetland must be protected for all freshwater use classes listed in 18 AAC 70.020(a)(1). These freshwater designated use classes consist of the following: water supply for drinking, culinary, and food processing, agriculture, aquaculture, and

industrial; contact and secondary recreation; and growth and propagation of fish, shellfish, other aquatic life, and wildlife.

The KIB Landfill Leachate discharge permit contains a compliance schedule for water-quality based parameters that have reasonable potential to exceed water quality criteria. These parameters include total residual chlorine (TRC), nitrate as N, total nitrate and nitrite as N, copper, lead, mercury, nickel, selenium, and whole effluent toxicity. The final effluent limits are the water quality criteria in 18 AAC 70. Ammonia, phenol, zinc, and pH have both TBELs and water quality criteria. Table A.2 summarizes the parameters containing water-quality criteria based effluent limits in the KIB Landfill Leachate discharge permit. Criteria are freshwater aquatic life unless otherwise noted.

Table A.2- Outfall 001A Water-Quality Based Effluent Limits

Parameter	Units	Chronic	Acute
Total Ammonia as N[a]	mg/L	8.8	51
TRC	micrograms per liter (µg/L)	11	19
Copper [b]	µg/L	2.5	3.2
Lead [b]	µg/L	0.4	11
Mercury	µg/L	0.012	2.4
Nickel [b]	µg/L	14	125
Selenium	µg/L	5.0	20
Zinc [b]	mg/L	32	32
Nitrate as N	mg/L	10,000 (drinking water)	
Total Nitrate and Nitrite as N	mg/L	10,000 (drinking water)	
pH	SU	6.5 (daily minimum)	8.5 (daily maximum)
Phenol	µg/L	21,000 (human health for consumption of water and aquatic organisms)	4,600,000 (human health for consumption of aquatic organisms only)

Footnotes:

a. Ammonia criteria based on receiving water temperature 10.4°C and pH 6.36 SU.

b. Freshwater hardness-dependent metals based on receiving waterbody hardness of 21 mg/L as CaCO3.

A.4 Selection of Most Stringent Limitations

If DEC does not authorize a mixing zone, WQS numeric criteria are applied at the end of the pipe, and TBELs are selected for those parameters that are solely technology based.

When DEC authorizes a mixing zone, parameters are identified in the mixing zone that will require dilution to meet WQS numeric criteria. If there are TBELs for an identified parameter in the mixing zone, TBELs apply at the end of the pipe, and WQS numeric criteria for that parameter, apply at the boundary of the mixing zone. If the reasonable potential analysis RPA requires the development of WQBELs or specific parameters in order to protect human health criteria at the boundary of the mixing zone, WQBELs are applied as end-of-pipe effluent limits. Those parameters that are not identified in the authorized mixing zone, must meet applicable water quality numeric criteria at the end of pipe. In the absence of water quality criteria for a particular pollutant, TBELs are applied as end-of pipe effluent limits.

A mixing zone is not authorized for the KIB Landfill Leachate discharge; therefore, Water-quality criteria apply at the end of the pipe. The permit; however, contains TBELs for some of the water-quality based pollutants. The CWA requires that the effluent limit for a particular pollutant be the more stringent of either

TBELs or WQBELs. DEC selected the more stringent of the TBEL and water quality criteria for inclusion in the permit. Table A.3 summarizes the selection of the effluent limits in the KIB Landfill Leachate permit.

Table A.3- Selection of Most Stringent Effluent Limits

Parameter	Type of Effluent Limit
Total Ammonia, as N	TBEL
BOD_5	TBEL
TSS	TBEL
Alpha-Terpineol	TBEL
Benzoic Acid	TBEL
Phenol	TBEL
Zinc	WQBEL
pH	WQBEL
TRC	WQBEL
Copper	WQBEL
Lead	WQBEL
Mercury	WQBEL
Nickel	WQBEL
Selenium	WQBEL
Nitrate as N	WQBEL
Total Nitrate and Nitrite as N	WQBEL

APPENDIX B- REASONABLE POTENTIAL DETERMINATION

The following describes the process the Alaska Department of Environmental Conservation (the Department or DEC) used to determine if the discharge authorized in the draft permit has the reasonable potential (RP) to cause or contribute to a violation of Alaska Water Quality Standards (WQS). The Department used the process described in the *Technical Support Document (TSD) for Water Quality-Based Toxics Control* (Environmental Protection Agency, 1991) and DEC's guidance, *Alaska Pollutant Discharge Elimination System Permits Reasonable Potential Analysis (RPA) and Effluent Limits Development Guide* (June 30, 2014) (RPA Guide) to determine the RP for any pollutant to exceed a WQ numeric criterion.

To determine if there is RP for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, the Department compares the maximum projected receiving waterbody concentration to the criteria for that pollutant. RP to exceed exists if the projected receiving waterbody concentration exceeds water quality criteria, and a water quality-based effluent limit must be included in the permit (18 Alaska Administrative Code 83.435).

The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the pollutant concentration upstream from the discharge. For criteria that are expressed as maxima, the 85th percentile of the ambient data is generally used as an estimate of the worst case. If ambient data is not available, DEC uses 15% of the most stringent given pollutant's criteria as a worst-case example. If a mixing zone is not authorized, the Department considers only the concentration of the pollutant in the effluent regardless of the upstream flow and concentration. Zinc is used as an example to demonstrate the RP determination process.

B.1 Mass Balance

For a discharge to a flowing waterbody, the maximum projected receiving waterbody concentration is determined using a steady state model represented by the following mass balance equation:

$$C_d Q_d = C_e Q_e + C_u Q_u \qquad \text{(Equation B-1)}$$

Where,

C_d = Receiving waterbody concentration downstream of the effluent discharge

C_e = Maximum projected effluent concentration

C_u = Assumed receiving waterbody ambient concentration

Q_d = Receiving waterbody flow rate = $Q_e + Q_u$

Q_e = Effluent flow rate (set equal to the design flow of the wastewater treatment facility (WWTF))

Q_u = Receiving waterbody flow rate

When the mass balance equation is solved for C_d, it becomes:

$$C_d = \frac{C_e Q_e + C_u Q_u}{Q_e + Q_u} \qquad \text{(Equation B-2)}$$

The above form of the equation assumes that the discharge is rapidly and completely mixed with the receiving waterbody. If a mixing zone based on a percentage of the critical flow in the receiving waterbody is authorized based on the assumption of incomplete mixing with the receiving waterbody, the equation becomes:

$$C_d = \frac{C_e Q_e + C_u (Q_U \times MZ)}{Q_e + (Q_u \times MZ)} \qquad \text{(Equation B-3)}$$

Where, MZ = the fraction of the receiving waterbody flow available for dilution.

Where mixing is rapid and complete, MZ is equal to 1 and equation B-2 is equal to equation B-3 (i.e., all of the critical low flow volume is available for mixing). If a mixing zone is not authorized, dilution is not considered when projecting the receiving waterbody concentration, and

$$C_d = C_e \qquad \text{(Equation B-4)}$$

In other words, as indicated above, if a mixing zone is not authorized, the Department considers only the concentration of the pollutant in the effluent regardless of the upstream flow and concentration. If the concentration of the pollutant in the effluent is less than the WQS numeric criteria, the discharge cannot cause or contribute to a WQ violation for that pollutant. In this case, the mixing or dilution factor (% MZ) is equal to zero and the mass balance equation is simplified to $C_d = C_e$.

Equation B-2 can be simplified by introducing a dilution factor (D):

$$D = \frac{Q_e + Q_u}{Q_e} \qquad \text{(Equation B-5)}$$

After the D simplification, this becomes:

$$C_d = \frac{(C_e - C_u)}{D} + c_u \qquad \text{(Equation B-6)}$$

B.2 Maximum Projected Effluent Concentration

To calculate the maximum projected effluent concentration, the Department used the procedure described in Section 3.3 of the *TSD*, "*Determining the Need for Permit Limits with Effluent Monitoring Data*" and the process described in section 2.4 of DEC's RPA Guide. In this procedure, the 99th percentile of the effluent data is the maximum projected effluent concentration which is used in the calculation of the maximum projected receiving waterbody concentration.

Since there are a limited number of data points available, the 99th percentile is calculated by multiplying the maximum observed effluent concentration (MOC) by a reasonable potential multiplier (RPM). The RPM is the ratio of the 99th percentile concentration to the MOC and accounts for the statistical uncertainty in the effluent data. The RPM is calculated from the coefficient of variation (CV) of the data and the number of data points. The CV is defined as the ratio of the standard deviation of the data set to the mean. When fewer than 10 data points are available, the *TSD* and DEC's RPA Guide recommends assuming that the CV is equal to 0.6. A CV value of 0.6 is a conservative estimate that assumes a relatively high variability. In the example of zinc, the Department used ProUCL, a statistical software program, to determine a CV of 1.6. ProUCL also indicated that the data set follows a gamma statistical distribution. Therefore, the RPM equation in Section 2.4.2.1 of the RPA Guide is used to determine the RPM for zinc.

$$RPM = \frac{\mu_n + z_{99}\,\sigma}{\mu_n + p_n\,\sigma} \qquad \text{(Equation B-7)}$$

Where,

$z_{99} =$ the z − statistic at the 99th percentile $= 2.326$

$\mu_n =$ mean calculated by ProUCL $= 10.0$

$\sigma =$ the standard deviation calculated by ProUCL $= 15.79$

$p_n =$ the z − statistic at the 95th percent confidence level of $(1 - 0.95)^{\frac{1}{n}} = 0.794$

$n =$ number of valid data samples $= 13$

RPM $= 2.0$

The maximum expected concentration (MEC) is determined by multiplying the MOC by the RPM:

$$MEC = (RPM)(MOC) \quad \text{(Equation B-8)}$$

MOC = 25 micrograms per liter (µg/L)

In the case of zinc,

MEC = (2.0)(25) = 50 µg/L*

* The above MEC calculation is simplified for illustrative purposes. The MEC is calculated in DEC's RPA tool with figures that have not been rounded. The actual MEC as calculated in the RPA tool is 51.1 µg/L.

Comparison with water quality criteria

In order to determine if reasonable potential exists for this discharge to exceed water quality criteria, the highest projected concentration is compared with the most stringent water quality criteria.

freshwater acute and chronic criteria: 31.9 µg/L

51.1 µg/L > 31.9 µg/L **YES,** there is RP for zinc to exceed water quality criteria.

Table B.1 summarizes the data, multipliers, and criteria used to determine RP to exceed water quality criteria at the end of the pipe.

Table B.1- Reasonable Potential Analysis Results

Parameter	Units	MOC	N	RPM	MEC	WQS Criteria	End-of Pipe RP?
Ammonia	milligrams per liter (mg/L)	130	20	1.4	186	51 (acute) 8.8 (chronic)	Yes
Total Residual Chlorine	micrograms per liter (µg/L)	980	13	2.3	2,258	19 (acute) 11 (chronic)	Yes
Copper	µg/L	5.4	12	1.7	9.0	3.2 (acute) 2.5 (chronic)	Yes
Lead	µg/L	1.8	12	2.0	3.6	11.2 (acute) 0.4 (chronic)	Yes
Mercury	µg/L	0.2	11	2.0	0.41	2.4 (acute) 0.012 (chronic)	Yes
Nickel	µg/L	41	16	1.3	54	125.3 (acute) 13.9 (chronic)	Yes
Selenium	µg/L	6.0	12	1.5	9.2	20 (acute) 5.0 (chronic)	Yes
Zinc	µg/L	25	13	2.0	51	31.9 (acute and chronic)	Yes