ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT FACT SHEET – FINAL

Permit Number: AK0053392

Ketchikan Pulp Company Ward Cove Landfill

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

Public Comment Period Start Date: November 7, 2019
Public Comment Period Expiration Date: December 6, 2019
Alaska Online Public Notice System

Technical Contact: Marie Klingman
Alaska Department of Environmental Conservation
Division of Water
Wastewater Discharge Authorization Program
610 University Avenue
Fairbanks, AK 99709
(907) 451-2101
Fax: (907) 451-2187
marie.klingman@alaska.gov

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

KETCHIKAN PULP COMPANY

For wastewater discharges from

Ketchikan Pulp Company Ward Cove Landfill
P.O. Box 6600
Ketchikan, AK 99901

The Alaska Department of Environmental Conservation (the Department or DEC) proposes to reissue an APDES individual permit (permit) to the Ketchikan Pulp Company. 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 Ketchikan Pulp Company Ward Cove Landfill and the development of the permit including:

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

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 of Water
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, AK 99501

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 APPLICANT

This fact sheet provides information on the Alaska Pollutant Discharge Elimination System (APDES) permit for the following entity:

Name of Facility:	Ketchikan Pulp Company Ward Cove Landfill
APDES Permit Number:	AK0053392
Facility Location:	409 Brusich Road, Ketchikan, AK
Mailing Address:	PO Box 6600 Ketchikan, AK 99901
Facility Contact:	Mr. Phillip Benning, Environmental Project Manager

Figures 1 and 2 of this Fact Sheet show the location of the leachate lagoon, storm water outfalls and the discharge locations.

2.0 FACILITY INFORMATION

2.1 Background

The Ketchikan Pulp Company (KPC) owns and maintains the KPC Ward Cove Landfill (KPC Landfill), located northwest of Ketchikan, AK. The landfill opened in 1988 to serve the nearby mill, formerly owned by KPC and currently owned by Power Systems & Supply of Alaska. Construction of the leachate treatment system was completed in 1998.

The KPC landfill is no longer used as a waste disposal site. The 16.9-acre landfill contains two waste disposal cells that were closed in accordance with State of Alaska solid waste regulations at 18 AAC 60. The first waste disposal cell was closed in 1998, and the second waste disposal cell was closed in 2001. Both cells contain primarily wood waste, boiler bottom ash, and fly ash from past mill operations. Fly ash is a lightweight component or byproduct of burning hog fuel (course chips and clumps of wood waste product) that rises with the flue gases and is captured by contaminant control equipment. Bottom ash is material that falls to the bottom of the burner unit. Storm water discharges from the landfill flows to Refuge Cove via storm water monitoring locations SWL4 and SWL6B and to Ward Cove via storm water monitoring locations SWL11, and SWL12. These monitoring locations have been designated as outfalls for the purpose of this permit.

2.2 Permit History

The KPC Landfill was originally permitted under National Pollutant Discharge Elimination System (NPDES) Permit AK0000922 in 1998 by the Environmental Protection Agency (EPA). The permit authorized the discharge of KPC Landfill leachate with other comingled treated wastewaters originating from the grounds of the mill. In 2004, KPC constructed a new outfall and requested EPA separate permits for their discharges. Subsequently, in August 2004, EPA issued AK0053392 for the landfill leachate. The 2004 permit, which expired in 2009, was administratively extended until May 1, 2013 when the Alaska Department of Environmental Conservation (DEC or the Department) issued an APDES permit. The APDES permit expired on April 30, 2018. 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 KPC on October 24, 2017; therefore, the 2013 permit is administratively extended until such time a new permit is reissued.

2.3 Process Description

The ash cell was permitted for the disposal of boiler bottom and fly ash from burning hog fuel mixed with diesel, calcium filtrate, tree bark, and wood waste mixed with rock and soil and primary and secondary sludges on a limited basis. The second cell was permitted for disposal of hog fuel derived from the preparation of timber for the pulping process, along with smaller amounts of mud, rock, and dredged spoils. The entire landfill is now capped with a low permeability geosynthetic cover and vegetated with grass and legumes.

The leachate collection system consists of piping installed during landfill closure. The piping collects ongoing leaching of residual materials in the landfill cells and conveys it via gravity to a lined treatment lagoon. Baffle curtains in the lagoon create an aeration and settling basin. At a design flow capacity of 86,400 gallons per day (gpd), the settling basin provides more than 100 hours of retention time.

Following the settling basin, the treated leachate is polished in a biofiltration swale where it passes over a vegetated substrate of topsoil mixed with muskeg, sand, and gravel that is overlain on top of clay. The biofiltration swale provides approximately five hours of retention time. Pipes convey the treated effluent from a collection sump located downstream of the biofiltration swale via gravity to Ward Cove through Outfall 001A, 200 feet from shore at a depth of 30 feet.

Storm water runoff from the vegetated landfill cover and surrounding area is collected in a series of natural and constructed rock-lined ditches that are lined with limestone to incorporate a pH neutralization treatment. These constructed ditches create the head waters of intermittent storm water flows that discharge into the marine waters of Ward and Refuge Coves.

2.4 Pollutants of Concern

2.4.1 Landfill Leachate

The KPC Landfill was used primarily for the disposal of wood waste and boiler ash and fly ash generated from coal. In general, wood waste leachate is dark in color and exerts a significant biological and chemical oxygen demand in water due to the decomposition of wood materials. Wood waste leachate can also contain various toxic compounds such as tropolones and resin acids and nutrients, which can contribute to more chronic problems in receiving waters. Metals are the primary constituents of concern in the leachate from landfills containing coal combustion wastes. Pollutants that were detected in the landfill leachate between May 2013 and July 2017 and their corresponding water quality criteria, or permit limit are depicted in Table 1.

Table 1- Pollutants Detected in Outfall 001A May 2013-July 2017

Pollutant	Units	Maximum Observed Concentration	Water Quality Criteria or Permit Limit
Ammonia	milligrams per liter (mg/L)	0.71	10 (maximum daily) 4.9 (monthly average)
5-day Biochemical Oxygen Demand	mg/L	4	140 (maximum daily) 56 (monthly average)
Color	color units	70	15, or the natural condition, whichever is greater
Total Suspended Solids	mg/L	5	88 (maximum daily) 27 (monthly average)
Arsenic	micrograms per liter (µg/L)	0.6	69 (maximum daily) 36 (monthly average)
Total Chromium	µg/L	0.2	100
Copper	µg/L	0.8	3.7
Lead	µg/L	0.04	8.5
Manganese	µg/L	775	100
Mercury	µg/L	0.0009	0.051
Nickel	µg/L	2.6	8.3
Silver	µg/L	0.03	2.3
Zinc	µg/L	19.2	86

2.4.2 Storm Water Outfalls

Pollutants present in storm water are similar to those found in the KPC Landfill leachate. Limestone-lined ditches surrounding the landfill create the headworks for storm water that drains, along with runoff from the surrounding areas, to one of four intermittent streams that in turn flow to either Ward or Refuge Cove. At most, the distance from the limestone ditches to marine water, is approximately 250 feet. Because this is a relatively short distance, whereby the storm water will combine with marine water quickly, DEC is applying marine water quality criteria to the storm water discharges to Ward and Refuge Coves. Table 2 summarizes the maximum observed concentrations of pollutants detected in the storm water outfalls between May 2013 and September 2017 and their corresponding water quality criteria.

Table 2- Maximum Observed Concentrations of Pollutants Detected in Storm Water May 2013 - September 2017

Pollutant	Units	SWL4	SWL6B	SWL11	SWL12	Water Quality Criteria
Color	color units	280	45	30	40	15 or the natural condition, whichever is greater
Cadmium	micrograms per liter (µg/L)	Not Detected (ND)	0.027	0.036	0.05	8.8 (chronic0 40 (acute)
Copper	µg/L	1.37	4.78	7.94	3.06	3.7 (chronic) 5.8 (acute)
Lead	µg/L	0.09	0.153	ND	ND	8.5 (chronic) 217 (acute)
Manganese	µg/L	43.4	36.9	93.9	118	100 (daily maximum)
Mercury	µg/L	0.007	0.0013	0.00015	0.002	0.051 (daily maximum)
Nickel	µg/L	1.4	6.9	7.69	4.6	8.3 (chronic) 75 (acute)
Zinc	µg/L	3.9	2.4	4	1.12	86 (chronic) 95 (acute)

3.0 COMPLIANCE HISTORY

DEC reviewed Discharge Monitoring Reports (DMRs) from May 2013 to September 2017 to determine the facility's compliance with permit effluent limits. The facility is in compliance with the permit effluent limits and the permittee performed all monitoring required by the permit with the exception of one receiving water sampling event for hexavalent chromium.

DEC conducted a routine inspection of the KPC Landfill in July 2018. There were no operational deficiencies noted in the inspection report. The inspection mistakenly identified monitoring and reporting violations that resulted in the issuance of a Notice of Violation to KPC; DEC later retracted all of the single event violations.

4.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS

4.1 Basis for Permit Effluent Limits

The Clean Water Act (CWA) requires that the limits for a particular pollutant be the more stringent of either technology-based effluent limits (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 water quality standards (WQS) of a waterbody are met. WQBELs may be more stringent than TBELs. The permit contains limits that are 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 and have been applied on a Best Professional Judgment (BPJ) basis. A detailed discussion of the basis for the effluent limits contained in the permit is provided in Appendix A.

4.2 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.

4.3 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 for flow, ammonia, total suspended solids (TSS), 5-day biochemical oxygen demand (BOD_5), pH, manganese, color, and zinc. A priority pollutant scan of effluent from Outfall 001A must be performed once during the fourth year of the permit. The prior permit required an additional scan in the second year of the permit. Priority pollutants were not detected in either of the scans: therefore, DEC has determined that once during the fourth year of the permit is a sufficient screening frequency for priority pollutants at this closed landfill. WET monitoring is required in the fourth year of the permit. See Section 4.4 for details regarding WET monitoring.

The permit requires storm water monitoring at SWL4, SWL6B, SWL11, and SWL12 for flow, color, pH, BOD_5, TSS, and manganese. Monitoring for metals in storm water must occur once during the second and fourth year of the permit. The prior permit also required annual storm water cadmium and mercury monitoring at a lower reporting limit than what had been in the 2004 NPDES permit. Monitoring results indicate cadmium and mercury concentrations below water quality (WQ) criteria; therefore, DEC has determined that annual monitoring for cadmium and mercury is no longer necessary. Cadmium and mercury will continue to be monitored in the second and fourth years of the permit as a part of the required metals monitoring. Copper was detected above WQ criteria in storm water sampled from storm water monitoring locations SWL6 and SWL11. In order to better assess the concentration of copper in the storm water from these locations, monitoring shall be conducted from these monitoring locations twice per year. Metals WQ criteria in marine water are not hardness dependent; therefore, hardness monitoring is not required. All storm water outfalls were monitored 5-7 times during the previous permit cycle and BOD_5 was not detected; therefore, monitoring for BOD_5 at the storm water outfalls is not required in this permit reissuance.

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 3 contains Outfall 001A landfill leachate limits and monitoring requirements and Table 4 contains SWL4, SWL6B, SWL11, and SWL12 monitoring requirements. Tables 5 and 6 contain effluent limits and monitoring requirement changes from the last permit issuance. Those parameters for which effluent limits or monitoring requirements have not changed from the last permit issuance are not included in either Table 5 or Table 6.

Table 3-Outfall 001A Effluent Limits and Monitoring Requirements

Parameter[a]	Effluent Limits				Effluent Monitoring Requirements	
	Daily Minimum	Monthly Average	Daily Maximum	Units[c]	Sample Frequency	Sample Type
Total Discharge Flow	N/A[b]	0.18	N/A	mgd	Continuous	Recorded
Total Ammonia, as Nitrogen	N/A	4.9	10	mg/L	1/Year	Grab
		7.4	N/A	lbs/day		Calculated[d]
TSS	N/A	27	88	mg/L	1/Year	Grab
	N/A	41	N/A	lbs/day		Calculated[d]
BOD_5	N/A	37	140	mg/L	1/Year	Grab
	N/A	56	N/A	lbs/day		Calculated[d]
pH [e]	6.5	N/A	8.5	s.u.	1/Quarter	Grab
Manganese[a]	N/A	1.5	3.9	mg/L	1/Quarter	Grab
		2.2	N/A	lbs/day		Calculated[d]
Color [e]	N/A	N/A	report	color units	1/Quarter	Grab
Zinc[a]	N/A	0.033	0.095	mg/L	2/Year[f]	Grab
		0.05	N/A	lbs/day		Calculated[d]

Footnotes:

a. Report metals as total recoverable
b. N/A = not applicable
c. mgd = million gallons per day, lbs/day = pounds per day, mg/L = milligram per liter, s.u.= standard pH units
d. lbs/day = [(concentration (mg/L) x (flow in mgd)) x 8.34 (lbs/gal)]
e. Color and pH measurements may be performed on site using procedures from 40 CFR 136.
f. Twice per year means one time between April and September and one time between October and March.

Table 4- Storm Water Outfalls SWL4, SWL6B, SWL11, SWL12 Monitoring Requirements

Parameter	Units [a]	Sampling Frequency [b, c]	Sample Type
Flow	mgd	2/year	Measured or Estimated
Color [d]	color units	1/year	Grab
pH [d]	s.u.	2/year	Grab
TSS	mg/L	1/year	Grab
Manganese [e]	µg/L	2/year	Grab
Copper [e,f]	µg/L	2/year	Grab

Footnotes:

a. mg/L = milligram per liter, mgd = million gallons per day, s.u.= standard pH units
b. Samples shall be collected as soon as reasonably possible following the onset of a measureable storm event before mixing with receiving waters. A measureable storm event means a rainfall event that produces at least 0.5 inch of precipitation in a 24 hour period and produces a discharge.
c. The two sampling events must be timed so that sampling occurs during both wet and dry seasons at least one week apart, and follow an interval of at least 72 hours since the previous measurable storm event.
d. Color and pH measurements may be performed on site using procedures from 40 CFR 136.
e. Report as total recoverable.
f. Monitoring for copper applies only to SWL6B and SWL11

Table 5- Outfall 001A Effluent and Monitoring Requirement Changes from Prior Permit

Parameter	Units [a]	Average Monthly Limit		Maximum Daily Limit		Sample Frequency	
		2013 Permit	2019 Permit	2013 Permit	2019 Permit	2013 Permit	2019 Permit
TSS	mg/L	27	no change	88	no change	1/quarter	1/year
	lbs/day	41					
BOD_5	mg/L	37	no change	140	no change	2/year	1/year
	lbs/day	56					
Color	color units	166	89	N/A	report	1/quarter	unchanged
Manganese	mg/L	N/A	1.5	report	3.9	2/year	1/quarter
	lbs/day	N/A	2.2	N/A	N/A		
Zinc	mg/L	0.086	0.033	0.095	0.095	2/year	unchanged
	lbs/day	0.13	0.05	N/A	N/A		
p-Cresol	mg/L	0.014	N/A	0.025	N/A	once during the 4th year of the permit	N/A
	lbs/day	0.02		N/A			
ά-Terpineol	mg/L	0.016	N/A	0.033	N/A	once during the 4th year of the permit	N/A
	lbs/day	0.02		N/A			
Phenol	mg/L	0.015	N/A	0.026	N/A	once during the 4th year of the permit	N/A
	lbs/day	0.02		N/A			
Benzoic Acid	mg/L	0.071	N/A	0.12	N/A	once during 4th year of the permit	N/A
	lbs/day	0.11		N/A			
Whole Effluent Toxicity	TU_c	20	N/A	40	N/A	annual	once during 4th year of the permit
Priority Pollutant Scan	N/A	N/A	N/A	N/A	N/A	once during the second and fourth year of the permit	once during 4th year of the permit

Footnote:

a. lbs/day = pounds per day, mg/L = milligram per liter, TU_c = chronic toxic units

Table 6- Storm Water Monitoring Requirement Changes from Prior Permit

Parameter	Units	Sampling Frequency	
		2013 Permit	2019 Permit
Cadmium	micrograms per liter (µg/L)	1/year	once during the second and fourth year of the permit
Mercury	µg/L	1/year	once during the second and fourth year of the permit
Copper [a]	µg/L	once during the second and fourth year of the permit	2/year
Hardness (as $CaCO_3$)	mg/L	2/year	N/A
BOD_5	mg/L	1/year	N/A

Footnote:
a. Monitoring for copper applies only to SWL6B and SWL11

4.4 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.

The previous permit required annual WET testing with the stipulation that sampling must occur in one season during the first, third, and fourth years of the permit and the alternate season during the second and fifth years of the permit. KPC conducted seven WET tests between May 2013 and January 2017. All of the test results indicated no observed effects at 65% effluent concentration, which was the highest concentration of effluent tested. DEC conducted a reasonable potential analysis (RPA) with the seven WET results using the dilution provided by manganese, the driver of the mixing zone in the reissued permit. The RPA indicates that WET does not have RP to exceed the WQ criteria of 1.0 chronic toxic unit (TU_c), defined as 100/No Observed Effect Concentration (NOEC), at the boundary of the mixing zone.

In order to continue to screen the landfill leachate for toxicity, the Department will require WET testing in the fourth year of the permit. This is a reduction from the annual monitoring frequency of the prior permit; however, DEC has determined that because there have been no observed effects of toxicity since KPC first monitored for WET in 2005, that WET testing once per permit term is sufficient for continued monitoring of WET at this closed landfill that will not have any new contributions of wood waste or boiler bottom ash. Chronic toxicity tests (larval development) shall occur on a bivalve species using either the Pacific oyster (*Crassostrea gigas*) or the mussel (*Mytilius galloprovincialis*) depending on species availability, and an echinoderm, purple sea urchin (*Strongylocentrotus purpuratus)* or sand dollar (*Dendraster excentricus)* (fertilization test), depending upon the availability of the echinoderm.

The permittee must conduct initial tests on both a bivalve species and an echinoderm species. After this screening procedure, any subsequent toxicity testing such as for accelerated testing, should be conducted on the more sensitive, either a bivalve or echinoderm, with species determined on availability.

The permit also requires accelerated WET testing if toxicity is greater than 15 TUc in any test. Four bi-weekly WET tests (every two weeks) over an eight-week period is required. If the permittees demonstrates through an evaluation of the facility operations that the cause of the exceedance is known and corrective actions have been implemented, only one accelerated test is required. If toxicity is greater than 15 TUc in any of the accelerated tests, the permittees must initiate a Toxicity Reduction Evaluation (TRE). A TRE is a site-specific process designed to identify the cause of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and confirm effluent toxicity reduction. The permittee may initiate a toxicity identification evaluation (TIE) as a part of the TRE. A TIE is a set of procedures that characterize, identify, and confirm the specific chemicals responsible for effluent toxicity. TREs and TIEs must be performed in accordance with EPA guidance manuals (see Section 1.6.4 of the permit for further details).

4.5 Receiving Waterbody Monitoring Requirements

The previous permit required KPC to monitor those metals identified as Compounds Nos.1-13 by the National Toxics Rule at 40 CFR Part 136, plus manganese in Ward Cove twice during the permit term. The monitoring was intended for use during the next permit cycle to assess the need for additional monitoring or the development of effluent limits. Other than manganese, there were no metals detected in the landfill leachate in concentrations high enough to exceed water quality criteria or demonstrate reasonable potential (RP) to exceed water quality criteria. Therefore, monitoring in Ward Cove of the metals identified as Compounds Nos.1-13 by the National Toxics Rule at 40 CFR Part 136, shall not be required in this permit reissuance. Ammonia criteria is dependent upon pH, temperature, and salinity; therefore, in order to establish ammonia criteria, monitoring in Ward Cove for pH, temperature, and salinity is required in the reissued permit. pH, temperature, and salinity monitoring shall occur, if practicable, at the same time as Outfall 001A ammonia sampling. Table 7 contains Ward Cove Ambient Monitoring Requirements.

Table 7- Ward Cove Ambient Monitoring Requirements

Parameter	Units [a]	Sampling Frequency [b]	Sample Type
pH	s.u.	Once in the 2nd and once in the 4th year of the permit	Grab
Temperature	˚ C	Once in the 2nd and once in the 4th year of the permit	Grab
Salinity	ppt	Once in the 2nd and once in the 4th year of the permit	Grab

Footnotes:

a. ˚ C = degrees Celsius, mg/L = milligram per liter, ppt= parts per thousand, s.u.= standard pH units

b. If practicable, ambient monitoring should occur on the same day as Outfall 001A ammonia monitoring.

4.6 Additional Effluent and Storm Water Monitoring Requirements

4.6.1 The discharge from Outfall 001A must be monitored in the fourth year of the permit term 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. This is a reduction in the monitoring frequency of the prior permit of twice per permit term; however, DEC has determined that because priority pollutants were not detected in the effluent over the previous two permit terms, that priority pollutant scanning once per permit term is sufficient for continued monitoring of

priority pollutants at this closed landfill that is not receiving any new contributions. 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.

4.6.2 The discharge from Outfalls SWL4, SWL6B, SWL11, and SWL12 must be monitored for metals in the second and fourth year of the permit term. Metals are those pollutants identified as Compound Nos. 1-13 by the National Toxics Rule at 40 CFR 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.

4.6.3 The permittee must perform the additional effluent testing in the APDES application Form 2C for existing manufacturing, commercial, mining and silvicultural operations. The permittee must submit the results of this additional testing with their application for renewal of this APDES permit. 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.

5.0 RECEIVING WATERBODY

5.1 Description of Receiving Waterbody

Ward Cove is a bay on the west side of Revillagigedo Island approximately 5 miles northwest of Ketchikan in Southeast Alaska. Ward Cove opens onto Tongass Narrows, between Revillagigedo Island and Gravina Island. Ward Cove is approximately 1 mile long and 0.5 miles wide at its widest point. The water depth at the mouth is approximately 200 feet. Currents within Ward Cove have been identified as a counterclockwise circulation pattern with flows into the cove along the southeastern shoreline and flows out of the cove along the northwestern shore. Superimposed on this horizontal circulation pattern is an estuarine flow condition caused by the mixing of saline waters from Tongass Narrows with fresh water flows from Ward Creek. The mean tidal range is 13.3 feet, and spring tides reach 15.7 feet. Refuge Cove is a small cove that borders the landfill on the west that also opens onto Tongass Narrows.

5.2 Outfall Locations

The treated leachate from the KPC Landfill is discharged to Ward Cove. The 295 foot outfall line to Ward Cove consists of four bundled 6 inch diameter high-density polyethylene pipes. It terminates approximately 140 feet from mean lower low water.

Storm water runoff from the landfill cap is collected in a series of rock-lined ditches that drain to either Ward or Refuge Cove. Storm water monitoring locations are designated as outfalls SWL4, SWLB6, SWL11, and SWL12. SWL4 is a monitoring location for storm water draining from the west of the landfill. Storm water from this area drains to Refuge Cove. SWL6B is located along the northern boundary of the landfill and contains a combination of runoff from both a wooded area and the capped ash cell. Storm water from this area drains to Refuge Cove. SWL11 is in a wooded area south of the leachate collection trench in the southern portion of the landfill site, and SWL12 is a monitoring location for runoff from the southeast face of the landfill cap. Storm water from both of these locations flows to Ward Cove.

Table 8- KPC Landfill Leachate Outfall Locations

Outfall	Receiving Water	Latitude	Longitude
001A	Ward Cove	55.4042° N	131.7292 ° W
SWL4	Refuge Cove	55.4018 ° N	131.7424 ° W
SWL6B	Refuge Cove	55.4041 ° N	131.7418 ° W
SWL11	Ward Cove	55.3993 ° N	131.7402 ° W
SWL12	Ward Cove	55.3999 ° N	131.73656 ° W

5.3 Water Quality Standards

Regulations in 18 AAC 70 require that the conditions in permits ensure compliance with the WQS. The State's WQS are composed of 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 waters for the discharge, Refuge and Ward Cove, have not been reclassified, nor have site-specific water quality criteria been established. Therefore, Refuge and Ward Cove must be protected for all marine water use classes listed in 18 AAC 70.020(a)(2). These marine water designated use classes consist of the following: water supply for aquaculture, seafood processing and industrial; contact and secondary recreation; growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life.

5.4 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.

Ward Cove is included in DEC's Section 303(d) list of water quality-limited waters for low dissolved oxygen and the presence of residues due to the discharge from KPC's dissolving sulfite pulp mill. Ward Cove remains Category 4a/Section 303(d) listed for non-attainment of residues and the dissolved gas standard for dissolved oxygen (DO) below the pycnocline (the layer where the density gradient is greatest within a body of water). A TMDL for residues and DO was developed and approved by EPA on May 15, 2007. The TMDL established a wasteload allocation (WLA) for DO that stated: "no point source loading of oxygen-demanding substances that will cause a measurable decrease (0.2 mg/L) in DO level below 5.0 mg/L from June through September." The impaired waters were those below the pycnocline.

In 1994, EPA approved a TMDL for BOD_5 in the surface waters of Ward Cove, and in 2007, superseded this TMDL with a DO TMDL that addressed the entire water column. In developing the 2007 TMDL, DEC and EPA identified all permitted discharges to Ward Cove, including the discharge of leachate from the KPC Landfill. The TMDL concluded that residues associated with the landfill

discharge were negligible, and BOD_5 discharges were small. The TMDL also concluded that the landfill discharges were to near shore waters at roughly 10 meters depth in Ward Cove, and they were accordingly not expected to affect oxygen levels in the deeper waters which were considered impaired. The TMDL also found that the KPC Landfill was permitted to discharge small amounts of suspended sediment which was not considered relevant to the residues TMDL.

According to the *State of Alaska 2014/2016 Final Integrated Water Quality Monitoring and Assessment Report*, Ward Cove is classified as a Category 4a impaired waterbody for residues and dissolved gas. Category 4a waterbodies are defined as being impaired but not needing a TMDL or an impaired water with a final approved TMDL. In the case of Ward Cove a TMDL has been approved. In this permit, discharge from Outfall 001A is required to monitor BOD_5 concentrations as a way of verifying that levels of oxygen-demanding substances from Outfall 001A will not contribute to a depletion of DO. All storm water outfalls were monitored 5-7 times during the previous permit cycle and BOD_5 was not detected; therefore, monitoring for BOD_5 at the storm water outfalls is not required in this permit reissuance.

5.5 Mixing Zone Analysis

In accordance with State regulations at 18 AAC 70.240, the Department may authorize a mixing zone in a permit. A chronic mixing zone is sized to protect the ecology of the waterbody as a whole and an acute mixing zone is sized to prevent lethality to passing organisms.

The previous permit authorized a circular mixing zone with a radius of two meters that was driven by color with a dilution of 13. In October 2018, the permittee submitted an application requesting authorization of a mixing zone 1.3 meter long by 0.7 meters wide driven by manganese with a dilution of 15.

Mixing zone model inputs that differed from the previous permit issuance include the pollutant modeled (manganese as opposed to color as the driving parameter of the mixing zone), the receiving water salinity profile, and the diffuser geometry as specified by an as-built provided by the permittee. The salinity profile of Ward Cove was obtained from temperature and salinity data from Station 48 collected as part of DEC's 2007 Ward Cove Residues and DO TMDL. Station 48 is located approximately 660 feet south of the terminus of Outfall 001A. The Department examined salinity and temperature information at various depths from Station 48 and calculated the corresponding density at depth. Vertical variation of density greater than 0.1 kilograms per cubic meter (kg/m3) and temperature variation from surface to bottom of greater than 1°C was noted. Accordingly, consistent with guidance in the Cornell Mixing Zone Expert System (CORMIX) User Manual, the Department examined the density profile and determined it constituted a Type A linear density profile, which was reflected in the permittee's mixing zone application.

The November 2005 Ward Cove Landfill Site Leachate Treatment System Gravity Outfall Installation Report prepared for KPC by URS contains record drawings documenting that the outfall pipe consists of four bundled six inch diameter high density polyethylene pipes approximately 295 feet in length. The discharge ports were ultimately installed approximately two feet above the bottom of Ward Cove slanted approximately 45 to 60 degrees from vertical. Each of the four outfall pipes is covered by an orifice plate which constricts each pipe opening to a diameter of 1.3 inches. Given the close proximity of the discharge ports to each other and the inability to model the diffuser as it exists in the CORMIX modelling software, the Department modelled the multi-port diffuser with CORMIX 1 for single port discharges using a port diameter of 0.0664 meters (2.6 inches). CORMIX advises modelling a single port that has the equivalent port area as all four ports on the diffuser. This avoids overestimating the dilution a single port would offer over the four ports that exist on the diffuser. Additionally, the exit velocity of the 0.664 meter port diameter is the same as that of the 0.03302 meter (1.3 inch) port diameter. The 0.0664 meter diameter port is the calculated diameter of a circle with the same surface

area as four circular 1.3 inch diffuser ports (5.32 square inches). A circle with an area of 5.32 square inches has a diameter of 2.6 inches, therefore a 2.6 inch (0.0644 meter) diameter port was modelled.

DEC modeled the mixing zone and calculated dilution factors using CORMIX version 11.0 modeling program, which yielded a different mixing zone size than the previous permit. CORMIX 11.0 is the latest version of the widely used and broadly accepted modeling tool for accurate and reliable point source mixing analysis. Inputs to CORMIX included the maximum expected effluent concentration, WQS numeric criteria for pollutants, as well as site-specific discharge and ambient data such as varying tidal velocities that simulate the alternating currents associated with the flow and ebb of tides in Ward Cove.

Other data required for the mixing zone modeling included: the input of receiving water characteristics at the outfall such as the depth the receiving water at the outfall, the ambient velocity, wind velocity, and outfall and diffuser specifications, such as the size, direction, and number of ports. Based on the inputs, CORMIX predicted the distance at which the parameters would meet WQ criteria as well as the corresponding dilution at that point. Appendix D outlines criteria that must be met in order for the Department to authorize a mixing zone. These criteria include the size of the mixing zone, treatment technology, existing uses of the waterbody, human consumption, spawning areas, human health, aquatic life, and endangered species. The following summarizes the Department's mixing zone analysis:

Size

In accordance with 18 AAC 70.240(k), the mixing zone must be as small as practicable. In order to ensure that the mixing zone is as small as practicable, DEC used CORMIX to model the mixing zone at various critical tidal velocities, effluent temperatures, effluent flow rates and ambient density profiles. 18 AAC 70.240(b)(2) requires the Department to consider the characteristics of the effluent after treatment of the wastewater. DEC reviewed Outfall 001A effluent data from May 2013-September 2017 to determine which parameters had RP to exceed WQ criteria at the end of pipe, and then which of the parameters required the most dilution to meet WQ criteria for the mixing zone. Manganese required the most dilution in the mixing zone to meet human health for consumption of aquatic organisms WQS numeric criteria. Color requires less dilution than manganese and fits within the mixing zone sized for manganese. The WQ numeric criteria for color may be exceeded within the authorized manganese mixing zone.

Manganese was modeled in CORMIX to determine the smallest practicable mixing zone size. Manganese's maximum expected concentration, WQ criteria, and ambient concentrations were entered into CORMIX. For the ambient concentration, the Department followed its RPA Guide, which stipulates using the 85th percentile of existing ambient data, which was 1.8 µg/L.

The permittee's application presented current speed summaries from a 1998 study performed by ENSR Consulting and Engineering. 10th and 90th percentile ambient currents were 0.01 meters/second (m/s) and 0.05 m/s respectfully. The final mixing model the Department selected indicated that at the 90th percentile current during the summer, at maximum observed effluent flow rates required the most time and space for the discharge plume to reach WQS numeric criteria. This was also the case in the winter with lower effluent and ambient temperatures. Accordingly, the Department sized both the mixing zone length and width according to 90th percentile current conditions, which were the critical conditions in which the least amount of dilution was provided.

In accordance with 18 AAC 70.240, the Department determined that the size of the mixing zone for the KPC Landfill discharge is appropriate. The dilution factor has increased from the previous permit, but the size of the mixing zone has decreased from the previous permit issuance. The manganese mixing zone has a dilution factor of 15 and is defined as a rectangle, with a length, parallel to the shore, of 1.3 meters and a width of 0.7 meters. The mixing zone achieves sufficient dilution to reach numeric WQ

criteria prior to reaching the surface. All numeric WQ criteria will be met and apply at the boundary of the mixing zone.

The mixing zone has a surface area of 0.91 $m^{2,}$ compared to the previous mixing zone with a surface area of 12.57 m^2. The CORMIX model indicates that the water quality criteria will be met relatively rapidly, approximately parallel to the direction of the ambient current (in both flooding and ebbing tidal directions). The mixing zone is sized to ensure: 1) the water quality criteria found in 18 AAC 70 are met at the boundary of the mixing zones, 2) the mixing zone is as small as practicable, and 3) compliance with all other applicable mixing zone regulations.

Table 9 summarizes basic CORMIX inputs that were used to model the mixing zones.

Table 9- CORMIX Model Inputs

Parameter Modeled	Discharge Excess Concentration	Water Quality Criterion
Manganese	1,462.23 µg/L	98.2 µg/L
Outfall and Receiving Waterbody Characteristics		
Diffuser Type & Distance from Shore	42.6 meter long outfall with submerged single port diffuser	
Average Depth at Discharge	8.36 meters	
Number & Size of Ports	Single port diameter 0.066 meters	
Port Height above Seabed	0.6096 meters	
Density - Type A Linear Stratification	surface density 1,017.64 kilograms per cubic meter (kg/m^3), bottom density 1,021.24 kg/m^3	
Ambient Velocity	0.0557 meters per second 90^{th} percentile current	
Wind Velocity	2 meters per second	
Effluent Characteristics		
Flow Rate	0.1 million gallons per day	
Density	1,022.77 kg/m^3	

Technology

In accordance with 18 AAC 70.240(c)(1), the Department finds that available evidence reasonably demonstrates that the wastewater at the KPC Landfill will be treated to remove, reduce, and disperse pollutants using methods found by the Department to be the most effective and technological and economical feasible, consistent with the highest statutory and regulatory treatment requirements. The leachate from the landfill is passively treated in an aeration and quiescent basin and polished by a biofiltration swale. The leachate collection system consists of piping installed during landfill and ash cell closure. The piping collects ongoing leaching of residual materials in the landfill cells and coveys it via gravity to a leachate lagoon southwest of the boiler ash landfill. The lagoon is lined with cushion fabric and geosynthetic material. Curtain baffles in the lagoon create a passive aeration basin and two parallel settling basins. The leachate treatment system consists of a passive aeration basin in the leachate lagoon that promotes oxidation of organic and inorganic dissolved constituents; a quiescent basin in the leachate lagoon that promotes settling of organic and inorganic solids; and a biofiltration swale, which allows wastewater to flow over a vegetated substrate of topsoil mixed with muskeg, sand and gravel, on top of clay.

Existing Use

In accordance with 18 AAC 70.240(c)(2) and and18 AAC 70.240(c)(4)(B) and (C),, the mixing zone has been appropriately sized to fully protect the existing uses of Ward Cove. The existing uses have been maintained and protected under the terms of the previous permit. The size of the mixing zone has decreased from the previous permit. Monitoring results indicate that the discharge neither partially nor completely eliminates an existing use of the waterbody outside of the mixing zone boundary. Mixing zone modeling suggests that the flushing is adequate to ensure full protection of uses of the waterbody outside of the mixing zone. Results of WET tests performed indicate that toxicity should not exist at levels that might result in biological impairment or cause an effect or damage to the ecosystem that the Department considers so adverse that a mixing zone is not appropriate. DEC has determined that the existing uses and biological integrity of the waterbody will be maintained and fully protected under the terms of the permit as required by 18 AAC 70.240(c)(3).

Human Consumption

In accordance with the conditions of the permit, and in accordance with 18 AAC 70.240(d)(6), the pollutants discharged cannot produce objectionable color, taste, or odor in aquatic resources harvested for human consumption.18 AAC 70.240(c)(4)(c) states the that discharge cannot preclude or limit established processing activities or commercial, sport, personal use, or subsistence fish and shellfish harvesting.

There is no indication that the pollutants discharged have produced objectionable color, taste, or odor in aquatic resources harvested for human consumption. Additionally, the discharge has not precluded or limited established processing activities or commercial, sport, personal use, or subsistence fish and shellfish harvesting. Signs are required to be posted to inform the public that certain activities such as harvesting of aquatic life for raw consumption should not take place in the mixing zone.

The CORMIX modeling suggests that the maximum expected effluent concentrations of pollutants will be diluted rapidly and that the mixing zone will not preclude or limit established fishery activities per 18 AAC 70.240(c)(4)(C). DEC has also determined that application data and available mixing zone modeling suggests that pollutants discharged will not produce objectionable color, taste, or odor in harvested aquatic resources for human consumption per 18 AAC 70.240(d)(6).

Spawning Areas

The mixing zone is authorized in the marine waters of Ward Cove. 18 AAC 70.240(f), which prohibits authorizing mixing zones in streams, rivers or other flowing fresh waters used for anadromous or resident fish spawning, does not apply.

Human Health

In accordance with 18 AAC 70.240(d)(1) and 18 AAC 70.240(c)(4)(B), the mixing zone must be protective of human health and will not result in pollutants discharged at levels that will bioaccumulate, bioconcentrate, or persist above natural levels in sediments, water, or biota, or at levels that otherwise will create a public health hazard through encroachment on a water supply or contact recreation uses. An analysis of the effluent data that was included with KPC's application for permit reissuance and the results of the RPA conducted on pollutants of concern indicate that the level of treatment is protective of human health. The effluent data was then used in conjunction with applicable WQ criteria, which serve the purpose of protecting human and aquatic life, to size the mixing zone to ensure all WQ criteria are met in the waterbody at the boundary of the mixing zone.

Manganese concentrates in the edible potions of mollusks. DEC is implementing a new WQBEL for manganese to ensure the protection of human health. DEC has determined that the permit satisfies 18 AAC 70.240, and that the level of treatment at the KPC Landfill is protective of human health.

Aquatic Life and Wildlife

In accordance with 18 AAC 70.240, the mixing zone authorized in the permit shall be protective of aquatic life and wildlife. Pollutants for which the mixing zone will be authorized will not accumulate in concentrations outside of the mixing zone that are undesirable, present a nuisance to aquatic life, cause permanent or irreparable displacement of indigenous organisms, or result in a reduction in fish or shellfish population levels. CORMIX modeling conducted for this discharge to Ward Cove incorporated the most stringent WQ criteria in the model for protection of the growth and propagation of fish, shellfish, other aquatic life, and wildlife, and all WQ criteria will be met at the boundary of the authorized mixing zone. CORMIX models of the outfall indicate that high dilution occurs relatively rapidly and pollutants discharged will have a relatively short residence time in the mixing zones prior to mixing to WQ criteria levels occurs. The Department determined that the mixing zones will not create a significant adverse effect to fish spawning or rearing, form a barrier to migratory species, fail to provide a zone of passage, result in undesirable or nuisance aquatic life, result in permanent or irreparable displacement of indigenous organisms, or result in reduction in fish population levels and that 18 AAC 70.240 is met.

Endangered Species

In accordance with 18 AAC 70.240(c)(4)(F), the authorized mixing zone will not cause an adverse effect on threatened or endangered species. DEC consulted the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) websites to identify any threatened or endangered species under their jurisdiction in the vicinity of the KPC Landfill Outfalls. DEC also contacted USFWS and NMFS on April 17, 2019 to provide them an early opportunity to notify DEC of any concerns that they may have regarding the reissuance of AK0053392 and potential impacts on listed species under their respective jurisdictions.

No detrimental effects to fauna in the area have been documented with previously authorized mixing zones for the facility, nor does the mixing zone appear to pose an undesirable nuisance to aquatic life. The RPA and CORMIX modeling resulted in an overall decrease in the size of the mixing zone, further reducing the possibility for any threatened or endangered species potentially in the area to come into contact with the treated leachate. Due to the reduced size and short residence time of pollutants in the mixing zone, the Department has concluded that the mixing zones are sized to not cause an adverse effect on threatened or endangered species in the vicinity of the discharge.

DEC will provide a copy of the permit and fact sheet to NMFS and USFWS when it is public noticed. Any comments received from the agencies regarding endangered species will be considered prior to issuance of the permit.

6.0 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.”

EPA’s *Interim Guidance for Performance-Based Reduction of NPDES Monitoring Frequencies (EPA, 1996),* states that monitoring requirements are not considered effluent limitations under the CWA, and therefore Antibacksliding prohibitions would not be triggered by reductions in monitoring frequencies.

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 been 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. Since the last permit was reissued, new information has been collected to characterize the effluent that justifies changes to effluent limits.

Since the 2004 permit was issued and subsequently reissued in 2013, p-Cresol, ά-terpineol, phenol, and benzoic acid have never been detected in the treated landfill leachate. Although EPA acknowledged in 2004 that it was unlikely that the compounds would be present in at the KPC Landfill, which contains wood waste and boiler bottom ash, there was insufficient evidence in 2004 to definitively support the absence of these compounds in the leachate as the closure of the landfill had been relatively recent. EPA; therefore, could not conclude whether leachate characteristics had stabilized. Data collected since 2004 indicates that p-Cresol, ά-terpineol, phenol, and benzoic acid are not present in the landfill leachate. If this information had been available at the time of issuing the 2004 permit, the semi-volatile compounds at 40 CFR 445, Landfills Point Source Category would not have been applied as BPJ TBELs because they are not pollutants of concern at the KPC Ward Cove Landfill. Therefore, DEC is removing these BPJ TBELs previously developed by using BPJ and incorrect assumptions that resulted in a technical mistake per 18 AAC 83.480(b)(2).

In addition, effluent data collected over the prior term of the permit demonstrates that manganese, rather than color, is the driving parameter of the mixing zone in this permit reissuance. Manganese WQBELs are protective of the waterbody at the boundary of the mixing zone. Color continues to have reasonable potential to exceed water quality criteria at the end of the pipe; however, color requires less dilution than manganese to meet water quality criteria. Therefore, water quality criteria for color will be met within the mixing zone sized for manganese. Based on this new information, whereby color no longer drives the mixing zone as in the prior permit, the effluent limits for color, have been replaced with a report monitoring results only for this permit reissuance.

The WET RPA was conducted using the dilution available from the mixing zone sized for Manganese and WET data collected over the most recent permit term. The results indicated that while WET has reasonable potential to exceed water quality criteria at the end of the pipe, it does not have reasonable potential to exceed water quality criteria at the boundary of the mixing zone. Manganese WQBELs are protective of the waterbody at the boundary of the mixing zone. Therefore, based on this new information, the WET limits of the prior permit, which had been carried over from the 2004 NPDES permit, and which are not reflective of the current driver and available dilution in the mixing zone, have been replaced with a report monitoring results only for this permit reissuance.

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.

7.0 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 Water Quality Standards (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 marine waters of Ward Cove are listed as impaired (Category 4a) on DEC's most recent *State of Alaska 2014/2016 Final Integrated Water Quality Monitoring and Assessment Report*; however, the discharge from the KPC Landfill has been determined not to contribute to the impairment as specified in the 2007 TMDL for Ward Cove (See Fact Sheet Section 5.4). Accordingly, 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).*

Per 18 AAC 70.020 and 18 AAC 70.050 all marine waters are protected for all uses; 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 to Ward Cove and Refuge Cove. This will ensure existing uses and the water quality necessary for protection of existing uses of the receiving waterbodies 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 WQ 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.

Pollutants of concern in the discharge that are associated with the KPC Landfill are summarized in Fact Sheet Section 2.4. The permit includes TBELs and/or WQBELs, or monitoring requirements for pollutants of concern that have exceeded or have the potential to exceed water-quality criteria. The permit also requires KPC to implement a BMP Plan and Storm Water Pollution Prevention Plan to minimize the discharge of pollutants to Ward and Refuge Cove.

Permit Section 1.2.2 requires that the discharge shall not cause or contribute to a violation of the WQS at 18 AAC 70. As previously stated, Ward Cove is listed as impaired; however, the KPC Landfill discharge does not contribute pollutant parameters that were identified as already exceeding the applicable criteria in 18 AAC 70.020(b) or 18 AAC 70.030. Neither Ward Cover nor Refuge Cove are listed under 18 AAC 70.236(b) as subject to site specific criteria.

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 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. Data submitted by KPC demonstrated that only color and manganese were determined to have reasonable potential to exceed water quality criteria at the end of the pipe. A mixing zone has been authorized in this permit in accordance with 18 AAC 70.240 to 18 AAC 70.270 (as amended June 26, 2003) and as allowed in 18 AAC 70.015(a)(2). The mixing zone has been sized to ensure that all applicable water quality criteria are met at all points outside of the mixing zone; therefore reduction of water quality in the mixing zone is allowed under the antidegradation policy, and outside the mixing zone all applicable WQS are protected. Based on data collected over the prior permit term, it is not expected that the low-volume discharge is toxic, so reducing water quality is not expected to affect WET; however, toxicity monitoring is required during this permit cycle to validate this expectation. Site-specific criteria as allowed by 18 AAC 70.236(b) has not been established for either Ward Cove or Refuge Cove and is therefore not applicable.

The Department has determined 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), 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. EPA has not published effluent limitation guidelines for this type of activity. The Department views the ELG found at 40 CFR Part 445, Subpart B, RCRA Subtitle D, Non-Hazardous Waste Landfill, provides the most meaningful guidance for developing effluent limits for landfill treatment process at the KPC Landfill. Therefore, these effluent guidelines have been applied on a BPJ basis to Outfall 001A unless the WQBEL is more stringent.

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 of equipment, visual monitoring, 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 water quality-based effluent limitations (WQBELS). A WQBEL is designed to ensure that the Water Quality Standards (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 permit requires compliance with the 18 AAC 70 WQS, includes effluent limits for ammonia, pH, manganese, and zinc, and monitoring for other applicable WQS pollutants.

The Department reviewed available information on known point source discharges to receiving waters covered under the permit, and found no outstanding noncompliance issues. There are no state regulated nonpoint sources that discharge to, or otherwise impact, the receiving waters covered under the permit.

After review of the methods of treatment and control and the applicable statutory and regulatory requirements, including 18 AAC 70, 18 AAC 72, and 18 AAC 83, the Department finds that the discharge authorized under this general permit meets the highest applicable statutory and regulatory requirements; therefore, 18 AAC 70.016(c)(7)(C) 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 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;

Manganese is the primary pollutant of concern at the KPC Landfill. Marine water criteria of 100 µg/L protects consumers of marine mollusks, as manganese concentrates in the edible portions of mollusks. The KPC Landfill has been completely closed since 2001. Manganese has been documented to occur naturally in the Ketchikan area, and may exceed water-quality criteria by a 2 to 10-fold factor due to

organic ligand complexation and/or particulate loading. Thus, it may not be possible to control the source of the manganese by means of a process change or typical BMPs. Costly alternative treatment measures such as ultrafiltration membranes, may reduce discharge of manganese, but is not warranted at this closed landfill where manganese is known to naturally occur.

Therefore, discharge under the limitations and requirements of the permit is identified as the practicable alternative; therefore 8 AAC 70.016(c)(7)(D)(i) finding is met.

The Department finds the most effective and reasonable methods of prevention, control, and treatment are the practices and requirements set out in the APDES permit. This type of treatment and associated discharge is similar in nature to other like facilities and their discharges located throughout the United States. EPA promulgated technology-based ELG for landfills point source category found at 40 CFR Part 445, Subpart B, RCRA Subtitle D, Non-Hazardous Waste Landfill. The development of the ELG included an extensive analysis of economic treatment alternatives for these types of discharges and concluded this type of pollution prevention, control, and treatment is effective and reasonable. Although the KPC Landfill fits an exception provided in the ELG, the ELG has been applied on a BPJ basis. The permit requires the permittee to continue implementation of an approved Best Management Practices (BMP) Plan. The BMP Plan includes pollution prevention measures and controls to prevent and/or minimize the generation and release of pollutants from the facility. The permittee is also required to continue compliance with a Storm Water Pollution Prevention Plan (SWPPP) that will be incorporated into KPC's BMP. The SWPP must ensure the implementation of practices to reduce pollutants in the storm water discharges. The Department concludes that this requirement is met.

With the permit required implementation of BMP and SWPP controls, and the requirement to meet BPJ ELGS and WQS, 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 18 AAC 70.016(c)(7)(D)(ii) finding 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*

The Department has determined the lowering of water quality is necessary given the treatment facility's proximity to the landfill and Ward Cove, and on the premise the facility is fully constructed and operational. At this point in KPC's existence (see the introduction of the fact sheet for information regarding KPC's activities at the site), it would be an extreme financial hardship for the company to implement other source control and treatment measures for an operation that no longer brings in revenue.

Although the Ward Cove Landfill is no longer operational, during the years KPC operated the Ward Cove mill (1954 to 1997), the mill was a major employer in the area. KPC supplied jobs throughout the logging industry, and the mill was an integral part of the industry. The mill was not only an important source of revenue for the City of Ketchikan, but for other areas throughout Southeast Alaska. The Ward Cove Landfill is located at the site where the mill operated, offering an economic disposal location while the mill was operating. APDES permit required monitoring and ongoing landfill cap maintenance provides a source of local regular employment. The Department concludes that this requirement 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.

8.0 OTHER PERMIT CONDITIONS

8.1 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 is required to develop 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.

8.2 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 as required in Permit Section 2.2 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 facility's SWPPP shall be incorporated into the facility's overall 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.

8.3 Storm Water Pollution Prevention 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 SWPPP shall contain storm water control measures that will reduce or eliminate pollutants in storm water and will be incorporated into the KPC Landfill Leachate BMP Plan.

8.4 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.

8.5 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.

9.0 OTHER LEGAL REQUIREMENTS

9.1 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 April 17, 2019, DEC contacted USFWS and NMFS to provide them early notification of DEC's intent to reissue AK0053392 and to provide them the opportunity to share concerns with DEC regarding listed species.

On April 17, 2019, NMFS directed DEC to NOAA's endangered species website at https://www.fisheries.noaa.gov/alaska/consultations/section-7-consultations-alaska.

The Department used this website to gain an approximate determination that the area surrounding Ward Cove and Refuge Cove may contain endangered stellar sea lions, fin whales, and humpback whales.

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.

9.2 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 April 17, 2019, DEC contacted NMFS to provide them early notification of DEC's intent to reissue AK0053392 and to provide them the opportunity to share concerns with DEC regarding EFH.

On April 17, 2019, NMFS directed DEC to NOAA's EFH website at

https://www.fisheries.noaa.gov/alaska/habitat-conservation/essential-fish-habitat-efh-alaska The Department used this website to gain an approximate determination that the area could be EFH for chum, pink, coho, sockeye, and chinook salmon.

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.

9.3 Ocean Discharge Criteria Evaluation

Section 403(a) of the CWA, Ocean Discharge Criteria, prohibits the issuance of a permit under Section 402 of the CWA for a discharge into the territorial sea, the water of the contiguous zone, or the oceans except in compliance with Section 403. Permits for discharges seaward of the baseline of the territorial seas must comply with the requirements of Section 403, which include development of an Ocean Discharge Criteria Evaluation (ODCE).

Interactive nautical charts depicting Alaska's baseline plus additional boundary lines are available at https://www.charts.noaa.gov/ChartCatalog/Alaska.html and interactive maps at https://alaskafisheries.noaa.gov/mapping/arcgis/rest/services/NOAA_Baseline/MapServer.

The charts and maps are provided for information purposes only. The U.S. Baseline committee makes the official determinations on baseline. Ocean Discharge Criteria are not applicable for marine discharges to areas located landward of the baseline of the territorial sea.

A review of the baseline line maps revealed that the KPC Landfill outfall terminus is positioned landward of the baseline of the territorial sea; therefore, Section 403 of the CWA does not apply to the permit, and an ODCE analysis is not required to be completed for this permit reissuance. Further, the permit requires compliance with WQS such that 40 CFR 125.122(b) is met and therefore the discharge is presumed not to cause unreasonable degradation of the marine environment.

9.4 Permit Expiration

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

10.0 REFERENCES

Alaska Department of Environmental Conservation (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, 2010. Alaska's final 2010 integrated water quality monitoring and assessment report. July 15, 2010.

ADEC, 2010. Interim antidegradation implementation methods, policy and procedure. July 14, 2010.

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

Doneker, Robert and Jirka, Gerhard. 2007. CORMIX user manual, U.S. Environmental Protection Agency, EPA-823-K-07-001, December 2007.

National Oceanic and Atmospheric Administration (NOAA Fisheries), 2019. Section 7 consultations in Alaska. <https://www.fisheries.noaa.gov/alaska/consultations/section-7-consultations-alaska >Accessed April 17, 2019.

NOAA Fisheries, 2019. Essential Fish Habitat in Alaska. https://www.fisheries.noaa.gov/alaska/habitat-conservation/essential-fish-habitat-efh-alaska >. Accessed April 17, 2019.

URS. 2005. Ward Cove Landfill site leachate treatment system gravity outfall installation report. November 2005.

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.

Figure 1- KPC Landfill Vicinity Map

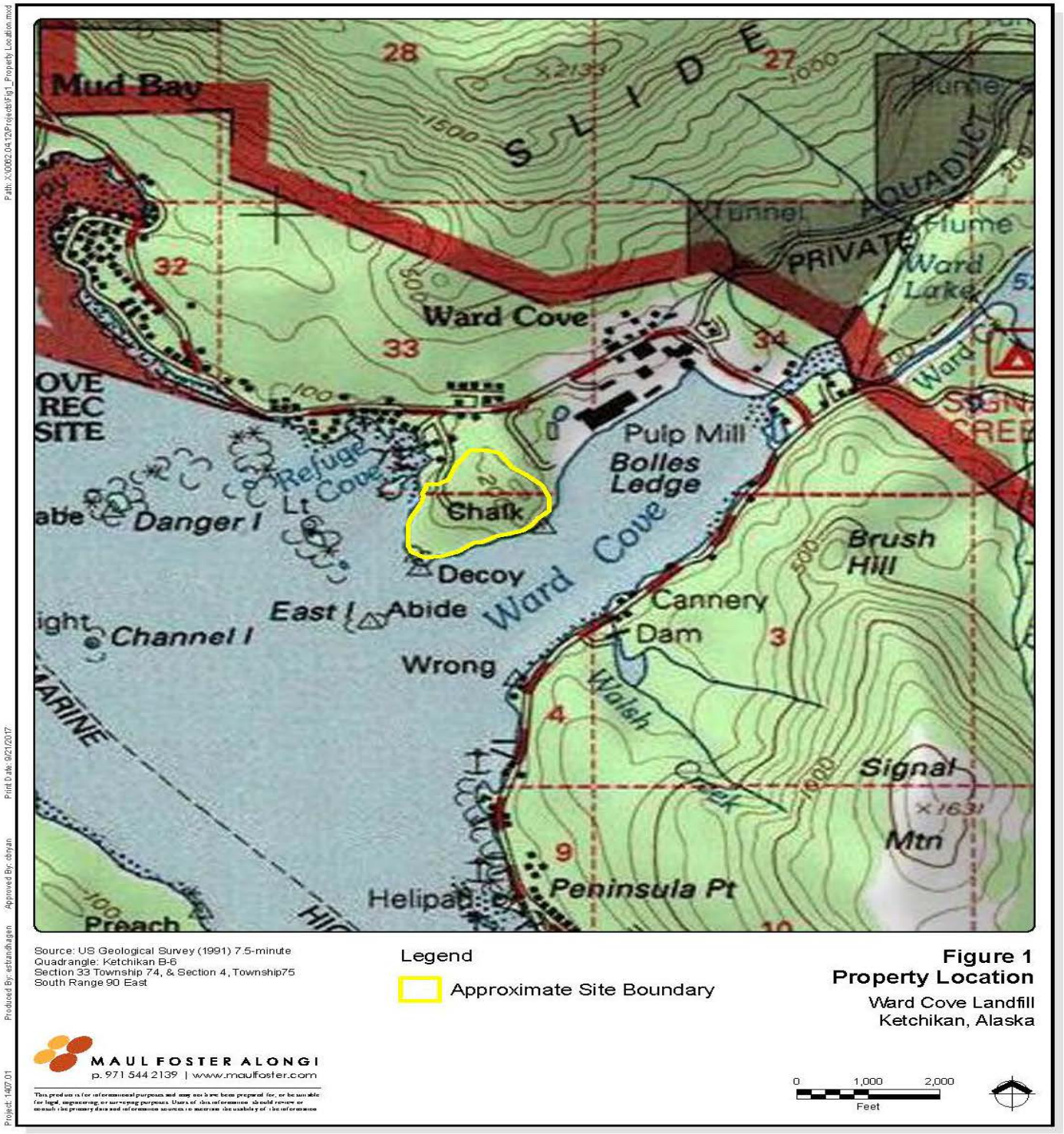


Figure 2- Location of KPC Landfill Outfall 001A and Storm Water Monitoring Locations

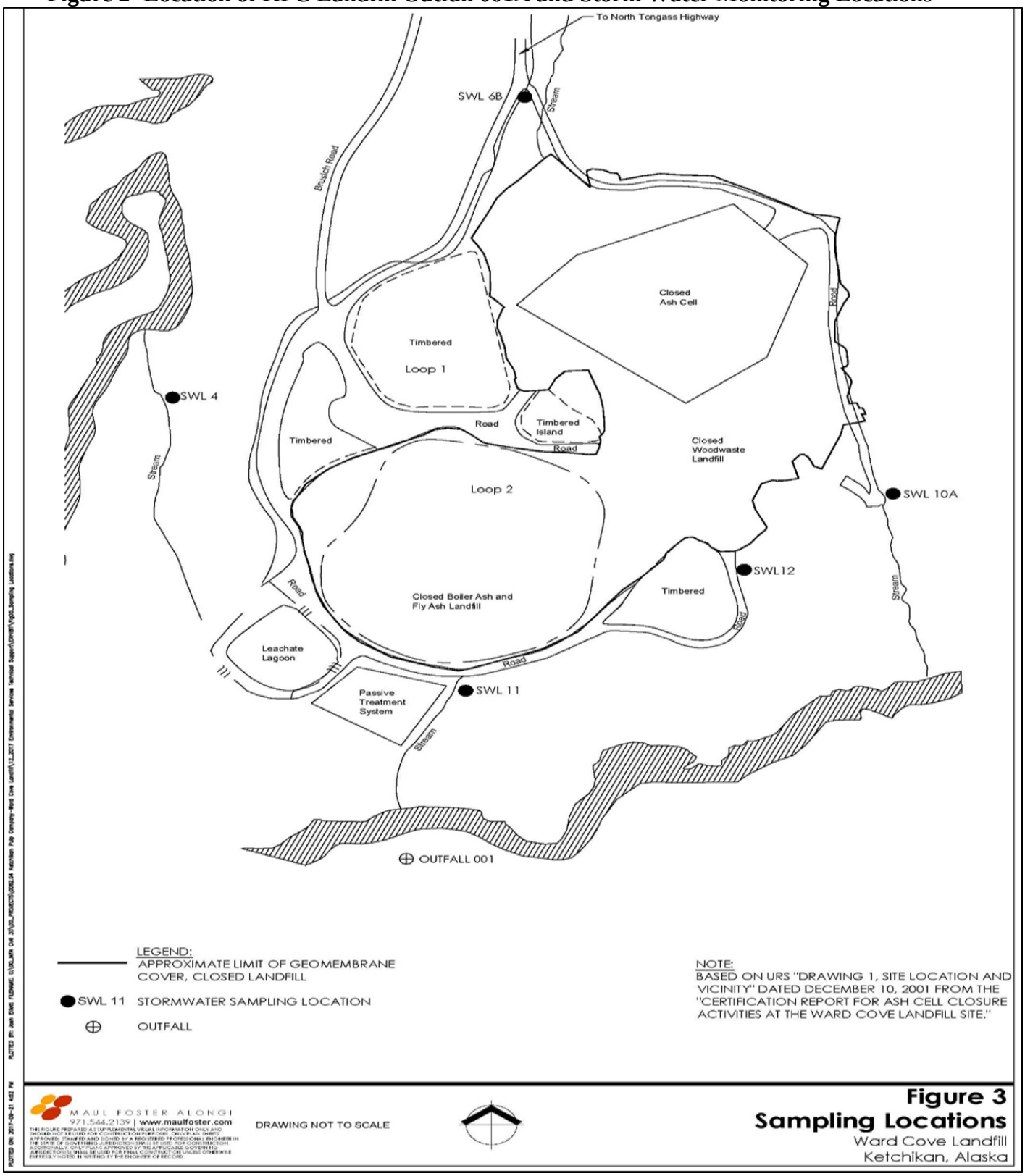
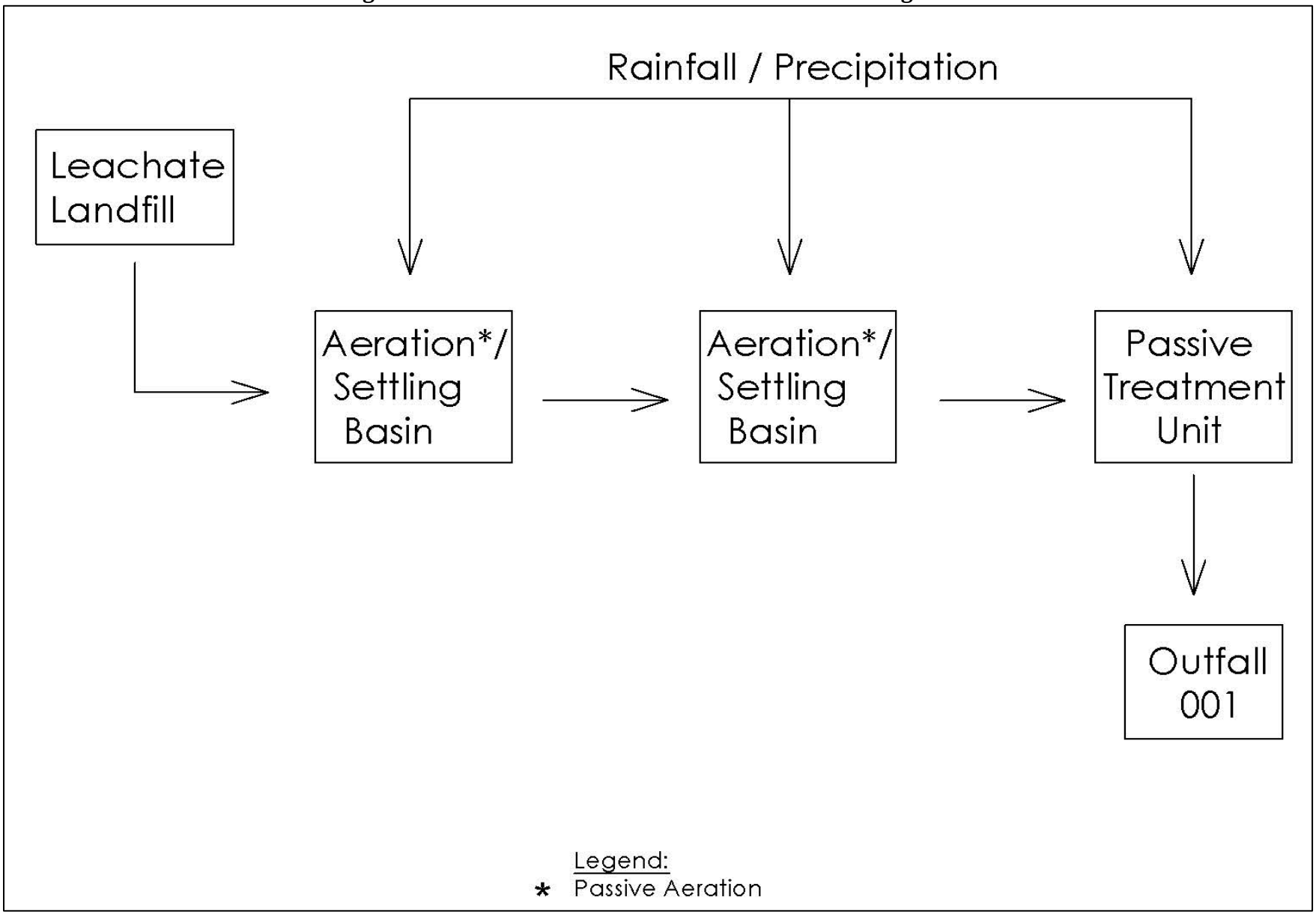


Figure 3- KPC Landfill Outfall 001A Process Flow Diagram



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.

The permit contains effluent limits for those parameters that either had an applicable ELG applied as best professional judgement (BPJ), had a preexisting WQBEL from the previous permit issuance, or showed reasonable potential at the boundary of the mixing zone. 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.

A.1 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).

A.2 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 (lbs/day) = concentration limit (mg/L) × design flow (mgd) × 8.34[1]

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. For dischargers in industrial categories for which EPA has not yet issued an ELG, and for types of discharges not covered by applicable ELGs, BPJ is used to establish TBELs.

EPA promulgated ELGs for landfills point source categories at 40 Code of Federal Regulations (CFR) Part 445, which include TBELs for the point source category, Subpart B, Resource Conservation and Recovery Act (RCRA) Subtitle D, Non-Hazardous Waste Landfill. This ELG has an exception for discharges from captive landfills – landfills operated in conjunction with other commercial or industrial

[1] 8.34 is a conversion factor with units (pounds x liters) / (milligrams x gallons x 10^6)

operations, when the landfill only receives wastes generated by the associated commercial or industrial operation. While the Ketchikan Pulp Company Ward Cove Landfill (KPC Landfill) is a point source from a landfill containing non-hazardous waste, it also fits the exception for captive landfills provided for in the ELG. The landfill is located on the same site as where mill operations took place and was dedicated to receiving waste only from that industrial facility.

Two other promulgated ELGs were reviewed as to their applicability to the KPC Landfill, 40 CFR Part 429 – Timber Products Processing Point Source Category and 40 CFR Part 430 – The Pulp, Paper, and Paperboard Point Source Category. 40 CFR Part 429 is applicable to any timber products processing operation, and any plant producing insulation board with wood as the major raw material, which discharges or may discharge process wastewater pollutants to the waters of the United States, or which introduces or may introduce process wastewater pollutants into a publicly owned treatment works. 40 CFR Part 430 is applicable to any pulp, paper, or paperboard mill that discharges or may discharge process wastewater pollutants to the waters of the United States, or that introduces or may introduce process wastewater pollutants into a publicly owned treatment works.

Process wastewater is defined in 40 CFR Part 401.11 – General definitions, as any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product. For facilities subject to 40 CFR 430, Subparts B – Bleached Papergrade Kraft and Soda Subcategory, and 40 CFR 430, Subpart E – Papergrade Sulfite Subcategory, process wastewater includes leachate from landfills. However, the KPC Landfill did not receive waste from either of these types of facilities defined in Subparts B or E. The Department has determined that ELGs 40 CFR Part 429 and 40 CFR Part 430 do not apply to the KPC Landfill discharge.

According to 40 CFR 125.3(c)(2) technology based treatment requirements may be imposed on a case-by-case basis under section 402(a)(1) of the Act when a promulgated ELG has not been developed that applies to the discharge. Case-by-case TBELs are developed using BPJ. The appropriate technology for the category or class of point source based on available information is to be considered when developing case-by-case TBELs. Factors to be considered are:

- The reasonableness of the relationship between the costs of attaining a reduction in effluent and the effluent reduction benefits,
- A comparison of the cost and level of reduction of such pollutants from the discharge from publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industrial sources,
- The age of equipment and facilities involved,
- The process employed,
- The engineering aspects of the application of various types of control techniques, process changes, and non-water quality environmental impacts.

The Department determined that there are no ELGs under development that would be applicable to a facility similar to the KPC Landfill and that the availability of information for developing case-by-case TBELs is too limited to adequately make cost and technology comparisons for an informed professional judgment. The ELG found at 40 CFR Part 445, Subpart B, RCRA Subtitle D, Non-Hazardous Waste Landfill, provides the most meaningful guidance for developing effluent limits for the leachate treatment process at the KPC Landfill. Therefore, these effluent guidelines have been applied on a BPJ basis to Outfall 001A and are consistent with the previous permit. Benzoic acid, p-Cresol, phenol and α-Terpineol were removed as BPJ TBELs as explained in Fact Sheet Section 6. Table A1 provides the effluent limits attainable by the application of BPJ.

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

Parameter	Maximum Daily (mg/L)	Average Monthly (mg/L)
BOD_5	140	37
TSS	88	27
Ammonia (as N)	10	4.9
Zinc	0.20	0.11
pH	Within the range 6 to 9 standard pH units	

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 7.0, 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 waters for the discharge, Ward and Refuge Cove, have not been reclassified, nor have site-specific water quality criteria been established. Therefore, Ward and Refuge Cove must be protected for all marine water use classes listed in 18 AAC 70.020(a)(2). These marine water designated use classes consist of the following: water supply for aquaculture, seafood processing and industrial; contact and secondary recreation; growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life.

A.3.1 Specific Water Quality-Based Effluent Limits

A.3.1.1 pH

Alaska WQS at 18 AAC 70.020(b)(18)(A)(i) (aquaculture) and 18 AAC 70.020(b)(18)(C) (Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife) states that the pH water quality criteria may not be less than 6.5 or greater than 8.5 s.u..

DEC reviewed May 2013 – September 2017 pH monitoring results from Outfall 001A. During this time period, the minimum pH was 7.2 s.u., and the maximum pH was 8.4 s.u. The previous permit required a minimum of 6.5 s.u. and a maximum of 8.5 s.u. These water quality criteria are retained as the pH limits for Outfall 001A.

A.3.1.2 Total Ammonia (as Nitrogen)

Total ammonia is the sum of ionized (NH_4^+) and un-ionized ammonia (NH_3). Temperature, pH, and salinity affect which form, NH_4^+ or NH_3 is present. NH_3 is more toxic to aquatic organisms than NH_4^+ and predominates with higher temperature and pH. NH_3 is less toxic with increased salinity. Biological wastewater treatment processes reduce the amount of total nitrogen in wastewater; however,

without advanced treatment, wastewater effluent may still contain elevated levels of ammonia nitrogen. Excess ammonia as nitrogen in the environment can lead to dissolved oxygen (DO) depletion, eutrophication, and toxicity to aquatic organisms.

The prior permit required the KPC landfill to monitor ammonia in the effluent once per year. A review of ammonia effluent data from May 2013 – September 2017 indicated a range of results from non-detect to a maximum observed concentration of 0.71 mg/L.

The most stringent criteria for ammonia in marine waters is the aquatic life criteria. DEC derived ammonia criteria from the *Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances* (Toxics Manual) (DEC, 2008). The 85th salinity (32.2 parts per thousand), temperature (13.4 ° Celsius), and pH (7.8 s.u.) percentiles determined from data collected by Tetra Tech in 1997 for development of DEC and EPA's total maximum daily load for residues and DO in Ward Cove, were used to extrapolate ammonia criteria from DEC's Toxics Manual, Appendices F and G. These extrapolations resulted in a chronic criterion of 2.0 mg/L and an acute criterion of 13.2 mg/L.

DEC's Reasonable Potential Analysis (RPA) and Effluent Limits Development Guide, requires that for pollutants where TBELs have been determined, that WQBELs be calculated using the dilution for the driving parameter of the mixing zone. Therefore, ammonia WQBELs were calculated using the dilution factor for manganese, the driving parameter of the mixing zone, which resulted in WQBELs of 13 mg/L maximum daily limit (MDL) and 7 mg/L average monthly limit (AML). The ammonia TBELs are more stringent than the WQBELs, and therefore are retained as the effluent limits for Outfall 001A.

A.3.1.3 Manganese

Manganese is a vital micro-nutrient for plants and animals. Human intake of manganese occurs primarily when ingested as a trace nutrient in food. Manganese can concentrate in the edible portions of mollusks with high bioaccumulation factors. The most stringent WQS numeric criteria for manganese is the human health criteria intended to protect against possible health hazard to humans by manganese accumulation in shellfish, with a criteria of 100 µg/L.

DEC reviewed February 2013 – September 2017 manganese monitoring results from Outfall 001A. During this time period, the average manganese value observed was 236.6 µg/L, the minimum observed manganese concentration was 14.5 µg/L, and the maximum observed manganese concentration was 775 µg/L. The previous permit did not implement a WQBEL for manganese as the previous driving parameter of the mixing zone was color, and after accounting for the available dilution from color, manganese did not have RP to exceed WQ numeric criteria. Maximum observed manganese concentrations have increased since the previous permit (614 µg/L versus 775 µg/L) and consistent with DEC's RPA Guide, DEC implemented a WQBEL for manganese as it was the driving parameter of the mixing zone requiring the most dilution to reach WQS numeric criteria at the boundary of the mixing zone. The calculated WQBELS are an AML of 1,464 µg/L and an MDL of 3,888 µg/L.

A.3.1.4 Zinc

The toxicity of zinc to aquatic life depends on the physical and chemical forms of zinc, the toxicity of each form, and the degree of interconversion among the various forms. DEC reviewed May 2013 – September 2017 zinc monitoring results from Outfall 001A. During this time period, the average zinc value observed was 3.6 µg/L, the minimum observed zinc concentration was non-detect, and the maximum observed zinc concentration was 19.2 µg/L. The most stringent WQS numeric criteria for zinc is located in the Toxics Manual and is the aquatic life criteria, with a chronic criterion of 86.1µg/L and an acute criterion of 95.1 µg/L.

DEC's RPA and Effluent Limits Development Guide, requires that for pollutants where TBELs have been determined, that WQBELs be calculated using the dilution for the driving parameter of the mixing

zone. Therefore, zinc WQBELs were calculated using the dilution factor for manganese, the driving parameter of the mixing zone, which resulted in WQBELs of 95 µg/L MDL and 33 µg/L AML. The zinc WQBELs are more stringent than the TBELs, and therefore are applied as the effluent limits for Outfall 001A

A.3.2 Selection of Most Stringent Limitations

Table A2 provides a summary and reference to those parameters that contain effluent limits at Outfall 001A.

Table A.2- Summary of Effluent Limitations

Parameter	Fact Sheet Reference	Type of Effluent Limit
BOD_5	APPENDIX A-Section A.2.2	BPJ TBEL
TSS		
Total Ammonia, as Nitrogen	APPENDIX A- Section A.2.2	BPJ TBEL
pH	APPENDIX A- Section A.3.4.1	WQBEL
Zinc	APPENDIX A- Section A.3.4.4	WQBEL
Manganese	APPENDIX A- Section A.3.4.6	WQBEL

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 wasteload allocation (WLA).

The permit contains a new WQBEL for manganese for the leachate discharge. Since 2013, KPC has been monitoring and reporting manganese effluent data at least twice per year. The most recent five years of available manganese effluent data (February 2013 - July 2017) indicates that the discharge has reasonable potential (RP) to exceed the human health for consumption of aquatic organisms marine water quality standards at the boundary of the mixing zone, therefore, a manganese WQBEL has been included in the permit. The leachate monitoring frequency for manganese has been increased to quarterly as a result of the WQBEL and to perform a robust RPA in the next permit issuance on a manganese dataset that more thoroughly illustrates the variability of manganese in the effluent.

New, more stringent WQBELs for zinc were calculated using the most recent five years of effluent data. These WQBELs were calculated using the dilution factor for manganese, the driving parameter of the mixing zone. The revised WQBELs are calculated consistent with the procedures in the DEC RPA Guide. These procedures stipulate that if there is a TBEL that applies to the facility and pollutant, WQBELs must be calculated. The more stringent of the TBELs or WQBELs is established as the final limit in the APDES permit.

The permit requires leachate monitoring for BOD_5, TSS, pH, and flow to determine compliance with the permit's effluent limits. TSS monitoring was reduced from quarterly to once per year to reflect the fact that the maximum concentration over the term of the previous permit was 5 mg/L. BOD_5 monitoring was reduced from twice per year to once per year to reflect the fact that the maximum BOD_5 concentration over the term of the previous permit was 4 mg/L.

The CWA requires that the effluent limit for a particular pollutant be the more stringent of either TBELs or WQBELs. TBELs are established by the EPA for many industries in the form of ELGs based on available pollution control technology and are adopted by reference in 18 AAC 83.010.

A.3.3 Reasonable Potential Analysis

When evaluating the effluent to determine if WQBELs based on chemical-specific numeric criteria are needed, the Department projects the receiving waterbody concentration for each pollutant of concern downstream of where the effluent enters the receiving waterbody. The chemical-specific concentration of the effluent and receiving waterbody and, if appropriate, the dilution available from the receiving waterbody, are factors used to project the receiving waterbody concentration. If the projected concentration of the receiving waterbody exceeds the numeric criterion for a limited parameter, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standard, and a WQBEL must be developed.

According to 18 AAC 70.990(38), a mixing zone is an area in a waterbody surrounding, or downstream of, a discharge where the effluent plume is diluted by the receiving water within which specified water quality criteria may be exceeded. Water quality criteria and limits may be exceeded within a mixing zone. A mixing zone can be authorized only when adequate receiving waterbody flow exists, and the concentration of the pollutant of concern in the receiving waterbody is below the numeric criterion necessary to protect the designated uses of the waterbody.

A.3.4 Procedure for Deriving Water Quality-Based Effluent Limits

The *Technical Support Document for Water Quality-Based Toxics Control* (TSD) (Environmental Protection Agency (EPA), 1991) and the WQS recommend the flow conditions for use in calculating WQBELs using steady-state modeling. The TSD, APDES Guide, and the WQS state the WQBELs intended to protect aquatic life uses should be based on the lowest seven-day average flow rate expected to occur once every ten years (7Q10) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years (1Q10) for acute criteria. In marine settings, tidal velocities must be representative of critical conditions as well.

The first step in developing a WQBEL is to develop a WLA for the pollutant. A WLA is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an exceedance of WQS or a total maximum daily load (TMDL) in the receiving waterbody. If a mixing zone is authorized in the permit, the WQ criteria apply at all points outside the mixing zone.

In cases where a mixing zone is not authorized, either because the receiving waterbody already exceeds the criterion, the receiving waterbody flow or tidal velocity and duration is too low to provide dilution, or for some other reason one is not authorized, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that the permittee will not cause or contribute to an exceedance of the criterion. The WQS at 18 AAC 70.020(a) designates classes of water for beneficial uses of water supply, water recreation, and of growth and propagation of fish, shellfish, other aquatic life, and wildlife.

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 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 (APDES) 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 (WQBEL) 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. Manganese 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 is based on the assumption 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 C-2 is equal to equation C-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

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

In other words, 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 C-2 can be simplified by introducing a dilution factor (D):

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

After the D simplification, this becomes:

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

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 making the assumption 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 manganese, the Department used ProUCL, a statistical software program, to determine a CV of 1.1. 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 manganese.

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

Where,

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

μ_n = mean calculated by ProUCL = 236.5

σ = the standard deviation calculated by ProUCL = 271.3

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

=0.821 (inverse of cumulative distribution function of 0.794)

n = number of valid data samples = 13

RPM = 1.9

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

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

MOC = 775 micrograms per liter (µg/L)

In the case of manganese,

MEC = (1.9)(775) = 1,473 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 1,464 µg/L.

Comparison with Human Health manganese water quality criteria

In order to determine if RP exists for this discharge to exceed water quality criteria, the highest projected concentrations at the boundary of the mixing zone is compared with human health water quality criteria.

Human Health water quality criteria: 100 µg/L

1,464 µg/L > 100 µg/L **YES,** there is RP to exceed human health 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 and at the boundary of the mixing zone. Since there is a RP for the effluent to cause an exceedance of human health manganese water quality criteria at the boundary of the mixing zone, WQBELs for manganese are required. See Appendix C for the calculations.

Table B.1- Reasonable Potential Analysis Results

Parameter	MOC	N[a]	C_u[b]	RPM	MEC (C_e)	D[c]	C_d[d]	WQS Criteria	Boundary of Mixing Zone RP?
Manganese	775 µg/L	13	1.8 µg/L	1.9	1,464 µg/L	15	100 µg/L	100 µg/L	Yes
Color	70 color units	22	8.7 color units	1.3	93 color units		14 color units	15 color units or natural background, whichever is greater	No
Zinc	19 µg/L	13	4.1 µg/L	2	39 µg/L		6.4 µg/L	95 µg/L (acute) 86 µg/L (chronic)	
Ammonia	0.7 mg/L	9	0.3 mg/L	2.6	1.9 mg/L		0.41 mg/L	13 mg/L (acute) 2.0 mg/L (chronic)	
WET	1.5 TU_c	7	0	2	3.1 TU_c		0.2 TU_c	1.0 TU_c	

Footnotes:

a. N = Number of valid samples
b. C_u = Ambient concentration
c. D = Dilution factor
d. C_d = Calculated receiving water concentration (RWC) at mixing zone boundary

APPENDIX C- EFFLUENT LIMIT CALCULATION

If the Alaska Department of Environmental Conservation (the Department or DEC) does not authorize a mixing zone, water quality standards (WQS) numeric criteria are applied at the end of the pipe, and technology-based effluent limits (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 water-quality based effluent limits (WQBELs) for 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, such as for 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS), TBELs are applied as end-of pipe effluent limits.

In the case of the Ketchikan Pulp Company Landfill (KPC Landfill), manganese demonstrated reasonable potential to exceed at the end of pipe and required the most dilution to meet water quality numeric criteria at the boundary of the authorized mixing zone; therefore, the Department developed WQBELs for manganese. An example of the manganese limit calculation is depicted below.

C.1 Effluent Limit Calculation

Once the Department determines that the effluent has a reasonable potential to exceed a WQS, a WQBEL for the pollutant is developed. 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 (APDES) RPA and Effluent Limits Development Guide* (June 30, 2014) (RPA Guide) to calculate WQBELs for manganese. The first step in calculating WQBELs is the development of a wasteload allocation WLA for the pollutant.

C.2 Mixing Zone-based WLA

When the Department authorizes a mixing zone for the discharge, the WLA is calculated using the available dilution, background concentrations of the pollutant, and the WQS. For human health criteria, the WLA is applied directly as an average monthly limit (AML). The maximum daily limit (MDL) is then calculated from the AML by applying a multiplier.

C.3 "End-of-Pipe" WLAs

In many cases, there is no dilution available, either because the receiving waterbody exceeds the criteria or because the Department does not authorize a mixing zone for a particular pollutant. When there is no dilution available, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that the permittee's discharge does not contribute to an exceedance of the criterion. When a human health criteria applies to a pollutant, the chronic dilution factor is used to calculate a WLA.

C.4 Permit Limit Derivation

The Department applies the statistical approach described in Chapter 5 of the TSD to calculate the maximum daily limit (MDL) and average monthly limit (AML). This approach takes into account effluent variability (using the coefficient of variation (CV)) and sampling frequency.

The MDL is based on the CV of the data and the probability basis, while the AML is dependent on these two variables and the monitoring frequency. As recommended in the TSD, the Department used a probability basis of 95% for the AML calculation and 99% for the MDL calculation.

The following is a summary of the steps to derive WQBELs from WQS numeric criteria for pollutants that have reasonable potential to exceed WQ numeric criteria. These steps are found in the RPA Guide and the guidance's accompanying Microsoft Excel RPA Tool. The guidance and tool were used to calculate the MDL and AML for manganese in the KPC Landfill permit.

Step 1- Determine the WLA

The human health criteria are converted to waste load allocations using the following equation:

$$WLA_{hh} = (WQC_{hh})(D_{hh}) + C_s(1 - D_{hh})$$

$$WLA_{hh} = WQC_{hh}\left(\frac{Q_d + Q_s}{Q_d}\right) + C_s\left(1 - \left[\frac{Q_d + Q_s}{Q_d}\right]\right)$$

Where: $D_{hh} = Dilution = \frac{(Q_d + Q_s)}{Q_d}$

$D_{hh}(Dilution\ [Human\ Health])$

$Q_s = Critical\ Upstream\ Flow$

$Q_d = Critical\ Discharge\ Flow$

$C_s = Critical\ Upstream\ Concentration$

$WLA_{hh} = Wasteload\ Allocation\ (\ human\ health)$

$WQC_{hh} = C_r = Water\ Quality\ Criterion(human\ health)$

For manganese,

$D_{hh} = 15$

$C_s = 1.8\ micrograms\ per\ liter$ (µg/L)

$WLA_{hh} = 1{,}475\ \mu g/L$

$WQC_{hh} = 100\ \mu g/L$

Step 2 - Calculate the Permit Limits

The MDL and AML are calculated using the following equations that are found in section 5.4.4 of the TSD:

$$AML_{hh} = WLA_{hh}$$

$$MDL_{hh} = AML_{hh}\left(\frac{\exp(z_{99}{}^{\sigma} - 0.5\sigma^2)}{\exp(z_{95^{\sigma}} - 0.5\sigma_n^2)}\right)$$

Where z_{95} = the z-statistic at the 95th percentile = 1.645

$$\sigma^2 = ln[CV^2 + 1]$$

$$\sigma_n^2 = ln\left[\left(\frac{CV^2}{n}\right) + 1\right]$$

CV = coefficient of variation = 1.1

n = number of samples per month = 4

For manganese:

MDL = 3,916 µg/L or 3.9 mg/L

AML = 1,475 µg/L or 1.5 mg/L

APPENDIX D- MIXING ZONE ANALYSIS CHECKLIST

The purpose of the Mixing Zone Checklist is to guide the permit writer through the mixing zone regulatory requirements to determine if all the mixing zone criteria at 18 AAC 70.240 as well as provide justification to authorize a mixing zone in an Alaska Pollutant Discharge Elimination System permit. See Fact Sheet section 5.5 for the Ketchikan Pulp Company Landfill mixing zone analysis.

Criteria	Description	Resources	Regulation
Size	Is the mixing zone as small as practicable? **Yes** **If yes, mixing zone may be approved as proposed or authorized with conditions.**	Technical Support Document for Water Quality-Based Toxics Control DEC's Reasonable Potential Analysis Guidance Environmental Protection Agency's Permit Writers' Manual CORMIX	**18 AAC 70.240(k)**
Technology	Were the most effective technological and economical methods used to disperse, treat, remove, and reduce pollutants? **Yes** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(c)(1)**
Low Flow Design	**For river, streams, and other flowing fresh waters.** - Determine low flow calculations or documentation for the applicable parameters. **Marine discharge; not applicable.**		**18 AAC 70.240(l))**
Existing Use	Does the mixing zone… (1) maintain and protect designated and existing uses of the waterbody as a whole? **Yes** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(c)(2)**

Criteria	Description	Resources	Regulation
	(2) impair overall biological integrity of the waterbody? **No** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(c)(3)**
	(3) create a public health hazard that would preclude or limit existing uses of the waterbody for water supply or contact recreation? **No** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(c)(4)(B)**
	(4) preclude or limit established processing activities or established commercial, sport, personal use, or subsistence fish and shellfish harvesting? **No** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(c)(4)(C)**
Human consumption	Does the mixing zone… (1) produce objectionable color, taste, or odor in aquatic resources harvested for human consumption? **No** **If yes, mixing zone may not be approved.**		**18 AAC 70.240(d)(6)**
Spawning Areas	Does the mixing zone… (1) discharge in a spawning area for anadromous fish or Arctic grayling, northern pike, rainbow trout, lake trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked coho, king, and sockeye salmon? **No** **If yes, mixing zone may not be approved.**		**18 AAC 70.240(f)**
Human Health	Does the mixing zone… (1) contain bioaccumulating, bioconcentrating, or persistent chemicals above natural levels to significantly adverse levels? **No** **If yes, mixing zone may not be approved.**		**18 AAC 70.240(d)(1)**

Criteria	Description	Resources	Regulation
	2) contain chemicals expected to present a unacceptable risk to human health from carcinogenic, mutagenic, teratogenic, or other effects as determined using risk assessment methods approved by the Department? **No** **If yes, mixing zone may not be approved.**		**18 AAC 70.240(d)(2)**
	(2) occur in a location where the department determines that a public health hazard reasonably could be expected? **No** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(k)(4)**
Aquatic Life	Does the mixing zone… (1) cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone? **No** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(c)(4)(A)**
	(2) result in a reduction in fish or shellfish population levels? **No** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AC 70.240(c)(4)(D)**
	(3) result in permanent or irreparable displacement of indigenous organisms? **No** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(c)(4)(E)**
	(4) form a barrier to migratory species or fish passage? **No** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(c)(4)(G)**

Criteria	Description	Resources	Regulation
	(5) result in undesirable or nuisance aquatic life? **No** **If yes, mixing zone may not be approved.**		**18 AAC 70.240(d)(5)**
	(6) prevent lethality to passing organisms; or exceed acute aquatic life criteria at and beyond the boundaries of a smaller initial mixing zone surrounding the outfall, the size of which shall be determined using methods approved by the Department? **Yes** **If no, mixing zone may not be approved.**		**18 AAC 70.240(d)(7)** **18 AAC 70.240(d)(8)**
Endangered Species	Are there threatened or endangered species (T/E spp) at the location of the mixing zone? If yes, are there likely to be adverse effects to T/E spp based on comments received from the United States Fish and Wildlife Service or National Oceanic and Atmospheric Association. If yes, will conservation measures be included in the permit to avoid adverse effects? **Stellar Sea Lions, Fin and Humpback Whales may be in the vicinity. Services provided Draft Permit and Fact Sheet.** **If yes, mixing zone may be approved as proposed or authorized with conditions.**		**18 AAC 70.240(c)(4)(F)**