

COMPREHENSIVE LANDFILL MONITORING PLAN

WARD COVE LANDFILL
KETCHIKAN, ALASKA



Prepared for
KETCHIKAN PULP COMPANY
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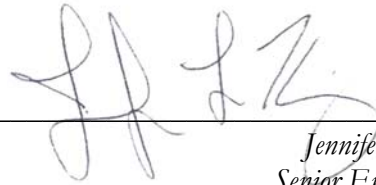
WARD COVE LANDFILL, KETCHIKAN, ALASKA

*The material and data in this plan were prepared
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CONTENTS

TABLES AND ILLUSTRATIONS	IV
ACRONYMS AND ABBREVIATIONS	V
1 INTRODUCTION	1
1.1 MONITORING PLAN OBJECTIVES	1
1.2 LANDFILL DESCRIPTION	2
1.3 RESPONSIBILITIES	3
2 STORMWATER	3
2.1 ANALYTICAL MONITORING	3
2.2 VISUAL MONITORING	4
3 LEACHATE	4
3.1 ANALYTICAL MONITORING	4
3.2 VISUAL SYSTEM MONITORING	4
4 RECEIVING WATER	5
5 LANDFILL INTEGRITY	5
5.1 PERIMETER MONITORING	5
5.2 FINAL COVER SYSTEM	5
5.3 OTHER POST-CLOSURE LANDFILL CARE AND MONITORING	6
6 SAMPLING AND QUALITY CONTROL	6
7 POST-MONITORING ACTIONS	6
7.1 CORRECTIVE ACTION	6
7.2 DOCUMENTATION	8
7.3 MODIFICATIONS	8
LIMITATIONS	
REFERENCES	
TABLES	
FIGURE	
APPENDIX A	
LEACHATE TREATMENT SYSTEM INSPECTION FORM	
APPENDIX B	
LANDFILL PERIMETER MONITORING FORM	
APPENDIX C	
LANDFILL POST-CLOSURE INSPECTION FORM	
APPENDIX D	
VISUAL EXAMINATION REPORT FORM	

TABLES AND ILLUSTRATIONS

FOLLOWING REPORT:

TABLES

1—SAMPLING LOCATIONS

2— MONITORING SUMMARY

FIGURE

SITE MAP

ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
APDES	Alaska Pollutant Discharge Elimination System
APDES Permit	APDES permit AK-005339-2
AWQC	ambient water quality criteria
BMP plan	Best Management Practices Plan
DMR	discharge monitoring report
KPC	Ketchikan Pulp Company
Landfill	Ward Cove Landfill
Monitoring Plan	Comprehensive Landfill Monitoring Plan
QAPP	quality assurance project plan
SAP	sampling and analysis plan
SWPPP	stormwater pollution prevention plan

1 INTRODUCTION

This Comprehensive Landfill Monitoring Plan (Monitoring Plan), which details post-closure monitoring activities, has been prepared for the Ward Cove Landfill (Landfill) in accordance with 18 Alaska Administrative Code (AAC) 60.800, 18 AAC 60.810, and 18 AAC 60.815. The Landfill formerly operated under Alaska Department of Environmental Conservation (ADEC) Solid Waste Permits 9213-BA001, 9713-BA001, and 9113-BA005. The Landfill currently operates under ADEC Alaska Pollutant Discharge Elimination System (APDES) permit AK-005339-2 (APDES Permit). The Landfill is in the post-closure period, which will continue until 2028, per ADEC's letter to Ketchikan Pulp Company (KPC) dated January 31, 2002 (ADEC, 2002).

This Monitoring Plan replaces the August 4, 2006, Monitoring Plan for the Landfill (MFA, 2006). It represents the ADEC Solid Waste Program requirements and/or references the APDES Permit, when applicable, for the monitoring of stormwater, leachate, surface water, and overall landfill and leachate treatment system conditions. This Monitoring Plan may be revised as the Landfill is reassessed. This Monitoring Plan encompasses practices outlined in the documents prepared for the APDES Permit, including the following:

- Best Management Practices Plan (BMP plan)
- Quality Assurance Project Plan (QAPP)
- Sampling and Analysis Plan (SAP)
- Stormwater Pollution Prevention Plan (SWPPP)

The above documents and this Monitoring Plan comprise the current operational documents for the Landfill. Where appropriate, forms and figures included in the above-referenced plans are not duplicated in this Monitoring Plan. When this Monitoring Plan was prepared, ADEC was in the process of reissuing KPC's APDES Permit; the above documents are referenced generically in this Monitoring plan.

1.1 Monitoring Plan Objectives

The purpose of this Monitoring Plan is to provide a complete picture of the site through observation and analysis and fulfill current regulatory and permitting requirements. Visual monitoring, surface water monitoring, and corrective action are included in this Monitoring Plan, as are additional components, to ensure that the Landfill is comprehensively monitored, focusing on the Landfill's dynamic elements. The requirements and procedures summarized in this Monitoring Plan reflect directives provided by ADEC in a letter to KPC dated July 5, 2005 (ADEC, 2005) and updated changes approved by ADEC Solid Waste and APDES programs.

As specified in 18 AAC 60.800, the visual monitoring program is intended to detect and document:

- Signs of damage or potential damage to any component of the facility from settlement, ponding, leakage, thermal instability, frost action, erosion, thawing of the waste, or operations at the facility
- Escape of waste or leachate
- Slippage of a flexible liner or damage to its anchor
- Erosion, tears, cracks, or other damage to the visible part of a liner
- Damage to the structural integrity of the containment, erosion-control, or diversion structure
- Fire or combustion in the waste
- Evidence of death of or stress to fish, wildlife, or vegetation that might be caused by the facility

The visual monitoring program integrated with this Monitoring Plan assesses system performance and provides early detection of potential environmental impacts.

Stormwater, treated leachate, and surface water represent the primary monitoring components of the Landfill in its post-closure phase. Implementing an analytical and visual monitoring schedule for water exiting the site allows an assessment of potential environmental impacts and triggers steps to correct any excursion. In addition, visually monitoring the physical aspects of the Landfill, including the perimeter, the final cover system, and other features as described in this Monitoring Plan, provides an overview of the Landfill integrity.

1.2 Landfill Description

The Landfill is a closed solid waste facility located southwest of the former KPC Ward Cove mill in Ketchikan, Alaska. The Landfill is 16.9 acres in surface area. It contains two inactive waste-disposal areas that were closed in 1997 and 1998 under State of Alaska solid waste regulations (18 AAC 60). These areas contain, primarily, woodwaste, boiler ash, fly ash, and process sludge from past mill operations. An on-site leachate treatment system was installed in 1998. An ash cell was constructed over the original wood waste area, filled with dewatered dredge spoils from Ward Cove, and was closed in July 2001. The Landfill is no longer used for disposal of waste. The entire woodwaste/ash landfill is now capped by a low-permeability, geosynthetic cover and vegetated with grass and legumes. Since closure, the leachate collection and treatment systems have performed as designed, and the site has been stable.

In 2004, handling of leachate discharge was changed from a pumped system discharging to Ward Cove through an outfall at the closed mill to a gravity feed system discharging to a different location near the mouth of Ward Cove.

The duration of the post-closure care phase is 30 years, unless otherwise amended by agreement between ADEC and KPC. The facility is considered closed as of spring 1998 (ADEC, 2002).

1.3 Responsibilities

KPC has ceased its Ketchikan operations. With respect to the Landfill post-closure operations, KPC maintains responsibility as defined in this Monitoring Plan. KPC will perform the tasks in this plan, or will oversee third-party contractors to ensure that all routine maintenance, inspections, documentation, landfill-monitoring events, reporting, and waste-management activities are conducted in accordance with the APDES permit, applicable regulations, and this Monitoring Plan. KPC is responsible for reporting violations to the appropriate authority.

2 STORMWATER

Stormwater, as a potential non-point source pollutant, is monitored to ensure a stabilized landfill. For the purposes of this Monitoring Plan, stormwater is defined as runoff from storms, snowmelt runoff, and surface runoff and drainage (40 Code of Federal Regulations 122.26(b)(13)). This definition mirrors ADEC's definition for surface water.

2.1 Analytical Monitoring

The four stormwater sampling locations are listed in Table 1, shown on the figure, and described below.

SWL4 is located in the lower reaches of a stream downstream from the leachate treatment lagoon and SWL4 scupper in the southwestern part of the Landfill. The designated sampling location for SWL4 is approximately 20 feet inland from the high-tide line of Refuge Cove. There is almost always some flow at SWL4, very dry periods being the exception.

SWL6B, a small, intermittent stream located along the northern boundary of the Landfill, represents a combination of drainage from a natural wooded area to the north of the Landfill and a portion of the runoff from the northern part of the Landfill.

SWL11 is a small, intermittent stream in the wooded area south of the leachate-collection trench in the southern part of the site. This stream is hydraulically downgradient of the ash landfill. It currently conveys runoff from the closed and capped landfill. The surface water sampling point for this stream is approximately 75 feet downgradient of the capped landfill.

SWL12 is a small, intermittent stream near the southeast area of the Landfill. This stream drains surface water from the southeast face of the Landfill.

The stormwater discharges are managed by implementation of the SWPPP and the BMP plan. The four stormwater sample stations (SWL4, SWL6B, SWL11, and SWL12) will be sampled according to the frequency, schedule, and parameters required by the APDES Permit and ADEC Solid Waste Program requirements for post-closure care monitoring. Table 2 lists the monitoring schedule in addition to those identified in the above-referenced plans and APDES Permit. In the event of an

exceedance or event that may endanger health or the environment, KPC will respond in accordance with the APDES Permit.

2.2 Visual Monitoring

Visual examination of the four stormwater sample stations is conducted concurrently with the stormwater analytical sampling. Visual monitoring documents observations of color, odor, clarity, floatable and settled solids, suspended solids, and other obvious indicators of stormwater pollution. The visual examination report form is included in the Appendix D, and completed forms are filed with the analytical results from the stormwater sampling. This monitoring is in addition to the stormwater system inspection and maintenance schedule described in the SWPPP.

3 LEACHATE

This section summarizes analytical monitoring of treated leachate and visual monitoring of the leachate collection and treatment system, which provides quantitative and qualitative indicators of site conditions.

3.1 Analytical Monitoring

Outfall 001 is located in Ward Cove immediately south of the Landfill and discharges leachate that is treated by passive aeration, settling, and a biofiltration swale (previously identified as a passive treatment system) that provides polishing of the effluent by filtration (see the figure). Treated effluent is conveyed via gravity to Outfall 001 from a collection sump at the downstream end of the swale.

The frequency and schedule of Outfall 001 monitoring vary by parameter, and sampling at Outfall 001 is conducted in accordance with the APDES Permit. This monitoring program conforms to both APDES Permit and ADEC Solid Waste Program requirements for post-closure care monitoring.

3.2 Visual System Monitoring

The leachate treatment system includes all leachate collection piping and sumps, the leachate treatment lagoon, and the passive treatment system. Monitoring will be performed weekly. The Leachate Treatment System Inspection Form is included in Appendix A. Any abnormalities will be noted on the log and may trigger corrective action. The weekly inspection forms will be compiled monthly and retained locally. A short version of the Leachate Treatment System Inspection Form is available to site personnel should more frequent inspections be warranted (also included in Appendix A). For example, a heavy rainfall event that may require adjustments to the allowed flow rate from the treatment lagoon to the passive aeration treatment system.

In addition to the weekly inspection log, the lagoon bottom will be inspected every five years for excessive buildup of sediments. Although not a requirement, this can most readily be done during

summer months at low flows by removing stop logs from the weir box to drop the elevation of the weir to 41.5 feet. If the depth is over half of the lagoon's normal minimum operating depth, the sediment will be removed and disposed of at a licensed landfill.

4 RECEIVING WATER

Receiving water for this purpose is defined as water in Ward Cove, outside the mixing zone in the Outfall 001 vicinity, as established in the APDES permit.

If required by the APDES Permit, a receiving water sample will be collected from Ward Cove in the vicinity of Outfall 001 and at a depth similar to that of the outfall. Receiving water sampling will be conducted in accordance with the APDES Permit.

5 LANDFILL INTEGRITY

In addition to the above monitoring, visual monitoring of other physical components ensures that the Landfill is maintained in proper working condition and may trigger corrective action should a problem arise.

5.1 Perimeter Monitoring

Prior data and observations indicate that the Landfill remains stable. Perimeter monitoring will document Landfill conditions, and will consist of a visual inspection of the Landfill boundaries to ensure that off-site migration of waste or leachate from the Landfill is not occurring, as well as to assess whether there is evidence of stress to vegetation, fish, or other wildlife. Landfill perimeter monitoring will be conducted twice per year, using the Landfill Perimeter Monitoring Form (Appendix B). The perimeter monitoring route and associated checkpoints are provided on the figure. At KPC's discretion, monitoring frequency may increase as needed to account for changes due to extreme storm or seismic events.

5.2 Final Cover System

The final cover system will be inspected at least every other year and documented using the Landfill Post-Closure Inspection Form (Appendix C). Landfill cap condition monitoring will include a determination of geomembrane liner integrity, liner slippage, leachate leakage, or any other cap damage or malfunction. Refer to Section 7.1 for corrective action response procedures.

Fourteen settlement monuments were installed on the Landfill surface during closure activities. Topographic surveys (i.e., settlement surveys) of these monuments will be completed once every five years, and as soon as possible after any significant seismic event in the Ketchikan area. These data will

be compared to past data, which have been collected since June 1998, to assess settlement rates and trends.

Landfill cap maintenance will be performed every two years. Operating the Landfill in a way that allows natural evolution of the cap vegetation is preferred for long-term success as long as cap damage is minimal. On a basis of every other year, the trees will be cut and left on the cap surface to decompose. Grass mowing may be discontinued at the discretion of KPC. Any cap damage from downed trees will be repaired during the two-year cycle. The annual report to ADEC will document observations regarding tree growth on the cap.

5.3 Other Post-Closure Landfill Care and Monitoring

Piezometers were installed at the Landfill to evaluate the hydraulic conditions during the early stages of closure to assess the Landfill prior to stabilization. The Landfill is stable, and water levels will continue to be monitored; the results are not likely to trigger a corrective action. Rather, data collected from piezometers may be used with other data to understand the overall Landfill performance.

The depth of water in the three piezometers will be monitored every other year, using the Landfill Post-Closure Inspection Form (Appendix C). The condition of the piezometers and the landfill gas collection vents will be assessed on the same schedule.

6 SAMPLING AND QUALITY CONTROL

Sampling procedures described in the SAP will be followed. Sampling methodology for analyzed parameters is specified by the QAPP. The analytical methods specified in the QAPP were established to ensure that the practical quantitation limits that are used for the chemical analyses are at levels that allow comparison of water quality with the applicable water quality standards.

7 POST-MONITORING ACTIONS

7.1 Corrective Action

Corrective action (18 AAC 60.815) will be triggered if damage to the facility or variance from an APDES Permit condition that could impact water quality is observed during monitoring or inspection. KPC will take action to correct the damage or variance in an attempt to prevent the escape of waste or leachate. If a statistically significant change in water quality detected at the point of compliance, KPC shall:

- Determine the extent of contamination;

- Determine if migration from the facility is the cause of the change in water quality;
- Evaluate whether the water quality in 18 AAC 70 are threatened or exceeded at the point of compliance; and
- Submit written notification to the department in accordance with the ADEC and/or APDES Permit requirements.

KPC's responsibilities for water quality monitoring and reporting under the APDES Permit may in some cases parallel the actions described here.

The corrective action will be tailored to the condition requiring evaluation, with the monitoring approach developed in consultation with ADEC. Examples of conditions where corrective action likely would be triggered include the following:

1. Perimeter visual monitoring indicates that there may have been a leachate release.
2. There is a breach or break in the containment system.
3. Freezing or precipitation conditions cause leachate to overflow the treatment system.
4. Routine stormwater, leachate, or surface water analytical monitoring indicates that there has been a leachate release.
5. Repairs, damage or failures of essential leachate collection and treatment system components leave the containment system vulnerable to a release.

Trigger 1 above will initiate corrective action monitoring if a new stream is discovered, or if there are changes in an existing stream, and the source of the variation is suspected to be leachate from the Landfill, as opposed to stormwater runoff.

Triggers 2 and 3 will be discovered during leachate treatment system visual monitoring. If such an event occurs, KPC will take appropriate actions immediately to stop the release. In the case of catastrophic failure of containment, KPC will also take immediate steps to ensure that containment is repaired. Corrective action monitoring will be initiated immediately in either case.

Trigger 4 will initiate corrective action monitoring if a qualitative assessment of each routine surface water parameter, when compared with previous data, shows any statistically significant anomalies that cannot be explained. Any anomalies discovered will first be investigated, taking into consideration weather conditions and other activities in the area of the sampling point where the anomaly is located. If this investigation does not explain the anomaly, routine analytical monitoring will be repeated at the site in question. If the second data set supports the anomaly, corrective action monitoring will be initiated immediately.

Trigger 5 will initiate corrective action monitoring if any work on the leachate collection system is determined to have the potential to affect water quality downstream of the section of the collection system that is being repaired.

Corrective action monitoring will be conducted only at sampling points directly impacted by the applicable trigger condition. Once initiated, corrective action monitoring will continue until the release has been stopped and damage to the containment system has been repaired.

To assess a release, data collected will be compared to historical data from the stream affected.

The parameters for corrective action monitoring are identical to the full set of parameters for routine analytical monitoring. However, the corrective action monitoring program may also be developed in consultation with ADEC.

7.2 Documentation

On or before January 31 of each year, a post-closure monitoring report will be issued to the ADEC Solid Waste Department. It will address the various monitoring activities undertaken during the prior year as outlined in this Monitoring Plan and related documents (i.e., SWPPP, BMP, QAPP, and SAP).

Tabulated water quality data and summarized laboratory analytical results for a five-year period will be submitted annually to the ADEC Solid Waste Department as a component of the post-closure monitoring report. The results will be provided in the annual post-closure monitoring report.

Alaska Water Quality Criteria for the metals monitored at this site are based on the dissolved fraction, with the exception of manganese. This Monitoring Plan has been structured to conform to the APDES permit, which requires measuring these parameters for the combined dissolved and particulate fractions (i.e., total recoverable). Consequently, only a qualitative comparison of the stormwater data to the ambient water quality criteria (AWQC) can be made. This comparison will be included as part of the data tabulation described above.

In the event that one or more total recoverable values in the stormwater exceeds the dissolved-fraction AWQC, KPC will notify ADEC and will work with them to develop an assessment approach, as applicable, consistent with the corrective action approach described in Section 7.1.

The APDES Permit requires that a monthly discharge monitoring report (DMR) be submitted electronically (using the NetDMR) to ADEC by the fifteenth of the month following monitoring. Comparison of the data reported in the DMR to the APDES Permit-specified criteria will reveal exceedances, should they occur. These will be reported to ADEC Division of Water. Additionally, the ADEC Solid Waste Department will be notified in conformance with 18 AAC 60.815.

At a minimum, monitoring records and reports will be retained for five years following the expiration of the APDES permit.

7.3 Modifications

KPC may modify this Monitoring Plan whenever there is a change in the Landfill, post-closure operations, and/or permitting requirements; at the time of permit reissuance (if necessary); or to reflect any other applicable changes in the operation of the Landfill. The revised Monitoring Plan shall be reviewed and approved by a KPC officer or senior manager. Monitoring changes require EPA

notification and may require changes to the Institutional Control Plan (Exponent, 2000) as described in Section 3.3 of that plan.

LIMITATIONS

The services undertaken in completing this plan were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This plan is solely for the use and information of our client unless otherwise noted. Any reliance on this plan by a third party is at such party's sole risk.

Opinions and recommendations contained in this plan apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this plan.

REFERENCES

ADEC. 2002. Letter (re request to reduce sampling parameters and frequency at KPC, Ward Cove Landfill under permit numbers 9113-BA005, 9213-BA001 and 9713-BA001) to C. Paulson, Ketchikan Pulp Company, Portland, Oregon, from G. Miller, ADEC Solid Waste Program, Juneau, Alaska. January 31.

ADEC. 2005. Letter (re request to modify Ketchikan Pulp Company Ward Cove Landfill monitoring program under permit numbers 9113-BA005, 9213-BA001 and 9713-BA001) to C. Paulson, Ketchikan Pulp Company, Portland, Oregon, from E. Emswiler, ADEC Southeast Solid Waste Program, Juneau, Alaska. July 5.

Exponent. 2000. Institutional control plan for the Ketchikan Pulp Company site. June.

MFA. 2005. Ketchikan Pulp Company Ward Cove Landfills proposed post-closure care modifications. Maul Foster & Alongi, Inc., Vancouver, Washington. March 17.

MFA. 2006. Comprehensive landfill monitoring plan, Ward Cove Landfill. Prepared for Ketchikan Pulp Company by Maul Foster & Alongi, Inc. August 4.

TABLES



Table 1
Sampling Locations
Ward Cove Landfill
Ketchikan, Alaska

Sample Station	Discharge	Receiving Water	Latitude	Longitude
SWL4	stormwater	unnamed stream	55° 24' 5.76" N	-131° 44' 32.13" W
SWL6B	stormwater	unnamed stream	55° 24' 12.02" N	-131° 44' 20.94" W
SWL11	stormwater	unnamed stream	55° 23' 59.41" N	-131° 44' 23.16" W
SWL12	stormwater	unnamed stream	55° 24' 2.39" N	-131° 44' 14.37" W
Outfall 001	treated leachate	Ward Cove	55° 24' 15" N	-131° 43' 45" W

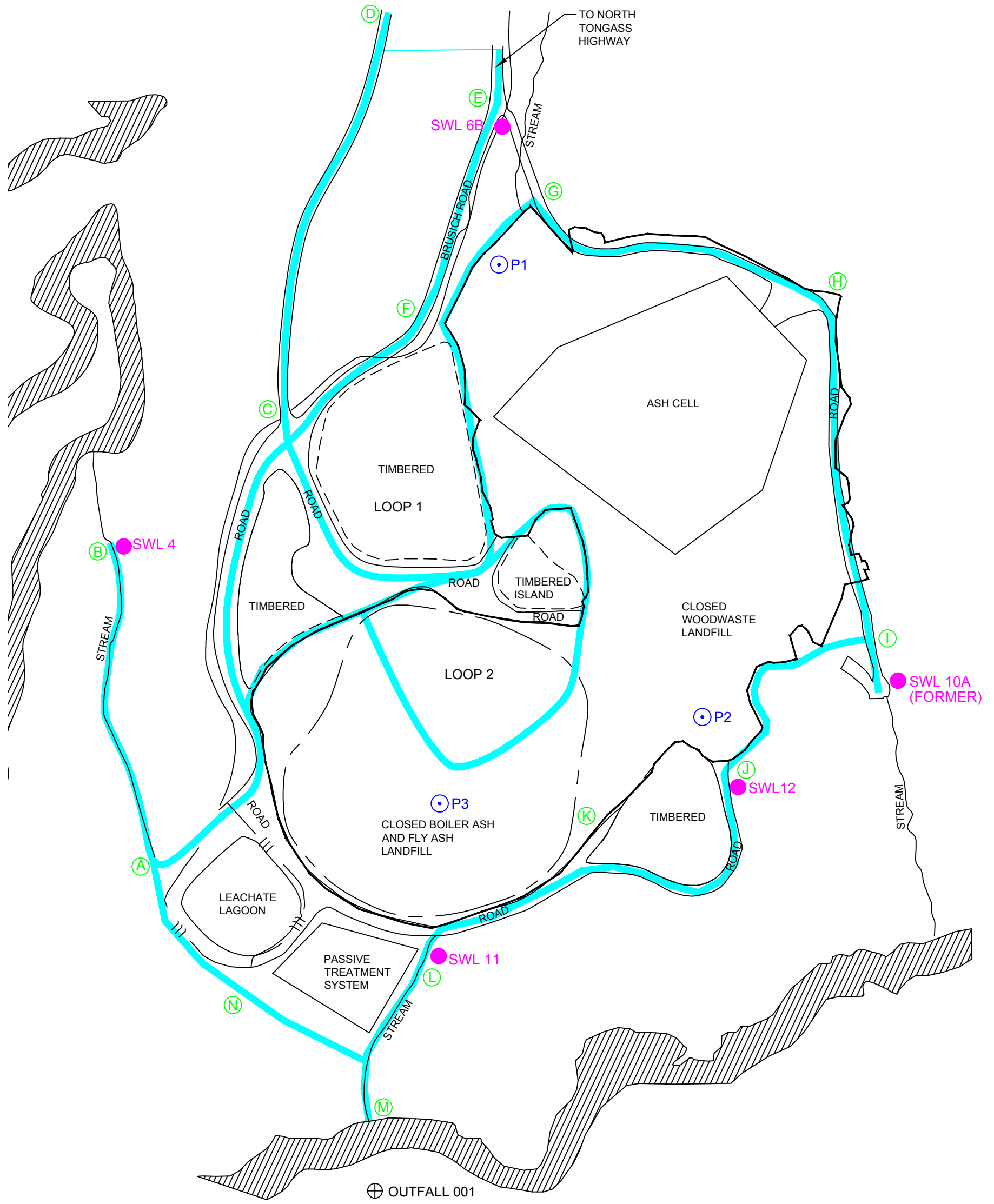
Table 2
Monitoring Summary
Ward Cove Landfill
Ketchikan, Alaska







Component	Frequency	Deliverable	Location
<i>Leachate</i>			
Sampling	Varies by parameter	Electronic Discharge Monitoring Report	ADEC Water Quality
Collection and treatment system monitoring	Weekly	Leachate Collection and Treatment System Form	on site
<i>Landfill Integrity</i>			
Landfill perimeter monitoring	Twice yearly	Landfill Perimeter Monitoring Form	on site
Check for cover slippage and subsidence	Every five years beginning in 2016	Topographic Survey Settlement Report	on site
Landfill cap condition monitoring	Every two years	Cover Visual Monitoring and Post-Closure Care Form	on site
Landfill cap maintenance (cut trees and leave to decompose)	Every two years	Cover Visual Monitoring and Post-Closure Care Form	on site
Groundwater depth (piezometers)	Every two years	Cover Visual Monitoring and Post-Closure Care Form	on site
Check for damage to three Landfill piezometers	Every two years	Cover Visual Monitoring and Post-Closure Care Form	on site
Check for damage to landfill gas collection system vents	Every two years	Cover Visual Monitoring and Post-Closure Care Form	on site
<i>Overall</i>			
All Components	Annually	Annual Report	to ADEC Solid Waste
NOTE: ADEC = Alaska Department of Environmental Conservation.			

FIGURE



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 PLOTTED BY: Teaso Shebram



- LEGEND:**
-  APPROXIMATE LIMIT OF GEOMEMBRANE COVER, CLOSED LANDFILL
 -  PERIMETER VISUAL MONITORING PATH
 -  VISUAL MONITORING PATH CHECKPOINT
 -  SWL 11 SURFACE WATER MONITORING POINT
 -  OUTFALL
 -  PIEZOMETER

DRAWING NOT TO SCALE

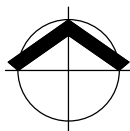


Figure Site Map

Ward Cove Landfill
 Ketchikan, Alaska

APPENDIX A

LEACHATE TREATMENT SYSTEM INSPECTION FORM



**Leachate Treatment System Inspection Form
Ward Cove Landfill
Ketchikan, Alaska**

Weather: _____

Inspected By: _____

Temperature: _____

Date & Time: _____

Is the inspector aware of permit requirements and inspection responsibilities under the Monitoring Plan?

Is the inspector aware of permit requirements under the NPDES permit # AK 005339-2?

Circle: YES or NO

Location	Comment
<u>KPU-Landfill Utilities</u>	
<u>Power Supply:</u>	KPU Electric Meter Readings: Total? _____ (meter alternates between each reading) Max Load? _____
Are there any observed problems with either the power supply or the telephone line? Yes? _____ No? _____	
Any problems with the alarm system? Yes? _____ No? _____	
Comments _____ _____	
 <u>Generator (if required)</u>	
(Generator should be run for 4-6 hours one day each week to ensure it is working correctly)	
<u>Onan:</u>	Running Yes? _____ No? _____
Voltage: _____	Oil Pressure _____
Load Amps: _____	Engine Water Temp: _____
Cycles: _____	Hours: _____
Is the noise normal?	Yes? _____ No? _____
Check lube oil	Yes? _____ No? _____
Check coolant level	Yes? _____ No? _____
Check heat trace	Yes? _____ No? _____
(If any problems are observed during generator inspections, initiate corrective action promptly)	
Are the auto-start and notification operating properly? Yes? _____ No? _____	
Onan Fuel Tank Level: _____	
(If less than 1/4 full, ensure prompt fuel delivery)	
 <u>Leachate Lagoon Area</u>	
Inlet sump conditions:	
Excess sediment in sump?	Yes? _____ No? _____
Water exiting sump normally?	Yes? _____ No? _____
Other observations: _____ _____	

**Leachate Treatment System Inspection Form
Ward Cove Landfill
Ketchikan, Alaska**

Location	Comment
<u>Dewatering pumps: (if required) (check for power to the pumps)</u>	
Are pumps operating correctly?	Yes? _____ No? _____
Record dewatering pump hours:	Pump 1: _____ hours Pump 2: _____ hours
Observations: _____ _____	
<u>Lagoon level:</u>	
Estimated lagoon leachate level: _____ (level to bottom of inflow pipe)	
Overflow or danger of overflow: (If yes, corrective action required)	Yes? _____ No? _____
Explain: _____ _____	
<u>Characteristics of Leachate in the Lagoon:</u>	
Color _____	
Foam or algae present?	Yes? _____ No? _____
Odor _____	
<u>Sea Curtain (top of baffle):</u>	
Is anchor tension proper?	Yes? _____ No? _____
Is curtain in acceptable condition?	Yes? _____ No? _____
<u>Condition of Liner throughout Lagoon (including seams, cracks and punctures):</u>	
Liner damage observed?	Yes? _____ No? _____
(Take action to arrange for repair immediately if any damage is observed)	
Location of damage: _____ _____ _____	

**Leachate Treatment System Inspection Form
Ward Cove Landfill
Ketchikan, Alaska**

Location	Comment
<u>Lagoon Effluent Weir Box, Stop Logs and Pinch Valve</u>	
Excessive debris in effluent weir box? (If yes, remove as much material as possible)	Yes? _____ No? _____
How many stop logs are in place? _____	
Is the pinch valve open or closed? _____	
<u>Passive Treatment System</u>	
Are there any signs of erosion?	Yes? _____ No? _____
Is there any unusual plant growth?	Yes? _____ No? _____
Is there any overflow of the system?	Yes? _____ No? _____
Comments _____	
<u>Effluent Sump (outfall intake)</u>	
What is the approximate level of water in the sump (ft from bottom of inlet weir)? _____	
Any debris on screen or in sump? (If yes, remove material if safely possible)	Yes? _____ No? _____
Comments _____	
<u>Flowmeter</u>	
What is the current level and flow reading on the meter?	Level? _____ Flow? _____
<u>Additional Observations (if any)</u> _____	

Leachate Treatment System Inspection Form (Short Form)
Ward Cove Landfill
Ketchikan, Alaska

Weather: _____

Inspected By: _____

Temperature: _____

Date & Time: _____

Is the inspector aware of permit requirements and inspection responsibilities under the Monitoring Plan?

Is the inspector aware of permit requirements under the NPDES permit # AK 005339-2? Circle: YES or NO

Location	Comment
<u>Lagoon:</u>	
Estimated leachate level in lagoon: _____	
Overflow or danger of overflow? Yes? _____ No? _____ (If yes, inform Facility Manager and take corrective action)	
Estimated leachate level at effluent sump: _____	
Overflow or danger of overflow? Yes? _____ No? _____ (If yes, inform Facility Manager and take corrective action)	
Are pumps and floats operating correctly? Yes? _____ No? _____ (If no, inform Facility Manager and take corrective action)	
Is system running on KPU power or generator? _____	
Condition of generator? _____	
Is the generator on and operating properly? Yes? _____ No? _____	
Are there any observed problems with either the KPU power supply or the telephone? Yes? _____ No? _____	
Other: _____ _____ _____	

APPENDIX B

LANDFILL PERIMETER MONITORING FORM



**Landfill Perimeter Monitoring Form
Ward Cove Landfill
Ketchikan, Alaska**

<p>Checkpoint A: SWL4 Scupper</p> <p>Any evidence of leachate bypassing scupper? (Y/N): _____</p> <p>Any ponded surface water near scupper? (Y/N): _____</p> <p>If yes to either question, fill in the following:</p> <p>Flow rate (gpm): _____</p> <p>Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____</p> <p>Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____</p> <p>Sheen (Y/N): _____</p> <p>Foam (Y/N): _____</p> <p>Other: _____</p>
<p>Checkpoint A to B: Path along SWL4 Stream</p> <p>Any unusual condition in stream? (Y/N): _____</p> <p>Location: _____</p> <p>Flow rate (gpm): _____</p> <p>Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____</p> <p>Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____</p> <p>Sheen (Y/N): _____</p> <p>Foam (Y/N): _____</p> <p>Other: _____</p>
<p>Checkpoint B: SWL4 Outfall (Use Visual Examination Report found in the Sampling and Analysis Plan)</p>
<p>Checkpoint A to C: Path on west Perimeter Road</p> <p>Any surface water streams? (Y/N): _____</p> <p>If yes, fill in the following:</p> <p>Location: _____</p> <p>Flow rate (gpm): _____</p> <p>Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____</p> <p>Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____</p> <p>Sheen (Y/N): _____</p> <p>Foam (Y/N): _____</p> <p>Other: _____</p>

**Landfill Perimeter Monitoring Form
Ward Cove Landfill
Ketchikan, Alaska**

<p>Checkpoint C to D: Path along Brusich Road</p> <p style="margin-left: 40px;">Any surface water streams? (Y/N): _____</p> <p style="margin-left: 80px;">If yes, fill in the following:</p> <p style="margin-left: 120px;">Location: _____</p> <p style="margin-left: 120px;">Flow rate (gpm): _____</p> <p style="margin-left: 120px;">Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____</p> <p style="margin-left: 120px;">Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____</p> <p style="margin-left: 120px;">Sheen (Y/N): _____</p> <p style="margin-left: 120px;">Foam (Y/N): _____</p> <p style="margin-left: 120px;">Other: _____</p>
<p>Checkpoint D: Outfall of SWL6 Stream toward Refuge Cove</p> <p style="margin-left: 40px;">Flow rate (gpm): _____</p> <p style="margin-left: 120px;">Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____</p> <p style="margin-left: 120px;">Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____</p> <p style="margin-left: 120px;">Sheen (Y/N): _____</p> <p style="margin-left: 120px;">Foam (Y/N): _____</p> <p style="margin-left: 120px;">Other: _____</p>
<p>Checkpoint E: SWL6B Outfall (Use Visual Examination Report found in the Sampling and Analysis Plan)</p>
<p>Checkpoint E to F: Path along Road West of Landfill</p> <p style="margin-left: 40px;">Any surface water streams? (Y/N): _____</p> <p style="margin-left: 80px;">If yes, fill in the following:</p> <p style="margin-left: 120px;">Location: _____</p> <p style="margin-left: 120px;">Flow rate (gpm): _____</p> <p style="margin-left: 120px;">Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____</p> <p style="margin-left: 120px;">Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____</p> <p style="margin-left: 120px;">Sheen (Y/N): _____</p> <p style="margin-left: 120px;">Foam (Y/N): _____</p> <p style="margin-left: 120px;">Other: _____</p>

**Landfill Perimeter Monitoring Form
Ward Cove Landfill
Ketchikan, Alaska**

Loop 1: Timbered Area	Any surface water streams? (Y/N): _____ If yes, fill in the following: Location: _____ Flow rate (gpm): _____ Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____ Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____ Sheen (Y/N): _____ Foam (Y/N): _____ Other: _____ Any visible breaches in landfill cap? (Y/N): _____ If yes, location: _____ Other: _____
Checkpoint F to G: Path along former SWL6A Scupper	Any visible breaches in landfill cap? (Y/N): _____ If yes, location: _____ Other: _____
Checkpoint G to H: North Run-On Diversion Ditch	Flow rate (gpm): _____ Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____ Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____ Sheen (Y/N): _____ Foam (Y/N): _____ Any potential breaches in liner? (Y/N): _____ Any obstructions in ditch? (Y/N): _____ Other: _____

**Landfill Perimeter Monitoring Form
Ward Cove Landfill
Ketchikan, Alaska**

Checkpoint H to I: East Run-On Diversion Ditch							
Flow rate (gpm):	_____						
Odor:	NONE	MUSTY	SEWAGE	ROTTEN EGGS	SOUR MILK	OTHER:	_____
Color:	CLEAR	BROWN	GREEN	YELLOW	GREY	RED	OTHER: _____
Sheen (Y/N):	_____						
Foam (Y/N):	_____						
Any potential breaches in liner? (Y/N):	_____						
Any obstructions in ditch? (Y/N):	_____						
Other:	_____						
Checkpoint I: SWL 10A (former) Monitoring Point (Use Visual Examination Report found in the Sampling and Analysis Plan)							
Checkpoint I to J: Ditch from Perimeter Road to SWL12							
Flow rate (gpm):	_____						
Odor:	NONE	MUSTY	SEWAGE	ROTTEN EGGS	SOUR MILK	OTHER:	_____
Color:	CLEAR	BROWN	GREEN	YELLOW	GREY	RED	OTHER: _____
Sheen (Y/N):	_____						
Foam (Y/N):	_____						
Any potential breaches in liner? (Y/N):	_____						
Any obstructions in ditch? (Y/N):	_____						
Other:	_____						
Checkpoint J: SWL 12 Monitoring Point (Use Visual Examination Report found in the Sampling and Analysis Plan)							
Checkpoint J to K: Area between Perimeter Path and South Manhole							
Flow rate (gpm):	_____						
Location:	_____						
Odor:	NONE	MUSTY	SEWAGE	ROTTEN EGGS	SOUR MILK	OTHER:	_____
Color:	CLEAR	BROWN	GREEN	YELLOW	GREY	RED	OTHER: _____
Sheen (Y/N):	_____						
Foam (Y/N):	_____						
Other:	_____						

**Landfill Perimeter Monitoring Form
Ward Cove Landfill
Ketchikan, Alaska**

<p>Checkpoint K to L: Path below Landfill East of SWL 11 Monitoring Point</p> <p style="margin-left: 40px;">Any surface water streams? (Y/N): _____</p> <p style="margin-left: 80px;">If yes, fill in the following:</p> <p style="margin-left: 120px;">Location: _____</p> <p style="margin-left: 120px;">Flow rate (gpm): _____</p> <p style="margin-left: 160px;">Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____</p> <p style="margin-left: 160px;">Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____</p> <p style="margin-left: 120px;">Sheen (Y/N): _____</p> <p style="margin-left: 120px;">Foam (Y/N): _____</p> <p style="margin-left: 120px;">Other: _____</p>
<p>Checkpoint L: SWL 11 Monitoring Point (Use Visual Examination Report found in the Sampling and Analysis Plan)</p>
<p>Checkpoint L to M: SWL11 towards Outfall 001</p> <p style="margin-left: 40px;">Any unusual condition in stream? (Y/N): _____</p> <p style="margin-left: 80px;">Location: _____</p> <p style="margin-left: 120px;">Flow rate (gpm): _____</p> <p style="margin-left: 160px;">Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____</p> <p style="margin-left: 160px;">Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____</p> <p style="margin-left: 120px;">Sheen (Y/N): _____</p> <p style="margin-left: 120px;">Foam (Y/N): _____</p> <p style="margin-left: 120px;">Other: _____</p>
<p>Checkpoint M to N: Path below Passive Treatment System to SWL11</p> <p style="margin-left: 40px;">Any potential system breaches? (Y/N): _____</p> <p style="margin-left: 80px;">If yes, fill in the following:</p> <p style="margin-left: 120px;">Location: _____</p> <p style="margin-left: 120px;">Flow rate (gpm): _____</p> <p style="margin-left: 160px;">Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____</p> <p style="margin-left: 160px;">Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____</p> <p style="margin-left: 120px;">Sheen (Y/N): _____</p> <p style="margin-left: 120px;">Foam (Y/N): _____</p> <p style="margin-left: 120px;">Other: _____</p>

**Landfill Perimeter Monitoring Form
Ward Cove Landfill
Ketchikan, Alaska**

Checkpoint N to A: Path behind Leachate Treatment System Lagoon

Any surface water streams or lagoon breaches? (Y/N):

If yes, fill in the following:

Location: _____

Flow rate (gpm): _____

Odor: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____

Color: CLEAR BROWN GREEN YELLOW GREY RED OTHER: _____

Sheen (Y/N): _____

Foam (Y/N): _____

Other: _____

Loop 2: Center of Landfill

Any visible breaches in landfill cap? (Y/N):

If yes, location: _____

Other: _____

APPENDIX C

LANDFILL POST-CLOSURE INSPECTION FORM



**Landfill Post-Closure Inspection Form
Ward Cove Landfill
Ketchikan, Alaska**

Part A: Final Cover System

Geomembrane Visibility

Are any parts of geomembrane liner visible? Yes___ No___
If yes, where, and what steps were taken to mitigate problem?

Date problem(s) corrected: _____ Approval: _____

Geomembrane Slippage

Are there any visual signs of geomembrane slippage? Yes___ No___
If so, describe nature of observation and location:

(Professional engineer should be contacted to assess significance of slippage)

When was engineer contacted? _____

Date problem(s) corrected: _____ Approval: _____

Topographic survey of settlement monuments complete (every 5 years starting in 2016)?
Yes___ No___

Date _____

Settlement Analysis complete? Yes___ No___

Date _____

(Settlement Analysis by Professional engineer is required per CLMP)

Visual Signs of Leachate

Are there any visual signs of leachate escaping from landfill
or vicinity? Yes___ No___

(If yes, initiate corrective action monitoring as appropriate)

What steps were taken to mitigate leachate release?

Date problem(s) corrected: _____ Approval: _____

Water Diversion Ditches

Is there visible damage or excessive erosion in run-on diversion ditches? Yes___ No___

If so, describe nature of observation and location:

Is there visible damage or excessive erosion in other stormwater diversion ditches? Yes___ No___

If so, describe nature of observation and location:

Date problem(s) corrected: _____ Approval: _____

Landfill Cover Inspection

Are there any visible signs of damage to landfill due to

- Differential settling? Yes___ No___
- Ponding? Yes___ No___
- Thermal instability? Yes___ No___
- Frost action? Yes___ No___
- Signs of erosion? Yes___ No___
- Operations? Yes___ No___

If so, describe nature of observation and location:

Date problem(s) corrected: _____ Approval: _____

Inspection of Vegetative Cover on Landfill

Is vegetative cover growing properly in all topsoiled areas? Yes___ No___

If not, describe nature of observation and location:

Average height of grass: _____ inches; trees: _____ feet

Other observations:

Were all trees cut down and left on the cap surface? Yes___ No___

Any damage from downed trees? Yes___ No___

If so, describe nature of observation and location:

Date problem(s) corrected: _____ Approval: _____

Part B: Other

Depth of water in piezometers

	Depth to water	Depth to Bottom	Water Column
P1			
P2			
P3			

Any damage to landfill gas collection vents? Yes___ No___

Any damage to piezometers? Yes___ No___

If so, describe nature of observation and location:

Date problem(s) corrected: _____ Approval: _____

Inspector: _____
Print name Signature Date

APPENDIX D

VISUAL EXAMINATION REPORT FORM



Visual Examination Report Form

Ketchikan Pulp Company
409 Brusich Road, Ketchikan, Alaska
APDES Permit Number AK0053392

Date: _____	Completed By _____(Printed)
Time: _____	_____ (Signed)
Photo taken (Yes, No): _____	Photo number(s): _____
OUTFALL # _____	
Flow Estimation: Flow observed (circle one): YES, NO Approximate depth of water: _____ Approximate flow velocity: _____ Approximate flow rate: _____	
Visual Observations (circle one): Color: CLEAR, RED, YELLOW, BROWN, GREEN, GREY, Other: _____ Odor: NONE, MUSTY, SEWAGE, ROTTEN EGGS, SOUR MILK, Other: _____ Clarity: CLEAR, CLOUDY, Other: _____ Floatables: NONE, OIL, SHEEN, FOAM, Other: _____ Settled Solids: NONE, SEDIMENTS, Other: _____ Suspended Solids: NONE, Other: _____	
Comments: _____ _____ _____ _____	

This form is to be kept with the Stormwater Pollution Prevention Plan when complete.