

Five-Year Review Report

Second Five-Year Review Report For Ketchikan Pulp Company Site Ketchikan, Alaska

August 2010

PREPARED BY:

U.S. Army Corps of Engineers, Alaska District
Elmendorf AFB, AK

FOR:

U.S. Environmental Protection Agency
Region 10 Environmental Cleanup Office
Seattle, WA



Approved by:

Date:

/s/

28 August 2010

Daniel D. Opalski, Director
Office of Environmental Cleanup
US EPA Region 10

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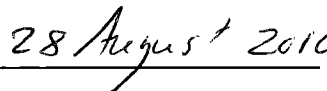


Approved by:



Daniel D. Opalski, Director
Office of Environmental Cleanup
US EPA Region 10

Date:



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List of Acronyms

ADOT&PF	Alaska Department of Transportation and Public Facilities
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
APDES	Alaska Pollution Discharge Elimination System
AMHS	Alaska Marine Highway System
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
ATS	Alaska Tidelands Survey
ATSDR	Agency for Toxic Substances and Disease Registry
BLM	Bureau of Land Management
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CoC	Contaminants of Concern
CSFo	Cancer Slope Factor, oral
cy	Cubic Yards
DTSR	Detailed Technical Studies Report
EMS	Emergency Medical System
EPA	United States Environmental Protection Agency
ESI	Expanded Site Investigation
GFP	Gateway Forest Products
HI	Hazard Index
IC	Institutional Controls
KGB	Ketchikan Gateway Borough
KPC	Ketchikan Pulp Company
LMRP	Long-Term Monitoring and Reporting Plan
LP	Louisiana-Pacific Corporation
mg/kg	Milligrams per kilogram
MLLW	Mean Lower Low Water
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List

O&M	Operations and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
ppm	Parts Per Million
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RAO	Remedial Action Objective
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RKG	Renaissance Ketchikan Group
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
TEC	Toxic Equivalent Concentration
USS	United States Survey

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EXECUTIVE SUMMARY

The Ketchikan Pulp Company (KPC) site is located on the shoreline of Ward Cove, near Ketchikan, Alaska. The KPC site is not listed on the National Priorities List (NPL). The site is divided into two Operable Units (OUs): the Uplands Operable Unit and the Marine Operable Unit. This is the second Five-Year Review Report, and it is a statutory review.

The remedy at the Marine OU is protective of human health and the environment. For the Marine OU, remedial action construction is complete the remedy is functioning as intended, and the Certificate of Completion has been issued. The remedial action objectives (RAOs) for the sediment remedy have been achieved, and institutional controls (ICs) and Restrictive Covenants remain in effect. No issues or follow-up actions were identified as a result of the five-year review process. Monitoring pursuant to the Long-Term Monitoring and Reporting Plan (LMRP) is no longer necessary.

The remedy at the Uplands OU is protective of human health and the environment. For the Uplands OU, construction is complete, the RAOs have been met, the Certification of Completion has been issued, and ICs and Restrictive Covenants remain in effect. These ICs and Restrictive Covenants remain effective and protective due to the responsible stewardship of Ketchikan Pulp Company and the Ketchikan Gateway Borough (Borough).

The Borough is actively leasing and/or preparing for the sale of portions of the property. Additional coordination may be necessary should extensive construction result from property development or transfer. Once per year, the Borough (or current property owner) should submit a brief report to the United States Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (ADEC) on institutional control implementation and property changes. A plain language summary of the enforceable institutional controls is recommended to be developed by the Ketchikan Gateway Borough for distribution to interested lessees or purchasers.

All remedies at the site are protective of human health and the environment.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Ketchikan Pulp Company		
EPA ID (from WasteLAN): AKD009252230		
Region: 10	State: AK	City/County: Ketchikan, Ketchikan Gateway Borough
SITE STATUS		
NPL status: <input type="checkbox"/> Final <input type="checkbox"/> Deleted <input checked="" type="checkbox"/> Other (specify) NPL equivalent site		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs?* <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Construction completion date: 02 /25 /2005	
Has site been put into reuse? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
Author name: Karen Keeley (Marine OU) and Jacques Gusmano (Uplands OU)		
Author title: RPMs	Author affiliation: EPA	
Review period:** 02 /02 /2010 to 08 /02 /2010		
Date(s) of site inspection: 05/24-25/2010		
Type of review: <input type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input checked="" type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action: <input type="checkbox"/> Actual RA Onsite Construction at OU #____ <input type="checkbox"/> Actual RA Start at OU#____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
Triggering action date (from WasteLAN): 08/02/2005		
Due date (five years after triggering action date): 08/02/2010		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

1. Marine OU. None.
2. Uplands OU. None. The Ketchikan Gateway Borough (Borough) is actively seeking industrial development through lease and/or sale of the former Ketchikan Pulp Company property. New construction could test the protectiveness and enforcement capabilities of the institutional controls and Restrictive Covenants. Additional coordination may be necessary during construction to ensure proper interpretation of institutional control guidelines.

Recommendations and Follow-up Actions:

1. Sitewide. None.
2. Marine OU. None.
3. Uplands OU. The Borough should inform EPA and the Alaska Department of Environmental Conservation (ADEC) of lease/sale activity and EPA and ADEC should increase oversight during a time of high construction activity, at least once each year. The Borough (or current property owner) should submit a yearly summary of actions taken at the property, including sales, leases, implementation of ICs. The Borough should develop a plain language summary of the enforceable institutional controls for distribution to interested lessees or purchasers, with approval by EPA and ADEC.

Protectiveness Statement(s):

1. Marine OU. The remedy at the Marine OU is protective of human health and the environment. For the Marine OU, remedial action construction is complete, the remedy is functioning as intended, and the Certificate of Completion has been issued. The remedial action objectives (RAOs) for the sediment remedy have been achieved, and institutional controls (ICs) and Restrictive Covenants remain in effect.
2. Uplands OU. The remedy at the Uplands OU is protective of human health and the environment. For the Uplands OU, construction is complete, the RAOs have been met, the Certification of Completion has been issued, and ICs and Restrictive Covenants remain in effect.
3. Sitewide. All remedies at the site are protective of human health and the environment.

Other Comments:

None.

KETCHIKAN PULP COMPANY SITE

KETCHIKAN, ALASKA

1 INTRODUCTION

The purpose of this second Five-Year Review is to ensure that remedial actions selected in the Records of Decision (RODs) for the Ketchikan Pulp Company Site Operable Units (OU) are being implemented, that they continue to be protective of human health and the environment, and are functioning as designed. To achieve this purpose, this review evaluates the status of implementation of the selected remedies, identifies any significant variances from the RODs, and makes recommendations for reconciling variances and/or for improving performance of remedial actions. In addition, the review identifies any new information that becomes evident, documents that no new contaminant sources or exposure pathways were discovered, and verifies that no new work was performed that was not identified in the RODs. The methods, findings, and conclusions of reviews are documented in the Five-Year Review reports. In addition, Five-Year Review reports identify issues or deficiencies found during the review, if any, and recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this Five-Year Review pursuant to CERCLA Section 121 and the National Contingency Plan (NCP). CERCLA Section 121(c) states that:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interpreted this requirement further in the NCP, at 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The United States Environmental Protection Agency (EPA), Region 10, is the lead Agency for the Ketchikan Pulp Company site. This is the second five-year review for the

site. The triggering action for this review is the date of the first five-year review, as shown in EPA's WasteLAN database: August 2, 2005. The EPA Region 10 conducted a first five-year review of the remedy implemented at the Uplands and Marine Operable Units (OUs) from February through June 2005 at the Ketchikan Pulp Company (KPC) site in Ketchikan, Alaska. The second five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

At the request of the EPA, the U.S. Army Corps of Engineers assisted with preparation of the second five-year review of the remedy implemented at the site in Ketchikan, Alaska. This review was conducted by staff from the Alaska District office on Elmendorf Air Force Base in Anchorage, Alaska, during April 2010 – August 2010. This report documents the results of the review.

2 SITE CHRONOLOGY

The KPC site is not on the NPL.

Table 1 - Chronology of Site Events

Event	Date
KPC operated a dissolving sulfite pulp mill	1954-1997
Preliminary site investigations	1991, 1993
EPA Consent Decree (Clean Water Act and Clean Air Act) Remedial Investigation/ Feasibility Study (RI/FS) work for Marine OU performed pursuant to this decree	September 19, 1995
Responsible party implements RI/FS (referred to as Detailed Technical Studies Report [DTSR] for the Marine OU)	September 1995 – March 2000
EPA performed Expanded Site investigation (ESI)	1997
EPA Administrative Order on Consent (AOC) between KPC, Louisiana-Pacific Corporation (the parent company of KPC), and the Alaska Department of Environmental Conservation (ADEC) - Primarily for the Uplands OU	1997
Final DTSR	May 1999
Issued Proposed Plan - Marine OU	July 12, 1999
Proposed Plan and RI/FS for Marine OU made available to public	July 1999 – August 1999
Recording of "Environmental Protection Easement and Declaration of Restrictive Covenants"	October 28, 1999
Sale of KPC assets to Gateway Forest Products (GFP), Inc., including Ward Cove real property other than the landfill and the pipeline and dam parcels, USS 3400 and 3401.	November 5, 1999
ROD Signed - Marine OU	March 29, 2000
ROD Signed - Uplands OU	June 7, 2000

Event	Date
EPA approval of remedial design – Marine OU	October 24, 2000
EPA/KPC/LP/GFP Consent Decree (CERCLA) for responsible party performance of Remedial Design/ Remedial Action entered by federal court	November 20, 2000
Start of remedial action - Marine OU	October 24, 2000
Field construction - Marine OU	October 2000 – February 2001
Pre-final inspection performed - Marine OU	February 28, 2001
Final inspection performed - Marine OU	April 4, 2001
EPA approval of final construction report - Marine OU	July 10, 2001
EPA approval of final Long-Term Monitoring and Reporting Plan for Marine OU	September 17, 2001
EPA approval of addendum to the Long-Term Monitoring and Reporting Plan for the Marine OU	January 3, 2002
Environmental Easement and Declaration of Covenants, by and between KPC, KGB and Gateway Forest Products	July 18, 2003
Field sampling for long-term monitoring in Marine OU	July 2004
Environmental Easement and Declaration of Covenants, by and between KPC and KGB	July 15, 2004
Responsible party submits draft 2004 Monitoring Report for Marine OU	October 2004
Ketchikan Gateway Borough creates Ward Cove Southeast (S.E.) replat (Plat No. 2005-30) and auctions off some of the parcels	August 2005
EPA comment letter on draft 2004 Monitoring Report for Marine OU	January 14, 2005
Preliminary Close Out Report signed for Marine OU	February 25, 2005
Responsible party submits final 2004 Monitoring Report for Marine OU	June 27, 2005
EPA first five-year review completed	August 2, 2005
Renaissance Ketchikan Group purchases Ward Cove properties	May 2006
Ketchikan Gateway Borough creates the Ward Cove West Replat (Plat No. 2006-10)	March 2006
IC Documents for Ward Cove Pipeline Parcels Approved	June 27, 2006
Field sampling for second long-term monitoring event – Marine OU	July 2007
KPC submits draft of 2007 Monitoring Report for Marine OU	January 31, 2008
Ketchikan Gateway Borough reacquires Ward Cove property from Renaissance Ketchikan Group through foreclosure	October 2008
EPA comment letter on draft 2007 Monitoring Report for Marine OU	October 28, 2008

Event	Date
Tenants sign new leases with the Ketchikan Gateway Borough	2009
KPC submits final 2007 Monitoring Report for Marine OU	April 24, 2009
EPA approves 2007 Monitoring Report for Sediment Remediation in Ward Cove, AK	May 7, 2009
EPA fact sheet mailed indicating RAOs met for Marine OU	May 2009
Pre-certification inspection/meeting for Marine OU	June 10, 2009
Certification of completion and extension letter for Remedial Action Report for Marine OU	June 11, 2009
Draft Remedial Action Report – Marine OU	August 5, 2009
Final Remedial Action Report – Marine OU	October 1, 2009
EPA issues Certification of Completion for Remedial Action, Uplands Operable Unit	January 21, 2010
EPA issues Certification of Completion for Remedial Action, Marine and Uplands Operable Units	January 22, 2010

3 BACKGROUND

3.1 Physical Characteristics

The Ketchikan Pulp Company (KPC) site is located on the shoreline of Ward Cove, approximately 5 miles north of Ketchikan, Alaska (Figure 1). The KPC site is comprised of uplands and patented tidelands in Ward Cove. Ward Cove is one mile long and has a maximum width of 0.5 mile. Ward Creek, located on the east end of Ward Cove, is the primary source of fresh water to the Cove.

The Marine OU includes all of Ward Cove and other marine areas where there has been a migration of hazardous substances from Ward Cove or the Uplands OU (Figure 2). The Marine OU consists of approximately 250 acres in Ward Cove, of which approximately 80 acres have been designated in the ROD as an Area of Concern where remedial action objectives have been met and sediment contamination no longer poses a risk to benthic organisms. Sediments in the cove are subtidal; intertidal sediments are limited to a very small area near the mouth of Ward Creek. The shoreline of the cove is mostly rocky and relatively steep.

Located on the north shoreline of Ward Cove, the Uplands OU covers approximately 85 acres. Ward Cove is a coastal valley bounded by Slide Ridge to the north and Ward Mountain to the south.

To the north of the former pulp mill area, the terrain slopes steeply upward to a peak approximately 2,100 feet above mean sea level, at a distance of approximately one mile from the shoreline. The area surrounding the former pulp mill is largely forested with pockets of industrial/commercial and residential properties clustered along North

Tongass Highway, and some properties used for recreational purposes. There is no residential area along the shoreline.

The former pulp mill was built mainly on steep bedrock. Course gravel fill and “shot rock” were used as fill material to a depth of 11 feet to 25 feet. The former mill area is fenced and has an unmanned gate access.

The area has a maritime climate, characterized by mild, wet conditions, receiving an average 151 inches of precipitation annually.

Groundwater in the Uplands OU consists of a transient, shallow aquifer system that exists in the fill areas above the fractured bedrock, a shallow aquifer in the fractured bedrock, and a potential discontinuous deeper aquifer within the fractured bedrock. This groundwater is considered Class III groundwater and thus, non-potable. According to the ADEC, the shallow aquifer and potential deeper aquifer are not considered a reasonably expected future source of drinking water.

A pipeline (wood stave) running from Lake Connell to the former pulp mill facility provides an industrial water supply. Drinking water for this area is supplied by the Ketchikan public water supply system and is stored in a water storage tank on site. A service road allows access to most of the pipeline. A gate limits motor vehicle access by the public. A large dam at Connell Lake (man-made) and the four-foot diameter pipeline supplied water to the former mill and now serve as a fire prevention water source for the North Tongass Fire and Emergency Medical Services (EMS) Area. There are plans for other potential industrial uses of this water supply. There are several historic small storage/disposal areas along the pipeline. The habitat along the pipeline is heavily forested and since the pipeline is gravity fed, the general gradient is downward towards Ward Cove.

The Wood Waste and Ash Disposal Landfill is located at Dawson Point, just west of the former pulp mill facility and east of Refuge Cove. The area around the landfill is heavily forested. The landfill is situated on thin soil covering fractured bedrock. Groundwater flows through fractures steeply down-gradient to Ward Cove and Refuge Cove. Groundwater is not now used as a resource and does not likely represent a future resource.

3.2 Land and Resource Use

The former KPC facility began operations as a dissolving sulfite pulp mill in 1954 and discharged pulp mill effluent to Ward Cove until March 1997, when pulping operations terminated. Equipment associated with pulp mill operations has largely been dismantled and removed from the site. In November 1999, the KPC upland mill property (excluding the landfill and the pipeline and dam parcels USS 3400 and 3401) and patented tidelands in Ward Cove were sold from KPC to Gateway Forest Products, Inc. (GFP).

For a short time, GFP operated a sawmill and veneer mill, producing lumber and veneer, chips for pulp, and hog fuel as a by-product. GFP initiated Chapter 11 Bankruptcy proceedings in 2001, and the U.S. Bankruptcy Court dismissed the action in 2002. GFP no longer owns or operates on any property within the KPC site.

At the present, the Ketchikan Gateway Borough (the Borough) reports that it owns all of the former KPC and GFP property which was subject to the consent decree and institutional controls. The only exception is that the landfill parcel is still owned by KPC.

The Borough originally obtained the property in 5 different ways. First, the Borough obtained 28 parcels from GFP in December 2002 in connection with the foreclosure on its deed of trust interest from a loan made in 1999. Second, the Borough foreclosed on acquired interests in a deed of trust originally granted in favor of Tymatt, Inc. and Tyler Rental concerning USS 1706 and the unsubdivided remainder of USS 1754, to which title was acquired in December of 2002. Third, the Borough foreclosed on its loan interest, a first deed of trust, on USS 1056 lot 3 and the unnamed 10.25 acre portion of ATS 1 (an odd shaped portion which contains the dock and extends both in front of the former sawmill and inland under warehouses) and obtained title in December 2002. Fourth, in December 2003, Foothill Capital transferred to the Borough USS 1862; ATS 1 portion C-1; ATS 1 portion A; USS 2090 portion B; USS 2923; and a 5.16 acre portion of USS 056 adjacent to USS 2923. Fifth, KPC transferred USS 2004 lot 1; USS 3400; and USS 3401 to the Borough.

In 2005, the Borough subdivided the southeast side of Ward Cove (Ward Cove S.E. Replat 2005-30, see Attachment 6) and auctioned off parcels including: Tract 3011, Tract 3013, Tract 3015, Tract 3017, Tract 3019, USS 1656, USS 1653, USS 1655, USS 1208, USS 1207, and USS 1508. Tract 3017 contains the Dredge Spoils Subarea of the Uplands Operable Unit. Along the shoreline, this parcel also contains small portions of the Marine Operable Unit. In May 2006, Renaissance Ketchikan Group (RKG) purchased the remaining Ward Cove Properties and leased portions of the site to Ty-Matt, Loggerville Holdings, Rhineco, GCI, Tongass Forest Enterprises, Anderes Oil, The Grotti Vikings, Ketchikan Wood Technology, Lighthouse Marine, and Pool Engineering.

In March 2006, the Borough created the Ward Cove West Replat – Plat No 2006-10 (see Attachment 6). In May 2006, a 3 acre parcel along the pipeline, which was subject to an earlier agreement between the Borough and KPC, was transferred from BLM to the State of Alaska and from the State of Alaska to the Borough. After the transfer these parcels were made subject to the ICs and Restrictive Covenants of the ROD (see Attachments 9 and 10).

In October 2008, the Borough reacquired the property through foreclosure. Multiple tenants signed new leases with the Borough, including: Alaska Growth Capital, First City Players, First City Wood Haulers, Fritz Peters, GCI, Lighthouse Marine, Loggerville Holdings, Olson Marine, Rhineco, SEAPA, and Tongass Forest Enterprises. Current lessees at Ward Cove include the State of Alaska Department of Transportation and Public Facilities (ADOT&PF)/Alaska Marine Highway System (AMHS) Department of

Administration, Alaska Whole Wood (Tongass Forest Enterprises), Crux Equipment Leasing, Inc., First City Players, First City Wood Haulers, Fritz Peters, GCI, Olson Marine, and Rhineco, Inc.

The Borough continues to actively pursue sale or lease of the property. The State of Alaska purchased a portion of the former KPC Facility from Ketchikan Gateway Borough for lay-up and operational berths for the AMHS on June 17, 2010. A Phase II Environmental Site Assessment Report, Ketchikan Ward Cove Property was completed by CH2M Hill for the ADOT&PF (CH2M Hill, April 2010). The Borough is also in the process of subdividing the property for ease of sale. Since much of the land is subject to institutional controls and deed restrictions, the Borough is taking steps to ensure that prospective buyers and lessors are fully aware of the restrictions that are imposed on these properties. The Borough has published all the Ward Cove Environmental Notice Documents on their website:

www.borough.ketchikan.ak.us/planning/WardCoveProperty.htm.

The current land use for the surrounding area is recreational, residential, commercial, and industrial (see Attachment 7). The former KPC upland property is industrial/commercial and is expected to remain industrial/commercial. The majority of the parcels are zoned Heavy Industrial by the Ketchikan Gateway Borough (see Attachment 7). The primary use of Ward Cove is navigation and recreation, including fishing. Although there are potential land use changes being pursued by the Ketchikan Gateway Borough, it is anticipated that a mix of land uses similar to that described will continue into the future.

There are no public health advisories for consumption of seafood from Ward Cove.

3.3 History of Contamination

The KPC mill operated continuously from 1954 until 1997, processing raw logs into lumber, pulp, and hog fuel. The principal product of the KPC mill was dissolving-grade sulfite pulp. When pulp production began, effluent from the mill was discharged directly to Ward Cove. After 1971, effluent was treated in a wastewater treatment plant located at the mill. After treatment, wastewater was discharged to Ward Cove.

The processes and conditions considered possible sources of chemicals of concern (CoC) included wastewater discharges, wood waste and ash disposal in landfill, stormwater discharges, release of airborne contaminants from the power boilers, and spills and accidental releases.

Specifically for the Marine OU, contamination at the site was discovered through water quality and sediment studies of Ward Cove that were conducted to evaluate the potential environmental effects associated with discharges from the KPC facility. Mill operations affected sediments through the release of large quantities of organic material as by-products from wood pulping. This organic material has altered the physical structure of the sediments, and thus the type and amount of benthic (bottom-dwelling) organisms.

Degradation of the organic-rich pulping and by product has led to anaerobic conditions in the sediment and production of ammonia, sulfide, and 4-methylphenol in quantities that are potentially toxic to benthic organisms in sediments on the bottom of Ward Cove. The chemicals of concern for sediments are ammonia, sulfide, and 4-methylphenol.

For the Uplands OU, sources of contamination were the use of oils and lubricants in the fuel storage areas, maintenance shop and paint shop; polychlorinated biphenyls (PCBs) from electrical transformers and capacitors; heavy metal, polynuclear aromatic hydrocarbons (PAHs) and dioxins/furans from ash generation and sludge generation in storage areas, as well as the wood waste/ash landfill; and, naturally-occurring arsenic contamination from “shot rock” fill material.

Other areas of contamination were the aeration basins, grit chamber soils, filter plant soils and several storage/disposal areas along the pipeline. The soil contamination outlined above was remediated during pre-ROD activities. EPA supervised the removal actions, which were conducted by KPC. Imported soil and rock products containing fines to be placed on the surface at the site are controlled by a Management Plan for Arsenic in Rock and Soil. Other potential areas not discovered during the RI/FS are managed by the use of Institutional Controls and Environmental Protective Easements. The wood waste and ash landfill has been capped and is currently scheduled for monitoring for 30 years.

3.4 Initial Response

The KPC site is not listed on the NPL.

Marine OU - The sediment investigation and feasibility study was implemented pursuant to a Clean Water Act and Clean Air Act consent decree. The remediation of Ward Cove was originally part of a consent decree with KPC dated September 19, 1995. The consent decree embodied a settlement between the United States and KPC for violations at the KPC facility of the Clean Water Act and the Clean Air Act. Under the terms of the settlement, KPC agreed to pay a penalty of \$3.1 million. KPC also agreed to implement requirements for operating the mill (e.g., using only certified wastewater treatment operators) and to perform certain projects.

One such project was to develop and implement the Ward Cove Sediment Remediation Project. EPA Superfund performed oversight of the RI/FS and work performed under the consent decree. Upon completion of the RI/FS, the Proposed Plan (July 1999), and the ROD (March 2000), EPA supervised the completion of the sediment remediation project pursuant to a CERCLA Remedial Design/Remedial Action consent decree with KPC, its parent company, Louisiana-Pacific Corporation, and the new owner of the Ward Cove facility, GFP.

No removal actions or responses occurred prior to the ROD.

Uplands OU - KPC/LP, EPA, and ADEC entered into an Administrative Order on Consent (AOC) during June 1997. The AOC required KPC/LP to undertake RI/FS activities focused on the Uplands OU. In the Uplands OU, early pre-ROD actions involved the removal of contaminated soil and upland sediment (ditch sediment). Soil removal was completed at the access road ditch, railroad track areas, compressor area, the paint shop/maintenance shop, the former bulk fuel area, and storage areas along the pipeline. KPC also conducted building demolition and cleaned out roof cisterns used for water collection and storage of drinking water in the mill vicinity. These activities were conducted between spring of 1998 and summer of 1999 with ADEC and EPA oversight.

3.5 Basis for Taking Action

Marine OU - Hazardous substances in Ward Cove sediments include ammonia, hydrogen sulfide, and 4-methylphenol. These substances potentially pose an unacceptable ecological risk to benthic (bottom-dwelling) organisms.

An ecological risk assessment was also conducted using a food-web assessment to estimate risks of bioaccumulative chemicals to representative birds and mammals at the top of the Ward Cove food web. The chemicals evaluated were arsenic, cadmium, mercury, zinc, chlorinated dioxins/furans, and PAHs. The results of this assessment indicated that there are no unacceptable risks to higher trophic level organisms in Ward Cove.

A human health risk assessment was conducted to identify potential risks posed by chemicals detected in sediments or seafood (e.g., fish, shellfish). Ingestion of seafood that may contain chemicals bioaccumulated from the sediments was identified as the only complete exposure pathway for humans. The chemicals that were evaluated included: arsenic, cadmium, mercury, zinc, phenol, 4-methylphenol, chlorinated dioxins/furans, and PAHs. Results concluded that sediments in Ward Cove do not pose an unacceptable risk to human health.

Direct human contact with sediments in Ward Cove is unlikely because of the depth of water overlying the affected sediments and the cold climate. Although direct contact is unlikely, this potential exposure was evaluated in a worst-case analysis and results indicated that sediments do not pose unacceptable risks to people.

Uplands OU - The early actions taken in the Uplands OU removed the most contaminated source material, eliminated unacceptable risks from direct contact with soils, eliminated soil transport to Ward Cove, eliminated leaching of surface soil contaminants to groundwater, and minimized potential future direct contact with subsurface soils at the site.

The paint shop/maintenance shop had an excess carcinogenic risk estimate of 3×10^{-4} , exceeding industrial worker risk for the combination of total PCBs, arsenic, and benzo(a)pyrene, and a total non-carcinogenic hazard index (HI) of 8. Lead industrial soil

concentrations were also exceeded at the paint shop and the pipeline. State soil cleanup levels were exceeded in several areas prior to the EPA-supervised removal activities conducted by KPC. Institutional Controls and Environmental Protective Easements will monitor subsurface use and disturbance to control and minimize exposure for industrial uses.

A baseline human health and ecological risk assessment was conducted prior to the removal actions. This assessment and State cleanup standards formed the basis for the removal actions, which were conducted at the pulp mill site and the water pipeline access road. Several pathways were fully evaluated, but did not require quantitative risk calculations due to the lack of a complete exposure pathway or lack of chemicals of potential concern for the pathways. Exposure pathways that were quantitatively evaluated in the human health risk assessment were as follows:

- Current and future adult workers in onsite areas and in areas where aerial deposition has affected industrial soils were evaluated for potential exposures to CoCs via ingestion, dermal contact, and inhalation.
- Current or future adult workers who might contact soils along the former pipeline access road via ingestion, dermal contact or inhalation.
- Offsite residents (adults and children) in aerial deposition areas were evaluated for potential exposures to CoCs via ingestion, dermal contact, inhalation, and consumption of homegrown produce.
- Offsite residents who have amended their yards with grit were evaluated for potential exposures to dioxins in soil via ingestion, dermal contact, inhalation, and consumption of homegrown produce.

The only completed exposure pathways exceeding the human health based risk levels applied by the EPA and the State was for current adult workers at the pulp mill site (the paint shop/maintenance shop area as described above).

In addition, potential exposures for residents who use water from cisterns that may have been affected by aerial deposition of power boiler stack emissions was considered in the remedial investigation and in a separate consultation by the Agency for Toxic Substances and Disease Registry (ATSDR) in 1998. The ATSDR assessment determined that there were no adverse health effects prior to cistern cleaning.

4 REMEDIAL ACTIONS

4.1 Marine OU Remedy Selection

The ROD for the Marine OU of the KPC site was signed on March 29, 2000. Remedial Action Objectives (RAOs) were developed as a result of data collected during the RI to aid in the development and screening of remedial alternatives considered for the ROD. The RAOs were achieved for the Marine OU as stated in EPA's Final Remedial Action Report dated October 1, 2009.

In order to eliminate or minimize the ecological risk associated with the toxicity of Ward Cove sediments to benthic organisms, the response action achieved these RAOs:

- Reduce toxicity of surface sediments
- Enhance recolonization of surface sediments to support a healthy marine benthic infauna community with multiple taxonomic groups.

The major components of the remedy selected in the ROD are described below.

4.2 Marine OU Remedy Implementation

In a Consent Decree signed with EPA on November 20, 2000, KPC/LP agreed to perform RD/RA and implement long-term monitoring and pay past and future costs for carrying out work in the Marine OU. The RD was conducted in conformance with the ROD, and was approved in 2004. The field work for RA construction was completed in February 2001, and EPA approved the final construction report in July 2001. Pursuant to Paragraphs 41 through 43 of the CERCLA Consent Decree, KPC and GFP each agreed to implement institutional controls for the property owned by each company.

The remedy that was selected for the Marine OU is listed below (verbatim from the ROD, Part 1: Declaration). Following each component of the remedy that was listed in the ROD is italicized text describing actual construction completion. Figure 3 depicts the areas of thin layer placement, dredging, piling removal, and natural recovery.

- Placement of a thin-layer cap (approximately 6- to 12-inches) of clean, sandy material where practicable. Thin-layer capping is estimated to be practicable over approximately 21-acres within the Area of Concern. Thin-layer capping is preferable over mounding.

Constructed thin-layer (approximately 6- to 12-inches) placement of clean, sandy material over an estimated 27 acres. The increase in acreage is due to the fact that thin layer placement was found to be successful over a broader area, and it was not necessary to construct mounding.

- Placement of clean sediment mounds in areas where thin-layer capping is either infeasible or impracticable, and where mounding is considered to be practicable. Mounding is currently considered to be practicable in areas where the organic-rich sediments are less than 5 ft thick and have a bearing capacity that is greater than 6 psf. Mounding is estimated to be practicable over approximately 6-acres within the Area of Concern.

Thin-layer placement was found to be practicable over the entire 27-acres, so mounding was not constructed.

- Dredging of approximately 17,050 cubic yards (cy) of bottom sediments from an approximate 4-acre area in front of the main dock and dredging of approximately 3,500 cy of bottom sediments from an approximate 1-acre area near the shallow draft barge berth area to accommodate navigational depths, with disposal of the dredged sediments at an upland location. After dredging, a thin-layer cap of clean, sandy material will be placed in dredged areas unless native sediments or bedrock is reached during dredging.

Dredged approximately 8,701 cubic yards (cy; pay volume) of bottom sediments from an area in front of the main dock and an area near the shallow draft barge berth area to accommodate navigational depths, with disposal of the dredged sediments at an upland location. The dredging volume estimate was less than expected because native, clean sediments were encountered at a shallower depth than anticipated. After dredging, thin layer placement of clean, sandy material was constructed in dredged areas where native sediments or bedrock was not reached.

- Removal of sunken logs from the bottom of Ward Cove in areas to be dredged.

Sunken logs (approximately 680 tons) were removed from the bottom of Ward Cove in areas to be dredged.

- Natural recovery in areas where neither capping nor mounding is practicable. Natural recovery is estimated to be the remedy for approximately 50 acres of the 80-acre Area of Concern, as follows:
 - 1) 8-acre area in the center of Ward Cove and 2-acre area near Boring Station 8 that exhibit a very high-density of sunken logs (>500 logs/ 10,000 m²);
 - 2) 13.5-acre area where water depth to the bottom of the Cove is greater than -120 ft mean lower low water (MLLW) and the depth of the sediment is currently considered to be too great to cap;

- 3) 14.5-acre area where slopes are estimated to be greater than 40 percent and are currently considered to be too steep for capping or mounding material to remain in place;
- 4) 11-acre area where the organic-rich sediments do not have the bearing capacity (i.e., strength is less than 6 pounds per square foot) to support a sediment cap and are too thick (i.e., thickness is greater than 5 feet) to practicably allow for placement of sediment mounds; and,
- 5) 0.2-acre area near the sawmill log lift where maintenance dredging generally occurs on an annual basis.

In areas where thin-layer placement was not constructed, allowed for monitored natural recovery in approximately 52 acres.

- Institutional controls requiring that post-remediation activities within the Area of Concern that materially damage the thin-layer cap or mounds will be required to redress such damage, at the direction of EPA.

Institutional controls requiring that post-remediation activities within the Area of Concern that materially damage the thin-layer cap or mounds will be required to redress such damage, at the direction of EPA.

In 1999 – before EPA had issued the ROD and before KPC had entered into a Consent Decree (CD) to perform the remedial action – KPC recorded an Environmental Easement and Declaration of Covenants on its property (1999 Covenant). The 1999 Covenant described restrictions on the use of Ward Cove, including but not limited to a requirement that any damage to the sediment cap be redressed by KPC at EPA’s direction. The 1999 Covenant designated the State of Alaska, Department of Natural Resources (ADNR) as the holder of the easement, and the ADNR subsequently granted oversight of the easement to the ADEC.

After KPC completed the remedy in Ward Cove, the Ketchikan Gateway Borough (the Borough) took possession of the property on which KPC placed a thin-layer cap of clean sandy material as part of the remedial action. The Borough, the new owner, and KPC entered into and recorded an Environmental Easement and Declaration of Covenants in July 2004 (2004 Covenant). In the 2004 Covenant, the Borough agreed to comply with all Ward Cove institutional controls that were set forth in the Consent Decree and recorded in the 1999 Covenant, or otherwise, including the restriction on damaging the cap. It states:

The Borough covenants and agrees that it shall not, through any activities or operations at or in the Ward Cove Area, materially damage any cap or capping materials that may be applied to sediments in the Ward Cove Area under the Ward Cove Consent Decree.

According to the 2004 Covenant, in the event of any such damage to the cap, the Borough (or any future owner) must immediately report the damage to EPA and KPC and then restore the cap. The 2004 Covenant states that the restricted uses shall run with the land and be binding on all future owners, and the terms and conditions shall be for a period of twenty (20) years, after which time the Covenant shall be automatically extended for successive periods of ten (10) years unless an instrument signed by KPC has been recorded agreeing to terminate the restrictions.

The Ketchikan Gateway Borough submitted a letter request dated 16 February 2010 to Mr. Tom Irwin, Commissioner, Alaska Department of Natural Resources, requesting a release from some or all of the restrictions established in the 1999 Covenant. The request for a release from the specific provisions is under consideration by the State of Alaska. It is unclear whether the request is for the release of some or all of the restrictions in the 1999 Covenant.

It is EPA's position that total unrestricted use of the property is not feasible because the remedy called for certain waste to be left in place in combination with institutional controls that would prevent the disturbance of the waste remaining on site. While the remedy selected for the Marine OU assumed that Ward Cove would be redeveloped in the future, the institutional controls that were put in place to protect that remedy do affect how the site may be redeveloped. Section IX of the 2000 ROD specifically prohibits person from "using the Site in any manner that would interfere with or adversely affect the integrity or protectiveness" of the remedy. Section XI of the 2000 ROD specifically states that this institutional control will remain in effect even after the Remedial Action Objectives are achieved.

Any activity that materially damages the thin-layer sediment cap at Ward Cove would be a violation of the ROD, the institutional controls, the 1999 and 2004 Covenants, and may also be considered a release of hazardous substances, subjecting the owner of the sediments, to liability under Section 107(a) of CERCLA.

- Implementation of a long-term monitoring program for the remedial action until RAOs are achieved, at the direction of EPA.

EPA approved a long-term monitoring program for the remedial action, which was implemented until RAOs were achieved. Based on results of the 2007 long-term monitoring data, it was determined that RAOs were achieved in Ward Cove (EPA 2009, see Attachment 18).

- Subtidal investigation of sediments near the east end of the main dock, and subsequent dredging and disposal of PAH-contaminated sediments, as deemed appropriate by EPA.

PAH-contaminated sediments were dredged along with other dredged materials. Submerged creosote-soaked pilings were also removed from the area of PAH contaminated sediments.

The deviations from the remedy selected in the ROD are as follows:

- Thin-layer placement occurred over a larger area than was estimated in the ROD;
- The ROD allowed for “mounding” if thin-layer placement could not be implemented - “mounding” did not occur as thin-layer placement was effective in all areas;
- The dredging volume was less than was estimated in the ROD.

EPA determined that all RA construction activities, including the implementation of institutional controls, were performed according to specifications.

The Preliminary Close-Out Report was signed on February 25, 2005.

4.3 Marine OU Long-Term Monitoring and Reporting

Remediation activities were completed in 2001. On behalf of KPC/LP, KPC conducted long-term monitoring and reporting according to the monitoring plan that was approved by EPA in September 2001. The primary objectives of the Ward Cove long-term monitoring program include the following:

- Compare sediment toxicity in thin capped and natural recovery areas in the remediated area with sediment toxicity in reference areas located elsewhere in the cove
- Compare the characteristics of benthic communities in thin capped and natural recovery areas in the remediated area with the characteristics of communities in reference areas located elsewhere in the cove
- Evaluate temporal trends in sediment toxicity in the thin capped and natural recovery areas of the remediated area
- Evaluate temporal trends in the characteristics of benthic macroinvertebrate communities found in the thin capped and natural recovery areas of the remediated areas
- Evaluate chemical concentrations and their relationship to sediment toxicity and benthic community structure.

The specific components of sediment quality used for the monitoring program are as follows:

- Sediment chemistry - Surface (0 to 10 centimeters) sediment samples will be analyzed for conventionals, ammonia, and 4-methylphenol.
- Sediment toxicity - Surface sediment samples will be evaluated using amphipod bioassay toxicity tests.
- Benthic macroinvertebrate communities - Characteristics of benthic communities will be evaluated by collection and enumerating the organisms found in surface sediment samples.

Sediment chemistry and toxicity were assessed during the RI/FS and therefore these monitoring components could be compared to pre-remedial conditions as well as to reference areas. Temporal trends in sediment chemistry, sediment toxicity, and benthic infauna were evaluated by comparing pre-remediation data with monitoring data collected in July 2004 and 2007. The analytical methods for chemistry and toxicity testing were comparable to those used in the RI/FS. Benthic infauna measurements were compared to reference area conditions and qualitative data collected prior to remediation.

The design of the Ward Cove monitoring program built on different categories of benthic strata, which were based on water depth and on the kind of remedial action taken. Multiple sampling stations were evaluated within each benthic stratum to estimate average (or mean) conditions in the stratum and to provide a measure of within-stratum variability so that statistical analyses could be conducted. A total of 37 Area of Concern stations and 2 reference area stations were sampled during the monitoring program.

The characteristics of benthic communities can be influenced by water depth and sediment character. Therefore, the Area of Concern was subdivided into various benthic strata as follows based on water depth (four strata):

- very shallow areas (<20 ft water depth at mean lower low water (MLLW); 5 stations),
- shallow areas (20–70 ft MLLW; 16 stations),
- moderately deep areas (70–120 ft MLLW; 11 stations), and
- deep areas (>120 ft MLLW; 5 stations).

Remedial action strata were defined as either enhanced natural recovery (ENR) (i.e., thin layer placement (TLP) areas; 15 stations) or monitored natural recovery (MNR) areas (22 stations). The shallow, MNR stratum was further subdivided into an area with thick organic deposits (>5 feet) adjacent to the former pulp mill and an area with more limited organic deposits along the north shore near the mouth of the cove.

On May 7, 2009, EPA approved the final 2007 Monitoring Report for Sediment Remediation in Ward Cove, Alaska (April 2009). EPA also concurred that the Remedial Action Objectives for the sediment remedy were achieved, that the remedy at the Marine OU is protective of human health and the environment, and monitoring pursuant to the long-term monitoring and reporting plan (LMRP) is no longer necessary.

4.4 Uplands OU Remedy Selection

The selected remedy for the Uplands OU included compliance with already-existing institutional controls to ensure the former pulp mill area remains commercial/industrial and that portions of the pipeline access road where cleanup activities occurred are not developed for residential use. These institutional controls are implemented through:

- Ketchikan Gateway Borough zoning restrictions;
- Management Plan for Arsenic in Rock and Soil, prepared July 1998;
- Environmental Protection Easement and Declaration of Restrictive Covenants, recorded on October 28, 1999;
- Excavation and Soil Handling Procedures, outlined in the Institutional Controls Plan, dated June 2000;
- Environmental Easement between KPC and ADNR, recorded August 6, 2001;
- Environmental Easement and Declaration of Covenants, between Ketchikan Gateway Borough, Ketchikan Pulp Company, and Gateway Forest Products, recorded July 18, 2003;
- Environmental Easement and Declaration of Covenants, between Ketchikan Gateway Borough and Ketchikan Pulp Company, recorded July 15, 2004; and
- Equitable Servitude and Easements granted by the Ketchikan Gateway Borough in favor of the ADNR, recorded May 1, 2006.

The selected remedy for the Wood Waste and Ash Disposal Landfill was to close and cover the landfill with a geomembrane cap, place a topsoil cover over the geomembrane, establish a vegetative cover and maintain the final cover, the passive gas venting system, and the leachate treatment system. The cap was installed in 1997 with an open cell constructed on top of that cap to receive ash from the power boilers which ran until March 1998. The final cap for this remaining open cell was installed in 2001. The remedy also included long-term visual and surface water monitoring to detect the potential for public ecological receptor endangerment or water quality standard or permit violations. The Wood Waste and Ash Disposal Landfill was also included in the Institutional Control Plan, Management Plan for Arsenic in Rock and Soil, and recorded Restrictive Covenants.

4.5 Uplands OU Remedy Implementation

The Record of Decision was signed June 7, 2000. An Environmental Protection Easement and Declaration of Restrictive Covenants was recorded on October 28, 1999. An Environmental Easement between KPC and ADNR was recorded August 6, 2001 regarding the Wood Waste and Ash Disposal Landfill at Dawson Point. The Ketchikan Gateway Borough and Ketchikan Pulp Company entered into an Environment Easement and Declaration of Covenants which was recorded on July 15, 2004. An Equitable Servitude and Easement and Subordination Agreement for the Pipeline Parcels was recorded May 1, 2006. The Institutional Control Plan was finalized in June 2000. The

Management Plan for Arsenic in Rock and Soil was finalized July 1998. The Restrictive Covenants pertaining to the Uplands OU are in effect until contaminants left in the soil reach acceptable levels for unrestricted land use or until 2099, whichever comes first.

4.6 Uplands OU Long-Term Monitoring and Reporting

KPC conducts visual inspections and periodic maintenance of the landfill cap and collects surface water samples to assess the site surface water, as well as maintains operation of the landfill leachate treatment and aeration ponds. KPC submitted a new National Pollutant Discharge Elimination System (NPDES) permit application to the EPA (and ADEC) in March 2009. The EPA began transferring authority for Federal NPDES permitting and compliance/enforcement programs to the State of Alaska on October 31, 2008. As of October 31, 2009, the state of Alaska has authority under the Alaska Pollutant Discharge Elimination System (APDES) Program for the KPC Ward Cover Landfill Leachate permit (#AK0054492), which expired on 9/30/2009. The KPC continues to operate under the expired permit, as a new permit has not yet been issued by the state.

The Ketchikan Gateway Borough enforces ICs with all leaseholders and coordinates with EPA and ADEC on all potential subsurface construction projects.

5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

RAOs have been achieved at the Marine and Uplands OUs since the last five year review. Certificates of Completion were documented for the Marine OU and Uplands OU by EPA letter to KPC dated January 22, 2010 (see Attachment 13).

Previous Protectiveness Statements from the last Five-Year Review (August 2, 2005): For the Marine OU, it stated: "The remedial action construction is complete, and the remedial action is an operating or ongoing remedial action. The remedy at the Marine OU is protective of human health and the environment."

For the Uplands OU, it stated: "The remedial action is complete. The remedy at the Uplands OU is protective of human health and the environment, and exposure pathways that would result in unacceptable risks are being controlled by institutional controls and Restrictive Covenants."

For Sitewide, it stated: "All remedies at the site are protective of human health and the environment."

Status of Recommendations:

For the Marine OU, there were no recommendations made in the previous Five-Year Review (August 2, 2005).

For the Uplands OU, the previous Five-Year Review (August 2, 2005) recommended: “Check with Ketchikan Gateway Borough on lease/sale activity of property formerly owned and operated by KPC at least once per year, and increase EPA oversight during time of high construction activity.” This recommendation has been addressed. The Ketchikan Gateway Borough has maintained good communication with EPA over the past five years in regards to leases, sales of property and proposed development. As a result, EPA has reviewed Sampling Plans and Construction Plans for several real and proposed construction projects, to determine consistency with ICs. This communication and coordination occurred several times a year, over the past five years.

For Sitewide, there were no recommendations made in the previous Five-Year Review (August 2, 2005).

6 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components/Community Involvement/ Document Review

The Five-Year Review team was comprised of the Remedial Project Managers responsible for the Marine and Uplands OU. There are no current active citizen groups associated with the KPC site. External stakeholders, including the state, were notified of the start of this five-year review in February 2010. In March 2010, a newspaper ad was placed in the Ketchikan Daily News to notify the public of the upcoming five-year review, and notification cards were mailed by EPA to addressees on the KPC Mailing List. The Five-Year Review consisted of a review of relevant documents including decision documents (RODs), remedial action completion reports, long-term monitoring plans and reports, environmental laws and regulations, and enforcement documents.

6.2 Data Review - Marine OU

The detailed results of the monitoring program are provided in the 2004 Monitoring Report for Sediment Remediation in Ward Cove, Alaska (Exponent, June 2005) and Final Remedial Action Report, Sediment Remediation in Ward Cove Marine Operable Unit, Ketchikan Pulp Company Site, Ketchikan, Alaska (Integral September 2009). The data from the final monitoring event (i.e., 2007) are summarized in the following table and in the text below:

Table 2. Summary of Recovery Status for Various Biological Indicators in Ward Cove Based on 2007 Data^a

Indicator	Stratum					
	Enhanced Natural Recovery (i.e., TLP)			Monitored Natural Recovery		
	1	2a	3a	2b	3b	4
Sediment Toxicity	✓	✓	✓	✓	✓	✓
Benthic Community Metrics ^b	100%	100%	100%	33% ^c	100%	100%
Abundance						
Total abundance	✓	✓	✓	--	✓	✓
Taxa abundance						
Molluscs	✓	✓	✓	--	✓	✓
Polychaetes	✓	✓	✓	✓	✓	✓
Arthropods	✓	✓	✓	✓	✓	✓
Richness						
Total richness	✓	✓	✓	--	✓ ^d	✓
Taxa richness						
Molluscs	✓	✓	✓	--	✓ ^d	✓
Polychaetes	✓	✓	✓	--	✓ ^d	✓
Arthropods	✓	✓	✓	✓	✓	✓
SDI	✓	✓	✓	--	✓ ^d	✓

✓ = For sediment toxicity: Survival is greater than the 75 percent screening value specified in the long-term monitoring and reporting plan.

For benthic metrics: Value is not significantly lower ($P > 0.05$) than the respective mean reference value.

-- = Significantly lower ($P \leq 0.05$) than the respective mean reference value.

^a Sediment chemistry was analyzed, but not included in this table because it is not applicable to RAOs. Stratum 2c is not included in this table because results of the 2004 monitoring event showed that this area had achieved the RAOs (see above text for further explanation).

^b Percentages indicate the number of benthic metrics that are not significantly lower ($P > 0.05$) than their respective mean reference values (note that for Stratum 3b, uncertainty exists for some benthic metrics due to low statistical power).

^c Recovery of benthic communities is progressing in this stratum (see Integral 2009).

^d Low statistical power for benthic comparisons.

Based on the results of the monitoring program, it was determined that the RAOs have been achieved in Ward Cove. The results of the 2004 and 2007 monitoring events demonstrated that environmental conditions throughout the Ward Cove Area of Concern had improved substantially since the RI/FS was conducted in 1996–1999. In addition, most conditions showed continual improvement between 2004 and 2007. The TLP area was successful in eliminating sediment toxicity and stimulating colonization of benthic macroinvertebrate species such that diverse communities comprising multiple taxa now inhabit most parts of the TLP areas, and exhibit enhanced characteristics beyond those of the reference areas. In addition, recovery is proceeding in the MNR areas, such that all four areas surpassed sediment toxicity screening levels and three of the four areas have achieved healthy benthic communities with multiple taxonomic groups. The weight of evidence for the remaining MNR area (i.e., Stratum 2b; located in the northwest corner of the cove) indicates that, in addition to surpassing sediment toxicity screening levels, substantial and acceptable progress has been made towards diversification of benthic communities in that area, and will continue to proceed, because sediment toxicity in that area has achieved the RAO, concentrations of total organic carbon, ammonia, and

4 - methylphenol declined by 20 to 50 percent between 2004 and 2007, and the major source of CoCs to the Area of Concern has been removed.

On May 7, 2009, EPA concluded that the multiple lines of evidence used to evaluate sediment quality in the Ward Cove Area of Concern indicate that the RAOs have been achieved. The lines of evidence include quantitative and qualitative evaluations of temporal and spatial trends in toxicity responses (amphipod toxicity tests) and benthic macroinvertebrate community characteristics (including statistical analyses comparing benthic metrics between remediated and reference areas), as well as supporting measurements of sediment chemistry (i.e., CoCs and conventional variables).

A summary of 2004 and 2007 data are provided in Figures 4 and 5, and additional details on the long-term monitoring data are provided in the Executive Summary of the 2007 Monitoring Report (reproduced herein as Attachment 17).

The EPA determined that the remedial action objectives (RAOs) for the Marine OU have been achieved and that no further sediment monitoring would be performed pursuant to the LMRP.

As described in correspondence from EPA (Keeley) to KPC (Benning) dated May 7, 2009 (see Attachment 18), EPA stated the following:

EPA identified RAOs for the sediment cleanup in the Record of Decision. Specifically, the response action was intended to achieve the following RAOs:

- *Reduce toxicity of surface sediments*
- *Enhance recolonization of surface sediments to support healthy marine benthic macroinvertebrate communities with multiple taxonomic groups.*

As stated in the ROD, monitoring data were evaluated using a weight-of-evidence approach to determine whether consistent and acceptable progress was made toward achieving the RAOs. The weight-of-evidence approach is recommended by EPA for sediment quality assessments as part of EPA's national sediment assessment programs, and is consistent with the most current methods of sediment assessment recommended by national experts.

The multiple lines of evidence used to evaluate sediment quality in the Ward Cove Area of Concern indicate that the RAOs have been achieved. The lines of evidence include quantitative and qualitative evaluations of temporal and spatial trends in toxicity responses (amphipod bioassays) and benthic macroinvertebrate community characteristics (including statistical analyses comparing benthic metrics between remediated and reference areas), as well as supporting measurements of chemicals of concern and conventional variables (sediment chemistry).

In making this decision, EPA has considered the following information: site-specific studies, including the 2004 and 2007 monitoring results from Ward Cove; site-specific decision documents, including the ROD and the LMRP; EPA guidance on long-term monitoring programs, including the Contaminated Sediment Remediation Guidance for Hazardous Waste Sites; and technical support provided by EPA oversight contractors.

In consideration of other similar sites in Alaska, EPA evaluated the long-term monitoring approach and site monitoring data for the Alaska Pulp Corporation (APC) pulp mill site in Sitka, for which the Alaska Department of Environmental Conservation issued a ROD in 1999 (see Technical Memorandum, December 19, 2008). Based on that review, EPA's monitoring plan and decision-making approach is not inconsistent with the State's approach at the APC pulp mill site, and the environmental data set for Ward Cove is more comprehensive than that for the APC site.

Finally, in consideration of potential consistency issues with other EPA Superfund sediment decisions, I contacted Steve Ells, EPA OSRTI Sediments Team Leader, and performed a search on EPA's ROD database, to identify potential sediment sites that included both a RAO for benthic infauna recovery and a long-term monitoring plan that required collection and statistical analysis of benthic infaunal communities to assess the long-term effectiveness of the remedial action in achieving the RAOs. Based on this work, only two RODs were identified that meet both these criteria – the KPC Marine OU ROD and Region 10's Commencement Bay/Nearshore Tidel flats ROD, specifically for St. Paul Waterway. The decision-making approach for these RODs was similar.”

KPC submitted a Final Remedial Action Report for the Sediment Remediation in Ward Cove Marine Operable Unit, Ketchikan Pulp Company Site, Ketchikan, Alaska in September 2009 and the document was approved by EPA Region 10 on October 1, 2009.

The following documents pertaining to potential property transfer were received since the last five-year review:

- June 10, 2010. ADOT&PF letter and attachments regarding Project 68704 KTN Lay-up Berth & Mooring Structures. Attachments include:
 - April 2010 Budgetary Cost Estimate for Ketchikan Ward Cove Property Demolition & Cleanup for Layup Berth & Mooring Structures;
 - August 27, 2009 Response to Peer Reviews of CH2M Hill Ward Cove Scour Study; and
 - May 29, 2009 Potential for Scour at Ward Cove from Proposed AMHS Ferry Operations.

The letter indicates that the State of Alaska and the KGB have signed a memorandum of agreement to complete transfer of part of the Ward Cove property by June 30, 2010. The letter states: “The AMHS intends to make immediate use of the warehouse on this parcel and begin planning for an office facility and a vessel berth. Please note that the parcel to be acquired does not include the dock, avoids most of the sand cap, and roughly coincides with the

location the scour report indicates could be used as a working berth without disturbing the sand cap.”

- March 26, 2010. KPC (Attorney) letter to Alaska Department of Law regarding Environmental Covenants.
- March 17, 2010. Karen Keeley (EPA) letter to Cindy Schoniger (Alaska DNR) regarding Ketchikan Pulp Company Superfund Site – Restrictive Covenants, Ketchikan, Alaska.
- August 27, 2009. “Response to Peer Reviews of CH2M Hill Ward Cove Scour Study”, prepared by CH2M Hill.
- July 31, 2009. “Peer Review of the 2009 CH2M HILL Scour Study of Ward Cove”, prepared by Dalton, Olmsted & Fuglevand, Inc., and Windward Environmental LLC, for KGB.
- July 28, 2009. “Ward Cove Sediment Scour – Peer Review of Scour Assessment”, prepared by PND Engineers, Inc., for KGB.

6.3 Data Review - Uplands OU

The following documents were reviewed for the Uplands OU:

- Exponent. 1998. Remedial Investigation Report, Ketchikan Pulp Company Site, Volumes 1-III.
- Ecology and Environment. 1998. Final Ketchikan Pulp Company Expanded Site Inspection Report, Volume 1 and 2.
- Exponent. 1999. Technical Memorandum 9, Technical Approach for Evaluating Arsenic Bioavailability in Soil and Crushed Rock.
- US EPA. 2000. Ketchikan Pulp Company (KPC) Ketchikan, Alaska Uplands Operable Unit, Record of Decision.
- Exponent. 2000. Management Plan for Arsenic in Rock and Soil.
- Exponent. 2000. Institutional Control Plan for the Ketchikan Pulp Company Site.
- Ketchikan Gateway Borough. 2005. Ketchikan Gateway Borough Sale of West Ward Cove – Phase 2 Property Information.

In addition, interviews were conducted with the following individuals:

Jonathan Lappin - Ketchikan Gateway Borough, Lands Manager
Amy Briggs - Ketchikan Gateway Borough, Assistant Lands Manager
Phil Benning - KPC Environmental Operations
Barry Hogarty - Technical Environmental Consulting Services
Bill Janes - ADEC Project Manager
Robert Holston, Lighthouse Excursions (lessee)
Larry Jackson, Tongass Forest Enterprises (lessee)

Interview Records are provided in Attachment 1.

A site visit was conducted on May 24 and 25, 2010. The Site Inspection Checklist is provided in Attachment 2 and associated photographs are provided in Attachment 3. Site visit participants included representatives from the Ketchikan Gateway Borough Planning Department, KPC, U.S. Army Corps of Engineers, EPA, and ADEC. The visit included the mill area, dock facilities, wooden pipeline and associated dam, landfill, and aeration ponds. During the site visit, Borough records and protocols for management of this property were reviewed. Attachment 4 includes a map of the former KPC holdings that are now held by the Ketchikan Gateway Borough, and a summary of covenants, easements, and other authorities associated with institutional controls, and of other relevant real property interests or contractual terms. For complete information, refer to the Consent Decree, its attachments, the applicable easements and covenants.

Since the ROD specified Institutional Controls as the primary selected cleanup action, review of the Uplands OU involved a review of property ownership, land use and ICs, all of which play a significant role in the effectiveness of the intended remedy. Notable ownership changes since the last five year review include:

- Renaissance Ketchikan Group purchased Ward Cove Properties in May 2006.
- Ketchikan Gateway Borough reacquired the Ward Cove property through foreclosure in October 2008.
- The land ownership of all parcels associated with this former KPC site, except the Wood Waste and Ash Landfill, Tract 3017, and Tract 3005, Lot 3A are now in the ownership of the Ketchikan Gateway Borough.
- The State of Alaska purchased a portion (Tract 3005, Lot 3A) of the former KPC Facility from Ketchikan Gateway Borough for lay-up and operational berths for the AMHS on June 17, 2010.
- The Ketchikan Gateway Borough maintains records of all parcels and strictly enforces the Restrictive Covenants and ICs.
- The Ketchikan Gateway Borough is actively seeking to lease and/or sell these parcels to promote industrial growth and jobs for Ketchikan, while maintaining ICs and Restrictive Covenants outlined in the ROD.
- KPC has documented landfill cap integrity through periodic monitoring, settlement surveys, and cap inspections. Monitoring and inspections have verified the stability of the engineering.
- Conveyance of parcels of land along the pipeline corridor to the Borough from KPC have had easement and covenants recorded; also, a 3.11 acres parcel previously held by BLM and transferred to the Borough, had easements and covenants recorded.

Significant physical changes at the property since 2005 include:

- 2007. Powerhouse/Turbine Room & Wood Rooms 1&2 demolished by RKG.
- January 2009. Gold Coast Lodge sinks.
- September 2009. Gold Coast Lodge cleaned up by Ketchikan Ready Mix.
- September 2009. Oil spill at Ward Cove Dock cleaned up by Alaska Commercial Divers and R&M Engineering.
- October 2009. James G. Murphy Group auctions the Veneer Mill equipment.
- December 2009. M/V Sleep Bandit sinks.
- January 2010. Cleanup and removal of M/V Sleep Bandit completed.
- January 2010. Saw Mill Building demolished, oil spill cleaned up by Alaska Commercial Divers.
- May 2010. Oil tanks removed from the Ward Cove property.
- May 2010. James Church contracted to cleanup rubble from the Power House.

Because of the above developments over the past five years, the Borough now owns the majority of the former KPC and GFP property which is subject to the Consent Decree and Institutional Controls, so ownership and management of the properties is clearer, record keeping is thorough and complete, and the ICs are being enforced. The completeness of Borough records and their written guidance to prospective leaseholders and purchasers indicates that, for at least the foreseeable future, these ICs will be enforced.

7 TECHNICAL ASSESSMENT

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Marine OU – Yes. Construction of the remedial action is complete, all long-term monitoring efforts are complete, and the results show that the remedy is functioning as intended and that RAOs have been achieved.

Institutional Controls (ICs) are adequate and complete; no actions related to ICs are necessary.

Uplands OU – Yes. Most remediation activities were complete prior to the ROD. The ROD called for implementation of: a) institutional controls to limit use of the upland properties to commercial/industrial (with the exception of the pipeline access road where it was restricted to commercial/industrial or recreational use), to prohibit groundwater use, and to require sampling, characterization, and proper management of the soil in the event of excavation or demolition activities; b) an arsenic management plan to limit exposure to arsenic from crushed rock used on the site; and c) long-term monitoring and care of the landfill. All of these elements were put in place and are functioning as intended.

The Institutional Controls and Restrictive Covenants were designed to be protective after remediation, even in the event of land transfers, and have proven effective through multiple land transactions. The Borough now owns a majority of the former KPC and GFP property which is subject to the Consent Decree and Institutional Controls, with the exception of the Dawson Point Landfill and recently completed purchase of a portion of Ward Cove by the State of Alaska, so ownership and management of the properties is more clear, record keeping is thorough and complete, and the ICs are being enforced. The completeness of Borough records and their written guidance to prospective leaseholders and purchasers indicates that, for at least the near future, these ICs will be enforced.

In addition, most waste (asbestos, hazardous material) originally left on site after remediation has been removed and landfill closure has been successful with no runoff or unauthorized effluent apparent to date; therefore, the ICs in place are adequate and complete and there is no evidence that the original remedy is not protective and effective.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) used at the Time of the Remedy Still Valid?

Marine OU – Yes. Site conditions have not significantly changed since the ROD. However, ownership and land use for many of the Upland OU properties adjacent to the Marine OU have changed significantly since the ROD; the land owner at the time of the ROD has since filed for bankruptcy and is no longer operating a veneer or sawmill. The uncertainty in land use adjacent to the Marine OU, which is not part of the Marine OU, does not bear on the protectiveness of the remedy, and the original assumptions regarding current and future land use and contaminants of concern are still valid.

The cleanup levels and RAOs for this project are still valid. There are no changes in the standards identified as ARARs in the ROD, and there are no newly promulgated standards that might be ARARs to the site, that bear on the protectiveness of the remedy.

Uplands OU – Yes. After review of the Remedial Investigation and Risk Assessment produced by Exponent on behalf of KPC, and review of current State and Federal applicable or relevant and appropriate regulations (ARARs), EPA believes that the ROD exposure assumptions, cleanup levels, and RAOs are still protective.

As a result of the multiple transactions documented in Section 6.3 and referenced above, the Borough now owns a majority of the former KPC and GFP property which is subject to the Consent Decree and Institutional Controls, so ownership and management of the properties is clearer, record keeping is thorough and complete, and the ICs are being enforced. Since the Borough is actively leasing and/or preparing for sale portions of the property, the good communication and coordination that has been occurring will need to continue, and additional coordination may be necessary should extensive construction result

from property development or transfer. EPA has suggested that once per year, the Borough (or current property owner) should submit a brief report to the EPA and ADEC on institutional control implementation and property changes. EPA also recommends that a plain language summary of the enforceable institutional controls be developed by the Ketchikan Gateway Borough for distribution to interested lessees or purchasers. The ROD utilized industrial worker exposure assumptions for areas evaluated on-site. As part of this five year review, a recalculation based on a residential scenario was conducted using standard EPA equations and parameters (see Attachment 12). The total risk exceeds a threshold of 1E-04 for all areas with the exception of the former bottom ash storage pile soils, wood waste and sludge disposal subarea soils, and forested and developed area soil. This reinforces the ROD requirement that the Upland OU properties remain subject to ICs precluding residential use.

The original risk and exposure assessment calculated a PCB bioavailability of 100 percent, so the 10 ppm cleanup level is conservative and protective. The underlying oral toxicity values for arsenic, benzo(a)pyrene, and PCBs have not changed. The industrial screening level of 1000 mg/kg for lead remains protective.

EPA's dioxin reassessment has been developed and undergone review over many years with the participation of scientific experts in EPA and other federal agencies, as well as scientific experts in the private sector and academia. The Agency followed current cancer guidelines and incorporated the latest data and physiological/biochemical research into the assessment. The results of the assessment have currently not been finalized and have not been adopted into state or federal standards. EPA anticipates that a final revision to the dioxin toxicity numbers may be released by the end of 2010. In addition, EPA/OSWER has proposed to revise the interim preliminary remediation goals (PRGs) for dioxin and dioxin-like compounds, based on technical assessment of scientific and environmental data. However, EPA has not made any final decisions on interim PRGs at this time. Therefore, the dioxin toxicity reassessment for this Site will be updated during the next Five Year Review.

7.3 Question C: Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

Marine OU – No other information has come to light that could call into question the protectiveness of the remedy.

Uplands OU – No other information has come to light that could call into question the protectiveness of the remedy.

7.4 Technical Assessment Summary

Marine OU – According to the data reviewed, the remedy is functioning as intended by the ROD, and RAOs have been achieved. There have been no changes in the physical

conditions of the OU that would affect the protectiveness of the remedy. There have no newly-promulgated ARARs for sediments. There have been no changes to the standardized risk assessment methodologies and input parameters that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

Uplands OU – According to the data reviewed, the site inspection, and interviews, the remedy is functioning as intended by the ROD. The physical changes that have occurred in the mill area have resulted in the removal of some of the residual asbestos and hazardous substances which could have posed risks in the event of exposure under some scenarios.

As part of this five year review a residential risk assessment was recalculated which confirmed the need for the ROD requirement that the Upland OU properties remain subject to ICs precluding residential use.

There have been no newly promulgated ARARs for the chemicals of concern in the Uplands OU. There have been no substantial changes in risk assessment methodologies and input parameters that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy. Current management monitoring and record keeping practices of KPC and the Ketchikan Gateway Borough are excellent and have improved the effectiveness of the ICs and Restrictive Covenants.

8 ISSUES

This section addresses issues that, either currently or in the future, prevent the remedial action from being protective. Table 3 summarizes the issues.

Table 3. Summary of Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Marine OU – None.		
Uplands OU – The Borough is actively seeking industrial development through lease and/or sale of this property. New construction could test the protectiveness and enforcement capabilities of the ICs and Restrictive Covenants. Additional coordination may be necessary during construction to ensure proper interpretation of IC guidelines.	N	N

EPA has determined that the Borough and KPC are performing their IC responsibilities and are expected to continue to do so, such that the remedy is and is expected to remain protective. Nonetheless, since the Borough is actively leasing and/or preparing for sale portions of the property, the good communication and coordination that has been occurring will need to continue, and additional coordination may be necessary should extensive construction result from property development or transfer.

9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 4 lists recommendations and follow-up actions for each issue identified in Table 3.

Table 4. Recommendations and Follow up Actions

Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affect Protectiveness? (Y/N)	
				Current	Future
Marine OU – None.					
1.a.) Uplands OU – The Borough should inform EPA and ADEC of lease/sale activity and EPA and ADEC should increase oversight during a time of high construction activity, at least once each year.	KGB, EPA, ADEC	EPA, ADEC	8/2011	N	N
1.b.) Uplands OU – The Borough (or current property owner) should submit a yearly summary of actions taken at the property, including sales, leases, implementation of ICs.	KGB	EPA, ADEC	8/2011	N	N
1.c.) Uplands OU – The Borough should develop a plain language summary of the enforceable institutional controls for distribution to interested lessees or purchasers, with approval by EPA and ADEC.	KGB	EPA, ADEC	8/2011	N	N

As mentioned in Section 8, EPA has determined that the Borough and KPC are performing their IC responsibilities and are expected to continue to do so, such that the remedy is and is expected to remain protective. Nonetheless, since the Borough is actively leasing and/or preparing for sale portions of the property, the good communication and coordination that has been occurring will need to continue, and additional coordination may be necessary should extensive construction result from property development or transfer. Therefore EPA has made the recommendations above, the Borough has indicated its

willingness to follow through with implementation, and EPA will track their implementation and re-evaluate their effectiveness as part of the next five year review.

10 PROTECTIVENESS STATEMENT

Marine OU. The remedial action construction is complete and the remedy is functioning as intended. The remedy at the Marine OU is protective of human health and the environment.

Uplands OU. The remedial action is complete. The remedy at the Uplands OU is protective of human health and the environment, and exposure pathways that would result in unacceptable risks are being controlled by ICs and Restrictive Covenants.

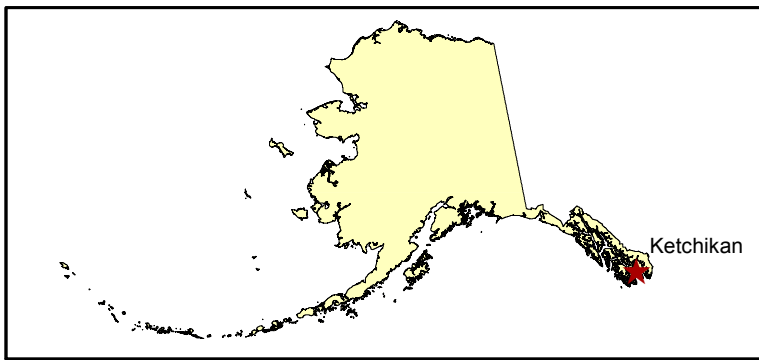
Sitewide. The remedial actions at all OUs of the site are protective, therefore the site is protective of human health and the environment and all necessary ICs are in place and functioning.

11 NEXT FIVE-YEAR REVIEW

The next review is due by 28 August 2015.

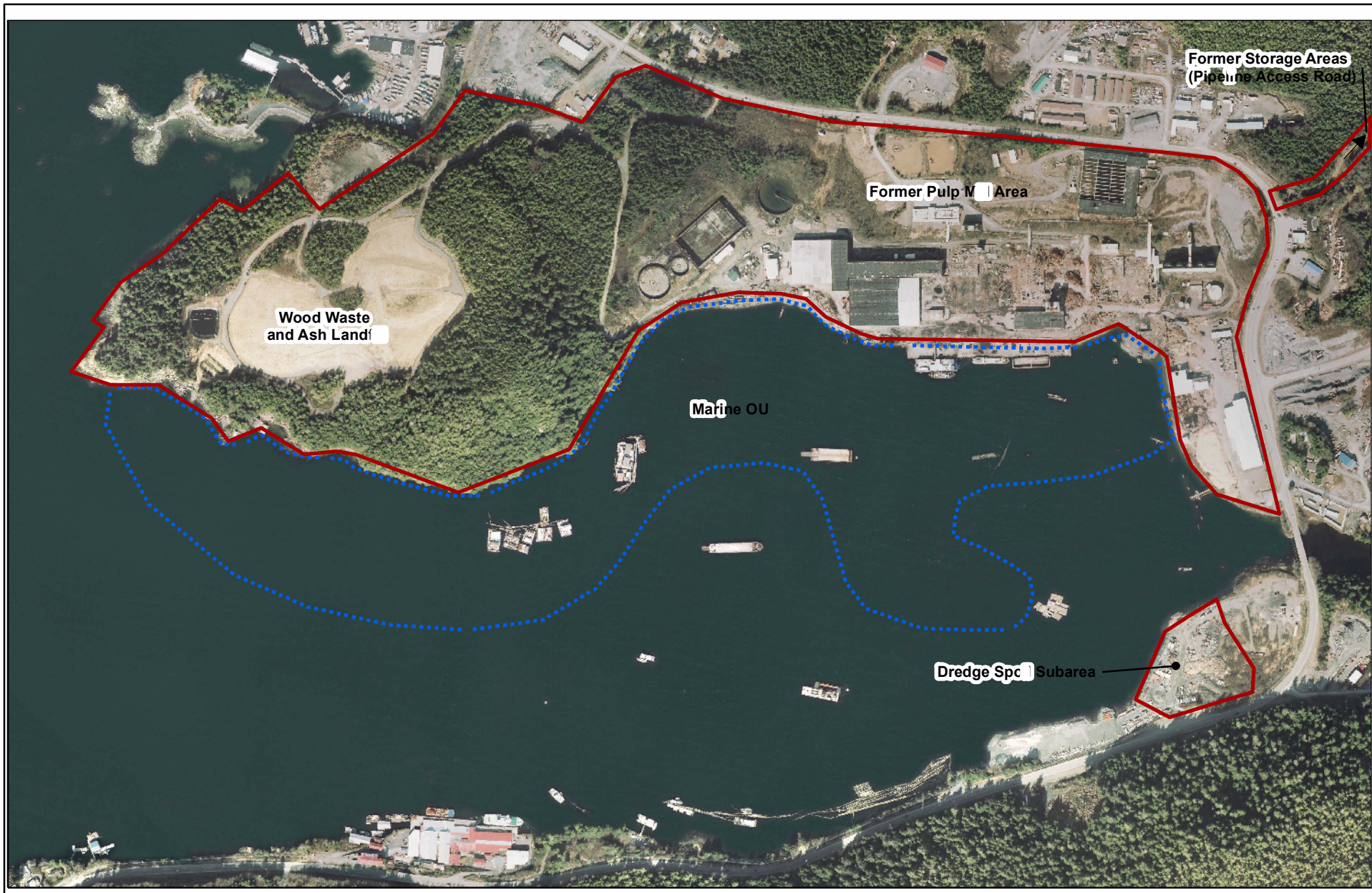


Former Ketchikan
Pulp Company



Source: USGS 7.5-Minute Topographic Quadrangle, Ketchikan (B-6), Alaska, 1995.

FIGURE 1 Former Ketchikan Pulp Company
Ward Cove Property Location



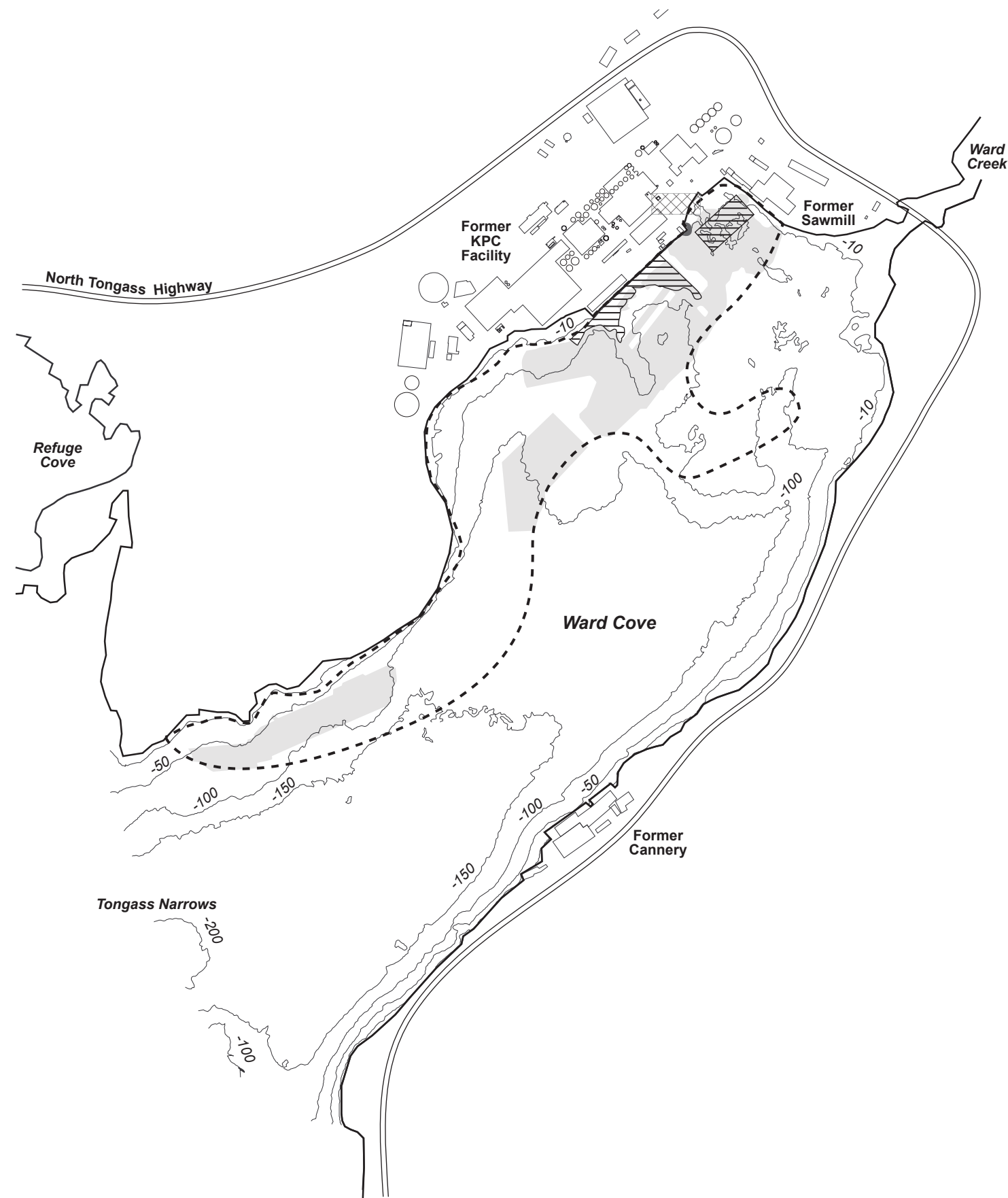
Legend

Operable Unit (OU) Boundary (approximate)

- Uplands OU
- Marine OU

FIGURE 2

Marine and Uplands Operable Units,
Former Ketchikan Pulp Company Site
Ketchikan, Alaska



LEGEND

- - - - Boundary of AOC

Remediation Areas

Dredged areas

Thin layer placement areas

Submerged pilings removed

Notes: Areas within AOC boundary not marked with hatching or shading are subject to natural recovery.

Bathymetry in feet at MLLW

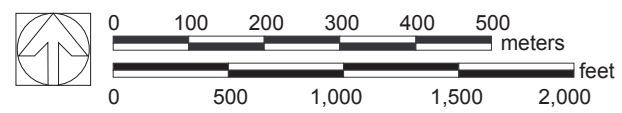


Figure 2. Location of the Ward Cove AOC; areas of thin layer placement, dredging, piling removal, and natural recovery

Figure 3

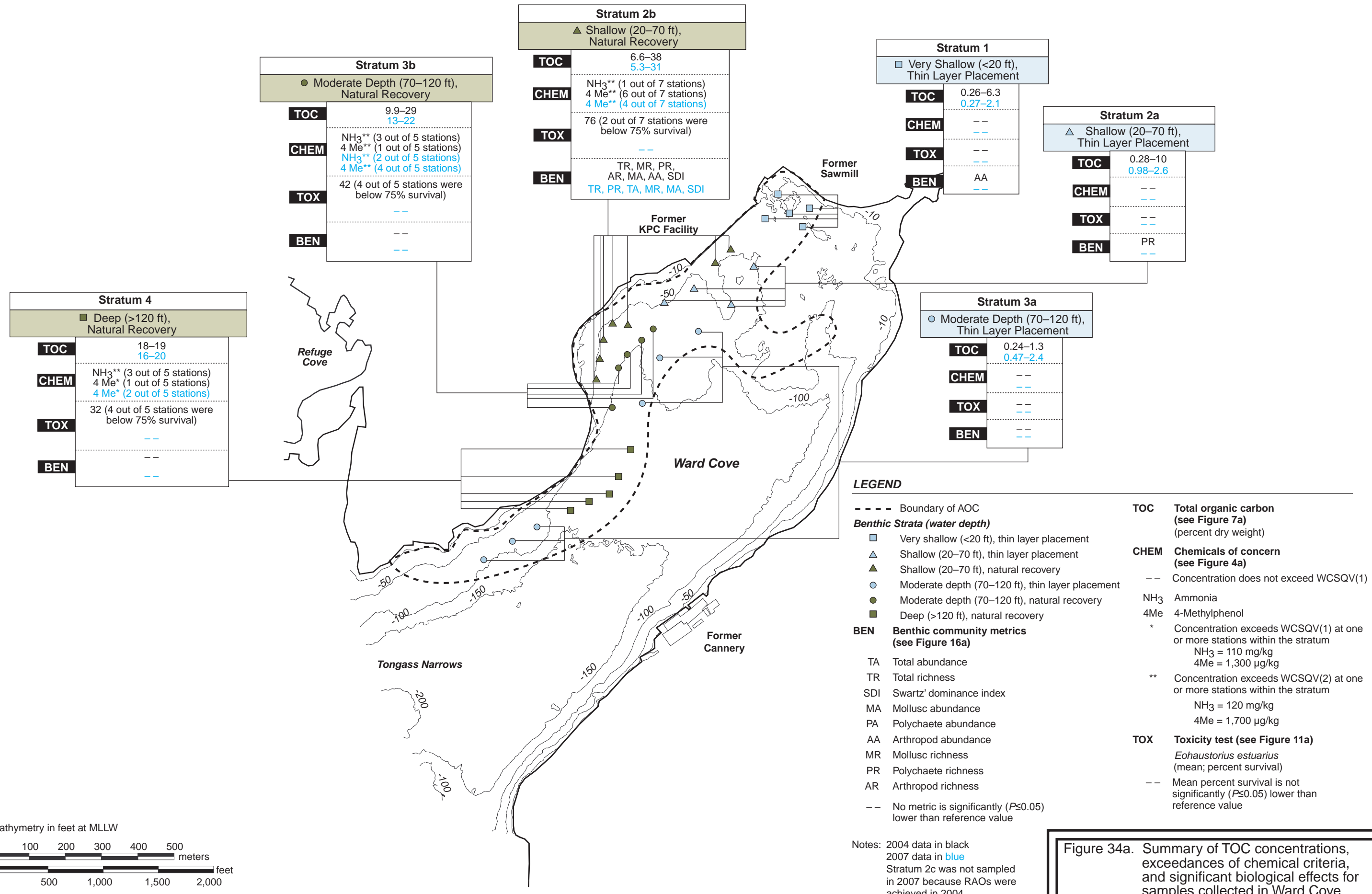


Figure 34a. Summary of TOC concentrations, exceedances of chemical criteria, and significant biological effects for samples collected in Ward Cove AOC in July 2004 and 2007

Figure 4

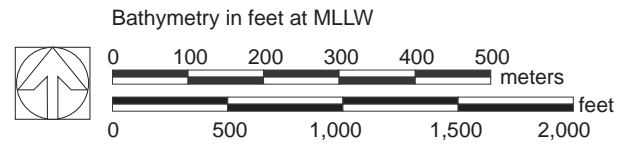
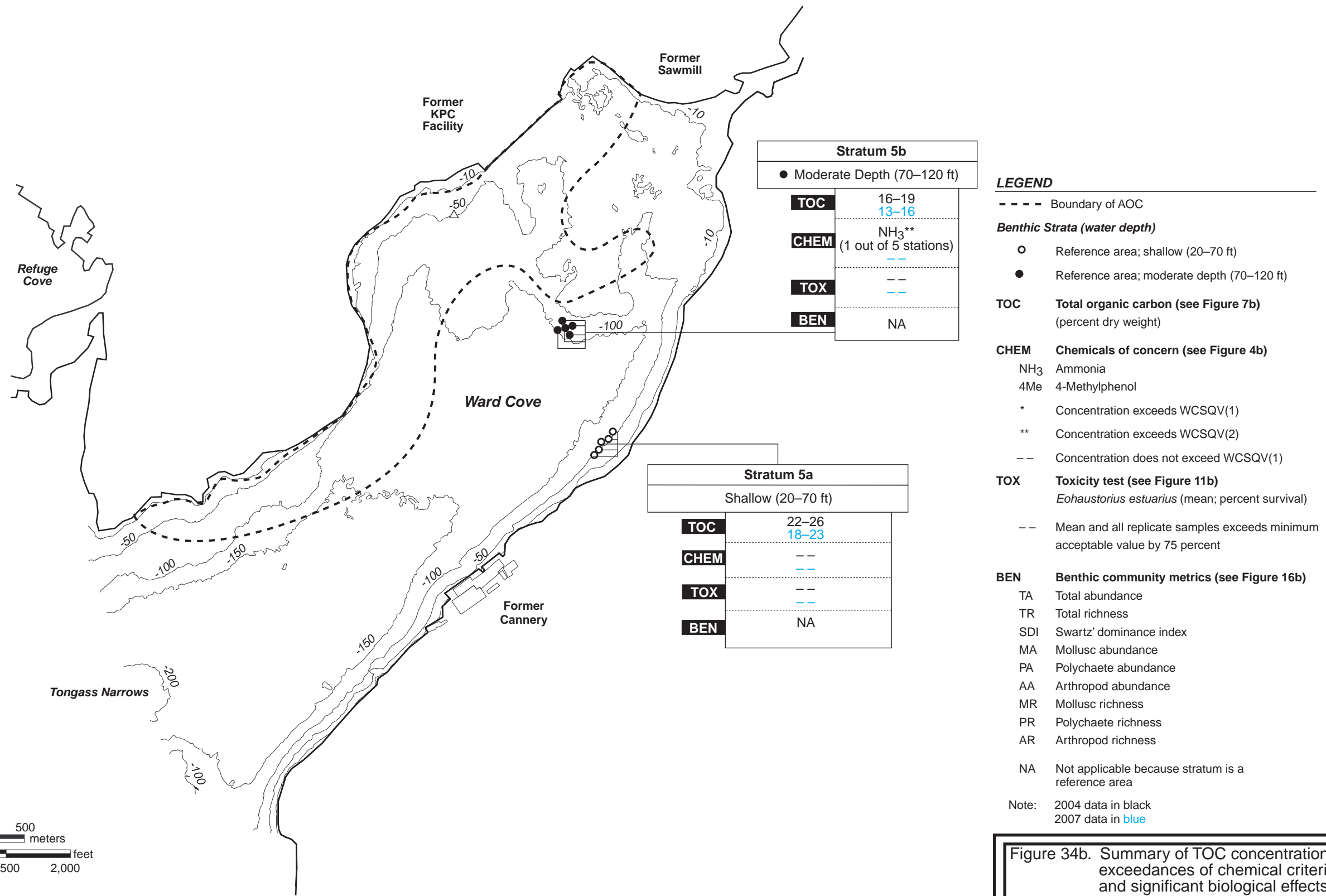


Figure 34b. Summary of TOC concentrations, exceedances of chemical criteria, and significant biological effects for samples collected in Ward Cove reference areas in July 2004 and 2007

Figure 5