Limited Environmental Impact Evaluation
Keku Cannery Main Building
Kake, Alaska

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Submitted To:
Alaska Department of Environmental Conservation
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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ACM	Asbestos-Containing Material
ADEC	Alaska Department of Environmental Conservation
CEEM	Conceptual Ecological Exposure Model
COI	Contaminants of Interest
DRO	Diesel Range Organics
EcoSA	Ecological Scoping Assessment
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
GRO	Gasoline Range Organics
LBP	Lead-Based Paint
LUST	Leaking Underground Storage Tank
NAC	National Assessment Corporation
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
OVK	Organized Village of Kake
PCB	Polychlorinated biphenyl
PAH	Polyaromatic Hydrocarbons
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RRO	Residual Range Organics
SQuiRT	Screening Quick Reference Table
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, and Disposal
VOC	Volatile Organic Compound

LIMITED ENVIRONMENTAL IMPACT EVALUATION
KEKU CANNERY MAIN BUILDING
KAKE, ALASKA

1.0 INTRODUCTION

This report presents the findings of Shannon & Wilson Inc.'s limited environmental impact evaluation of the main Keku Cannery building in Kake, Alaska. Authorization for these services was received from Mr. Dennis Harwood, Alaska Department of Environmental Conservation, in the form of a signed notice to proceed (NTP) on January 24, 2014 (NTP Number 18803603016).

2.0 SITE AND PROJECT DESCRIPTION

Keku Cannery is located approximately 1.5 miles south of the village of Kake on the northwestern corner of Kupreanof Island in the Alexander Archipelago. The street address is 541 Keku Road, Kake, Alaska. The main cannery building is a 35,000 square foot building that is presently vacant and in a general state of disrepair. The surrounding area contains the rest of the cannery complex including warehouses and housing for cannery workers.

2.1 Background

The Keku Cannery, which was constructed between 1912 and 1940, and closed in 1977, is the third-oldest cannery in Alaska and the only cannery listed as a National Historic Landmark. The cannery once had four main warehouses on wood pilings over Keku Strait, although the majority of the canning activities occurred in the main cannery building which is the subject of this study. The larger cannery complex incorporates part of a salmon saltery from the early 1900s and is on the site of a traditional Tlingit summer camp.

The current owner of the cannery is the Organized Village of Kake (OVK). We understand OVK is concerned with the imminent failure of the cannery building and the environmental concerns that may result if the building and contents are discharged into the water, tidelands, or nearby uplands. The near-shore area is rich in fish, shellfish, seaweed, and other marine life that are important resources to the local subsistence culture. In the event of a cannery building collapse, these resources could be exposed to a variety of physical and chemical hazards.

2.2 Purpose and Objectives

The overall project purpose is to assist the ADEC and other stakeholders in evaluating re-use and redevelopment (R&R) alternatives for the main cannery building. The targeted objective of this project phase is to assess the potential environmental impact and remediation costs if the cannery building collapses into Keku Strait. We understand the work is likely a part of a larger R&R evaluation conducted by OVK and may be used to support a request for federal funding to rehabilitate the structure, although a detailed cost analysis of rehabilitation (e.g., engineered support of the dock and structure, structure renovations, etc.) is not included in this analysis.

2.3 Scope Summary

The first phase of the environmental impact evaluation was a Phase I Environmental Site Assessment (ESA), which was conducted by Shannon and Wilson in February 2014. This document serves to further characterize the nature of the recognized environmental conditions (RECs) and other environmental conditions identified in the Phase I ESA report, and to evaluate the risks posed by these concerns in the event of a specific release scenario (e.g., collapse of the main cannery building). The second phase was an Ecological Scoping Assessment (EcoSA), which was conducted under subcontract to Shannon & Wilson Inc. and discussed in Section 4.0 of this report. The results of the Phase I ESA and EcoSA are incorporated into a summary Hazard and Risk Evaluation, which in turn is used to develop rough order-of-magnitude cost estimates for remedial action, and recommendations for immediate measures to mitigate risk to human health and the environment. Note that the findings presented in this document are based on information presently available and contained in the Phase I ESA and the EcoSA; no additional investigation, including sample collection, analysis of the drums and containers observed within the building, or testing for hazardous building materials, was conducted.

3.0 PHASE I ENVIRONMENTAL SITE ASSESSMENT SUMMARY

A Phase I Environmental Site Assessment (ESA) was conducted by Shannon and Wilson in February 2014. The recognized environmental conditions identified at the main cannery building are listed below. Additional information is provided in Shannon and Wilson's February 2014 document titled *Phase I Environmental Site Assessment, Main Cannery Building, Keku Cannery, Kake, Alaska*.

- According to information provided by OVK, asbestos-containing materials (ACMs) are present in each building. Due to the age of the building, the presence of lead-based paint (LBP) and/or polychlorinated biphenyls (PCBs) in the lighting ballasts is possible.
- Floor drains were observed throughout the building. Mr. Gary Williams of OVK stated that he did not know where the floor drains discharged. It is possible due to the condition and former use of the building that these drains discharge into the water below the cannery.

- Staining was observed beneath the machine shop on the beach/shoreline and boiler area on the floor. This indicated a past release onto the ground surface and/or water at high tide.
- Drums, tanks, and containers of potentially hazardous substances and/or petroleum products as well as metal scraps were observed on the Property. Some of the containers were labeled as ____; whereas others were not labeled.
- Vehicles, engines, and refrigerators were observed in the building during the February 3, 2014 site visit. These items likely contain motor oil, gasoline, diesel, and/or Freon.

4.0 ECOLOGICAL SCOPING ASSESSMENT SUMMARY

An EcoSA was performed by Sound Ecological Endeavors LLC in February 2014. This assessment incorporated considerations of potential hazards, impacted media, and ecological receptors to develop a conceptual ecological exposure model (CEEM) and assessment endpoints for the subject site and study release scenario. The following paragraphs summarize key elements of the EcoSA, which additional information provided by Shannon & Wilson Inc for clarification. The full text of the *Ecological Scoping Assessment, Kake Cannery Collapse, Kake, Alaska*, included in Appendix A.

4.1 Potential Hazards

The Ecological Scoping Assessment lists the following potential hazards associated with the collapse of the main cannery building:

- Petroleum products;
- Creosote-soaked pilings;
- Small electrical (fluorescent light) ballasts containing PCBs;
- Lead-based paint (LBP) used inside and outside of the building;
- Unknown potential solvents;
- Freon in two abandoned refrigerators;
- Approximately five gallons of metals shavings from the machine shop, and metal machinery/parts buried up-gradient of the Cannery; and
- A limited amount of asbestos containing materials.

4.2 Potentially impacted media

The collapse of the main cannery building would potentially deposit a variety materials into the near-shore marine environment and on the shoreline at low tide. Accordingly, marine surface water and marine/tideland sediment are the two exposure media of primary concern for this study. If the cannery were to collapse into the near-shore marine environment, contaminants and/or debris would be deposited in the underlying waters and shoreline. Immediately following the collapse, some contaminants would be at least partly dispersed or diluted by the water, wind, waves, and current. In particular, solvents, refrigerants, and other volatile organic compounds (VOCs) would likely dissipate and/or evaporate quickly. Similarly, volatile components of petroleum fuels would likely disperse, with heavier fractions potentially entrained in the marine sediments. Metal shavings and LBP paint chips could also be transported away from the area, although larger debris would likely settle to the seafloor under the cannery. Although the debris itself could pose an ongoing risk if not removed, these materials pose a potential long-term risk from contaminants leaching into the water and becoming sorbed to sediment. PCBs from ballasts would likely only be released in limited quantities.

4.3 Receptors

Contamination resulting from a collapse of the cannery building could potentially impact both ecological and/or human receptors. Ecological receptors of concern include marine plants, shellfish/invertebrates, fish, birds, and mammals. Assessment endpoints identified in the EcoSA include potential impacts to the marine plant species abundance, diversity, and primary production; the abundance and diversity of aquatic invertebrates; and the growth, reproduction, and survival of fish, birds, and mammals. The magnitude of risk and impact to these ecological receptors is determined by a wide range of factors, with critical factors including the exposure scenario, and the type, concentration, and toxicity of the contaminants. Most of the contaminants considered in this study don not generally exhibit strong short-term (acute) effects and long-term (chronic) exposure is of primary concern. Moreover, the effective exposure area is likely to be within close proximity to the collapsed cannery due to the fate-and-transport mechanisms described above. In this context, immobile species such as marine and semi-aquatic plants, and benthic invertebrates that cannot move located in the proximity of the cannery building are the ecological receptors at greatest immediate risk.

Although a cannery building collapse would likely pose a lesser immediate and direct exposure to human receptors, relative to ecological receptors, the near-shore marine environment is considered to be a sensitive environment due to its use for subsistence by Kake residents. The residents of the Village of Kake (with a population of approximately 500) obtain a substantial portion of their food from subsistence hunting and gathering in the marine water surrounding the main cannery building. Fish are collected from nearby streams and rivers and fish, shellfish, marine mammals, waterfowl, marine plants, and other species are collected from Keku Strait near the cannery. Human exposure could therefore occur through harvesting and consumption of impacted ecological receptors in the marine/tidelands environment. It is also possible, although less likely, that the cannery collapse could impact upland plant species harvested for consumption.

4.4 Recommendations

The EcoSA provides the following recommendations lessen the potential for ecological risks associated with the main cannery building:

- Remove all hazardous materials from the Cannery as soon as possible and dispose of them properly.

- Remove, repair, or replace the Cannery buildings immediately using techniques to avoid spreading lead-based paint into the marine environment.

- Do not pull pilings out of the bottom sediment, but rather, cut them off and leave the buried portion of the pilings in place to avoid redistribution of long buried creosote.

- If the Cannery is repaired or rebuilt over the water as it is now, use non-toxic pilings to support the new structures.

- If the Cannery collapses, remove all debris from the water, stop subsistence harvesting within 0.5 miles of the cannery, and initiate the determination of need for further more detailed assessment of the potential for human health and ecological risks due to the collapse.

5.0 HAZARD AND RISK EVALUATION

This section consolidates the findings of the Phase I ESA and EcoSA to specify the exposure pathways of primary interest in the event of a cannery building collapse, and discuss in general terms how these exposure pathways might trigger the need for mitigation measures under state and federal regulation.

5.1 Release Scenario

The single release scenario considered for this evaluation is collapse of the main cannery building into the water and adjacent shoreline.

5.2 Summary of Hazards

Potential hazards identified in the Ecological Scoping Assessment include both chemical compounds and solid waste. Chemicals of interest include petroleum products, creosote from the dock piles, PCBs from light ballasts, LBP, potential/unknown solvents, Freon or other refrigerants, metal shavings, and ACMs. Solid waste in the form of abandoned vehicles and building materials can pose a risk due to physical exposure to the debris and long-term leaching of chemical compounds, but may also be undesirable simply from an aesthetics perspective.

It is important to note that due to the presence of creosote-soaked pilings, staining observed beneath the cannery, and other indicators of contamination, it is likely that impact to the environment has and/or continues to occur, even in the absence of a catastrophic building collapse.

5.3 Exposure Pathways

Complete exposure pathways need a source/contaminant, release mechanism, exposure route/medium, and viable receptor. For this study, a variety of potential contaminant sources were identified. A single release mechanism – collapse of the cannery building – was considered, and the primary exposure route/impacted media are surface water, marine/tideland sediments, and solid debris. Ecological receptors of concern include marine plants, invertebrates, fish, birds, and mammals, with human receptors identified as a secondary receptor through harvest and consumption of potentially impacted ecological receptors. Based on these findings and other considerations discussed in this document and the EcoSA, the following exposure pathways are considered of primary interest.

- Acute effects from direct contact or uptake of released chemicals or impacted surface water by waterfowl, invertebrates, marine plants, fish, and possibly marine mammals. Long-term effects are likely mitigated by rapid dispersion from tides, wind, and waves, with the possible exception of a slow discharge from a leaking drum/container over time.

- Chronic effects resulting from direct contact, ingestion, or uptake of contaminants from impacted sediment by benthic invertebrates and immobile marine plants. Contaminants can be physically entrained or chemically sorbed within the sediment as a result of deposition immediately following the initial building collapse and/or leaching from remaining debris over time.

- Chronic bio-accumulation effects from ingestion of impacted ecological receptors by fish, marine mammals, and human receptors. This exposure pathway could have a long term impact on the environment and human health, as the community of Kake harvests invertebrates and marine plants from the vicinity of the cannery for subsistence consumption.

Note that impact from residual cannery building debris from the cannery building is not identified as a primary exposure concern. Although there may be an immediate physical hazard, and potential for on-going leaching of heavy metals or LBP solids, the long-term impact of these materials left in the water may be largely aesthetic, rather than toxicological.

5.4 Regulatory Context

The solid waste and chemicals that could be released to the environmental following a cannery building collapse are potentially subject to a variety of state and federal regulations. These regulations, considered in context of the release event details and the complete exposure pathways, will determine the basis, need, and approach for remedial action. Examples of applicable state regulations administered by the ADEC include Oil and Other Hazardous Pollution Control (18 Alaska Administrative Code [AAC)] 75), Water Quality Standards (18 AAC 70), and Solid Waste (18 AAC 60). Applicable federal regulations could include the Clean Water Act, Clean Air Act, Toxic Substances Control Act (TSCA), and the Resources Conservation and Recovery Act (RCRA). Note this list is not comprehensive, and additional regulations administered by the US Coast Guard, US Army Corps of Engineers, or other agency may also be applicable to the site, facility, or associated environmental remediation and cleanup actions.

The application of these regulations will be governed by the type and circumstances of the release and the specific compounds involved. Moreover, the need for mitigation will likely be based on promulgated cleanup levels, screening level guidance, and hazardous waste criteria/thresholds of individual compounds. Regulated compounds of interest at this site, based on our knowledge of the site conditions, include the following

- Petroleum fuels/hydrocarbons (diesel range organics, residual range organics, and gasoline range organics);
- VOCs (including volatile petroleum hydrocarbons, refrigerants, and solvents);
- Polynuclear Aromatic Hydrocarbons (PAH);
- PCBs;
- Metals (lead, both elemental and in LBP, and other RCRA-regulated elements); and
- ACM.

Cleanup levels for individual compounds may be developed using one or more regulations. In general, cleanup levels for soil at this site (if appropriate) and surface water would be established in ADEC regulations for most compounds. Because there are no promulgated cleanup levels for sediment, the National Oceanic and Atmospheric Administration (NOAA) screening quick reference tables (SQuiRTs) are commonly used to guide remediation actions for contaminated sediment. In addition to the promulgated state cleanup levels and NOAA screening criteria, RCRA thresholds for hazardous waste classifications must also be considered for impacted soil, sediment, and water media. It is important to note that the classification of a waste as a listed or characteristic hazardous waste under RCRA can have a significant impact on cleanup costs.

6.0 REMEDIATION COST ESTIMATE

This purpose of this remediation cost estimate is to provide a rough order of magnitude (ROM) costs for cleanup and disposal of waste streams generated by the cannery building collapse. The three major components of a cleanup action considered in this evaluation include removing solid waste/debris from the beach and/or water, addressing residual impacted media, and long-term monitoring.

6.1 Solid Waste/Debris Removal

A Demolition Clean-up Estimate for Keku Cannery in Kake, Alaska was provided by Alaska Demolition in February 2014 and is included in Appendix B. The estimated costs for clean-up of the main cannery building range from $8,400,000 to $11,900,000. The low range number is if the cannery collapses and remains in the basic proximity of the existing location and the high range number is if the structure collapses and dispenses over a 0.5-mile proximity. The estimate includes mobilization of the equipment and personnel to remove debris from both land and water; characterize and abate ACM, LBP, creosote-soaked piles, and other hazardous building materials; transport by barge to appropriate disposal facility or facilities; and landfill disposal costs. A list of the assumptions made in developing the estimate is provided in Appendix B. Note that in developing the cost estimates, an attempt was made to provide reasonable, yet conservative, estimates. However, the actual cost may vary significantly from these estimates, given the numerous uncertainties surrounding an event that has not yet occurred and speculation regarding what might constitute a “worst-case” scenario.

6.2 Impacted Media Remediation

The need and objectives of impacted media remediation will be based on the actual release event, and could employ one or remedial technologies. To provide an estimate of the type of costs that may be incurred, we assume that impacted sediment will require excavation and treatment/disposal, and that the impacted sediment is near the shore and accessible by excavator. We further assume that the nature of contamination dictates disposal in a RCRA Subtitle C or D landfill, although other less expensive remedial options – including on-site treatment/disposal – may be practicable in some circumstances. Remediation of impacted sediment in general has unique challenges relative to soil or water, including the need to dewater the sediment prior to transport, and the state and federal permits that would be required for work within a navigable water body. These challenges would be exacerbated at the subject site due to the remote location and the specialized equipment that may be required.

The initial cost for equipment mobilization and permitting will likely be at least $100,000, and for planning purposes is assumed to be $150,000. The sediment removal, sampling and analysis, and sediment transport and disposal is estimated to have costs of about $1,500 to $2,000 per cubic yard in addition to equipment mobilization, with lower unit rates corresponding to larger volumes and economy of scale. Therefore, mitigating 50 cubic yards (cy) of material would cost approximately $150,000, and mitigating 1,000 cy would cost approximately $1,200,000. It is noted that some of these costs may be defrayed if the same equipment used for the solid waste/debris removal is also used for the impacted sediment removal, and if a single barge can transport both the debris and impacted sediment.

6.3 Long-Term Monitoring

The need and scope for long-term monitoring will depend on the nature of the release and impacted media remaining after initial cleanup activities. Potential long term monitoring may include surface water monitoring, groundwater monitoring, and/or sediment sampling. Depending on the scope, costs for long-term monitoring could be $20,000 or more per year.

6.4 Cost Sensitivity Analysis

The cost of the site mitigation following a collapse of the cannery building will be heavily influenced by a large number of variables, many of which are difficult to quantify prior to the actual collapse event. Several of the most critical factors are discussed below.

Time. In general, cost of mitigation efforts increase with time after the building collapse event. Immediately after the building collapse, the materials of interest are more likely to be localized in the cannery area, potentially limiting the area of the mitigation effort, volume of impacted media, and impact to sensitive receptors. Over time, debris may drift further into Keku Strait, hazardous materials may settle into the sediment, and contaminants may continue to leach and/or spread. Conversely, some chemical contamination may diminish over time due to natural attenuation, noting previous petroleum spills into Keku Strait have rapidly dissipated by wind and waves. In some circumstances, natural attenuation effects could reduce the contaminated media cleanup costs, although with a potential tradeoff of longer exposure time for ecological and/or human receptors.

Climate/Weather. Weather and tidal cycles at the time of the collapse, after the collapse, and during the mitigation effort will likely have a major influence on mitigation costs. A large storm at the time of collapse could spread debris and hazardous materials into Keku Strait. Likewise, the tidal cycles and weather conditions after the collapse will dictate the fate and transport of mobilized contaminants. Finally, weather at the time of the mitigation will affect site mobilization and the time required to complete the mitigation.

Nature of Debris & Contaminated Media. Because the exact type and quantity of hazardous materials and chemical contaminants in the main cannery building has not been established, it is difficult to ascertain what materials or chemicals might be subject to regulation if released to the environment. Moreover, the nature of the collapse event will dictate the extent to which chemicals are released, as well as the need and applicable alternatives for remedial action. For example, a drum of oil that falls in the water may have a different recovery cost than the same drum that falls to uplands or the shoreline during low tide, and a drum that is ruptured and releases its contents would more likely impact the environment than a drum that remains intact.

6.5 Non-Financial Considerations

In addition to the financial costs of site mitigation, a collapse of the main cannery building would likely have other impacts that are not as easily quantified. An impairment of the populations or health of near-shore marine ecosystems could adversely impact the subsistence resources of the community. The collapse of the main cannery building would also mean the loss of a cultural resource and a missed opportunity for beneficial reuse of the cannery as a tourist attraction. The Keku Cannery is the third oldest cannery in Alaska and the only cannery listed and a National Historic Landmark. Finally, if resources are not available for a complete mitigation effort, residual debris from the area may detract from the area's aesthetic value.

7.0 SUMMARY

The objective of limited environmental impact evaluation was to assess the potential environmental impact and remediation costs if the main cannery building collapses into the bay. The study comprised a Phase I ESA, an ecological assessment, a hazards summary, and a cost estimate for debris removal and environmental site cleanup. Although there are numerous uncertainties regarding the circumstances of a building collapse and the nature of the resulting impact to the environment, the potential exists to create conditions that adversely impact the nearby marine ecosystem as a primary effect, and the subsistence lifestyle of the Kake residents as a secondary effect. It is likely that the building debris, released contaminants, and/or impacted media would be subject to regulation, and would require mitigation. Mitigation cost estimates ranged from $8,400,000 to $11,9000,000 for debris removal, $250,000 to $2,000,000 (or more depending on nature and volume of impacted media) for contaminated sediment remediation, and $20,000+ for annual long-term monitoring. In addition to financial costs, the building collapse would likely have additional adverse impacts, including diminished subsistence resources, lost opportunity for re-use, and loss of a nationally-registered historic structure and the associated cultural heritage.

We understand the results of this study will be used to assess multiple re-use and re-development alternatives. Although there are numerous uncertainties regarding the financial and cultural impacts from a collapse of the cannery building, allowing this to occur – either by choice or by not selecting and implementing an alternative solution in a timely manner – likely will result in an expensive mitigation effort with no apparent re-use benefit. While OVK is considering the various options and alternatives for the building's future, it is our opinion that expedient action is appropriate to characterize and remove hazardous building materials, regulated chemicals, and other hazards identified in this evaluation. Removing these materials from the main cannery building prior to collapse will reduce the potential for a release occurrence, or to lessen the magnitude, extent, impact of contamination of a release. Specific actions to achieve this goal were presented in the EcoSA, and reiterated in the body of this report. Note this preventative measure should reduce remediation cleanup costs and non-financial impacts, but not the cost of debris removal if the cannery collapses.

8.0 CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of our clients and their representatives in the study of this site. Changes in site conditions can occur over time, due to natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised.

This Additional Services report and the opinions expressed herein are based exclusively on information presently available and/or provided to us including the results of the Phase I ESA, Ecological Scoping Assessment, and limited research conducted for this effort; no sample collection and analysis was conducted. There are materials on site that may not have been tested (e.g. drums, 5-gallon buckets, potential ACM, LBP, etc.). In addition, note this Additional Services is not a conventional "risk assessment" as defined in the regulatory guidance, but instead a qualitative overview of the risks posed by the RECs identified in the Phase I ESA.

Detailed modeling, including food chain and contaminant dispersion modeling, tissue sampling, species-specific toxicity testing, and site specific risk assessment is not included.

Shannon & Wilson has prepared the documents in Appendix C, “Important Information About Your Geotechnical/Environmental Report”, to assist you and others in understanding the use and limitations of our reports. You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information. Shannon & Wilson does not assume the responsibility for reporting these findings and therefore has not, and will not, disclose the results of this study except with your permission or as required by law.

Copies of documents that may be relied upon by our client are limited to the printed copies (also known as hard copies) that are signed or sealed by Shannon & Wilson with a wet, blue ink signature. Files provided in electronic media format are furnished solely for the convenience of the client. Any conclusion or information obtained or derived from such electronic files shall be at the user’s sole risk. If there is a discrepancy between the electronic files and the hard copies, or you question the authenticity of the report please contact the undersigned.

Sincerely,

SHANNON & WILSON, INC.

Laura Coulson
Environmental Chemist

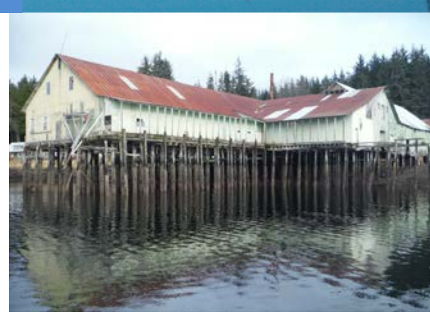
Matt Hemry, P.E.
Vice President

APPENDIX A

ECOLOGICAL SCOPING ASSESSMENT BY SOUND ECOLOGICAL ENDEAVORS

ECOLOGICAL SCOPING ASSESSMENT

KAKE CANNERY COLLAPSE
KAKE, ALASKA



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1.0 INTRODUCTION

The Kake Salmon Cannery (Cannery), located in SE Alaska on Kupreanof Island near the city of Kake, AK (Figure 1), is dilapidated to the point of near collapse. Two of the main buildings have collapsed, leaving only the main cannery and warehouse #4 buildings (Fiigure 2). This report presents a scoping-level ecological risk assessment (Scoping ERA; Alaska Department of Environmental Conservation [ADEC], 2012) for chemicals of interest (COIs) that may be released to the environment in the event of further Cannery collapse into the nearshore environment of Keku Strait. The Scoping ERA includes an ADEC EcoScoping Checklist (Appendix A), a preliminary problem formulation that provides understanding of site conditions, a qualitative determination of the potential scope of ecological risks resulting from a cannery collapse, and a brief discussion of the potential need for further ecological risk assessment following such a collapse. Problem formulation is the process of examining what is known about the site and based on this knowledge and understanding, developing a conceptual ecological exposure model (CEEM), and, if needed, developing assessment endpoints and assessment measures that provide a basis for further, more detailed ecological assessment of the site. If more detailed assessment is conducted, the preliminary problem formulation is then updated during that process, to reflect additional data gathered at the site. This report is organized to address the various elements of an ecological preliminary problem formulation, as follows:

- Site Description and History: Location, uses, and developed attributes of the site.
- Site Land and Water Use: Providing a general understanding of how the land and water are used by residents of the region.
- Previous Investigations: Description of past investigations and the data that they provide for the Scoping ERA
- Contaminants of Interest (COIs): Based on historic site uses and analytical data from media samples collected during previous site investigations, a list of COIs is developed.
- Ecology: Regional and site ecology, including ecological receptor groups likely inhabiting the Site and consideration of rare, threatened, and endangered species presence at the site.
- Exposure Media: Examination of the likely media where COIs may be found and allow exposure of ecological receptors.
- Receptors of Concern: Selection of ecological receptors likely to be exposed to the COIs, important to the ecology or human subsistence of the region, and potentially requiring further ecological assessment.
- Conceptual Ecological Exposure Model (CEEM): Summary graphic presentation of sources of contaminants, known and likely transport mechanisms, likely exposure media, and likely exposed ecological receptor groups and their exposure routes.
- Assessment endpoints and measures: Elements to be assessed and the measures to used for any further ecological risk assessment.

Following the problem formulation is a qualitative assessment of the potential for ecological risks in the event of a Cannery collapse.

2.0 PRELIMINARY PROBLEM FORMULATION

This problem formulation describes physical and chemical characteristics of the site and the important conditions, habitats, and ecological receptors known or likely to be present at the site, and likely routes of chemical exposure for these receptors. Consideration is provided for ecological receptors that are important for subsistence of regional residents. This process identifies the contaminants of interest (COIs) and receptors of concern likely to be exposed to COIs, all of which will be used to develop the conceptual ecological exposure model (CEEM). This exposure model depicts the expected fate and transport of COIs at the site, the potential exposure media, and likely exposure pathways for selected ecological receptor groups of concern. The problem formulation concludes with identification of assessment endpoints and measures that aid in delineation of the scope and objectives of additional ecological assessment, should it become necessary. Completion of the problem formulation will help bring the ERA process to a scientific/management decision point (SMDP) regarding the need, if any, for additional risk assessment in the event of a Cannery collapse.

2.1 Site Description and History

The Kake Salmon Cannery is located one and one-half miles south of Kake village in the northwestern comer of Kupreanof Island in the Alexander Archipelago, about ninety miles southeast of Juneau, Alaska (Figure 1) at 56.975830° north latitude and -133.947220° west longitude (Sec. 34, T056S, R072E, Copper River Meridian). The village is home to the southern coastal Kake Tlingit (Keex'Kwaan) Native Alaskans who once lived throughout the region and had a permanent village on Kupreanof Island. An 1897 executive order excluded approximately 94 acres in and around the village of Kake from the surrounding Tongass National Forest.

The Cannery is one of 134 salmon canneries built in southeast Alaska between 1878 and 1949. The Cannery incorporates part of an early 1900s salmon saltery and is on the site of a traditional Tlingit summer camp where the Tlingit would come to fish and preserve salmon. The historic Kake cannery district was constructed between 1912 and 1940, and was the most distinctive collection of eighteen buildings and structures on the waterfront south of Kake village. Their design reflects the catching, processing, and canning of North Pacific salmon and cultures of Alaska Native, Euro- American, Oriental, Filipino, Black, and other foreign labor employees. Many of these elements have decayed or been demolished with only the main cannery building and warehouse #4 remaining (Figure 2).

In 1912 the Sanborn Cutting Company built the Cannery, possibly incorporating buildings that were already on the site of the Tlingit summer fishing camp. In 1917 the Cannery produced 89,369 cases of salmon, consisting primarily of pink and chum salmon. In 1925 or 1926 the Sunny Point Packing Company acquired the Sanborn Cutting Company at Kake. The 1926 Kake pack, at 93,480 cases, remained consistent with previous years. In 1929 the Kake Cannery packed 82,040 cases under new ownership by the Alaska Pacific Salmon Corporation. Due to smaller fish populations and rising production costs in the 1930s, a large number of salmon canneries began to close and in 1941 P.E. Harris & Company bought the Cannery from the Alaska Pacific Salmon Corporation. That year the cannery packed a high of 181,029 cases. However, over the next seven years there was a steady decline in the amount of fish canned, plunging to 9,075 cases in 1948, when production temporarily ceased.

In December 1949 representatives from the Interior Department and P.E. Harris signed an agreement for the sale of the Kake Cannery to the Organized Village of Kake (OVK). The OVK renamed the cannery the "Keku Canning Company" after the Keku Straits near the Keku Islands in southeast Alaska. Because the cannery had not been used since 1948 season, inactivity had deteriorated some of the buildings and the 1950 pack of 25,653 cases was less than anticipated. The 1951 pack was more productive, consisting of 72,768 cases. But production fell the following year and a series of poor fishing seasons led to the cannery's closure in 1977. Since then the cannery has been used for storage.

The cannery once included a cribbed log dam in Gunnuk Creek, a powerhouse, 3,000 feet of water piping from Gunnuk Creek, additional buildings south of the cannery, and ten fish traps. Until 1920, when a road was built through the middle of the village, the cannery was completely cut off from Kake Village by Lower Gunnuk Creek, and was a self-contained industrial site where workers lived during the entire salmon season, which could span several months. Steady use and maintenance retained the sprawling warehouse-type buildings in relatively good condition until 1977 when the cannery closed. At the time of closing, five original buildings were demolished. Since the late 1970s, neglect and lack of use have caused many of the buildings and adjoining docks to fall into disrepair. The cannery historic district currently includes the four principal cannery buildings and associated equipment and docks, all secondary buildings that date from the period of significance, and all existing worker housing.

The cannery once had four main warehouses perched on a foundation of wood pilings and projecting from the shore out over tidal waters of Keku Strait. The buildings include the Main Cannery Building, Warehouse No. 1, Warehouse No. 2, and Warehouse No. 4. The Main Cannery Building was the site of most salmon canning activity and it houses the associated machinery, consisting of the canning room, fish house with six wooden compartment bins and iron tie rods, pile dock, a processing addition and machine shop, and a retort section containing seven 54" diameter retort machines, and an overlooking loft. Other components include a boiler house addition with three boilers, a lye wash area, an electrical room, a warehouse, an Iron Chink machine parts storeroom, and a salmon sorting and brining egg room. Warehouse No. 1 was used as a store, office, and supply storage. The second floor houses space for net repair and stringing. In Warehouse No. 2 there was a can cooling area on the first floor and a net storage loft and pens for storing fishing gear on the second floor. Warehouse No. 4 supported a mechanized canning line that formed and fitted metal cans.

As storms and tides scoured the beach from under the buildings, cannery workers added rocks and fill to re-anchor the buildings. The nearshore area is narrow, rocky, and rich in shellfish and seaweed.

2.2 Land and Water Use

Land east of the Cannery area, and east of the adjacent Keku Road, is part of the Tongass National Forest, primarily comprised of previously logged, second growth coniferous forest. Immediately surrounding the Cannery and extending north and south along the shoreline, the land has been disturbed by the roadway from Kake village and by over one hundred fifty years of active human occupation, with cannery operations and cannery-associated activities, storage and maintenance buildings, and living quarters since the early 1900s. Timber harvest has occurred for many years from the national forest surrounding the village and cannery. The nearshore marine environment has also been somewhat altered by the Cannery's presence, with beach scour underneath the Cannery buildings and recent development of a new multi-use dock just south of the Cannery.

The residents of Kake obtain a substantial portion of their food from subsistence hunting and gathering from the forest and the marine waters surrounding the Cannery. Wildlife, berries, and plants are harvested from the surrounding uplands. Fish are collected from streams, rivers. Fish, shellfish, marine mammals, waterfowl, marine plants, and other species are collected from Keku Strait and surrounding marine waters. Drinking and process water for the Cannery was once drawn from a reservoir on Gunnuk Creek (approximately 3,000 feet north of the Cannery) until approximately 2005, when the drinking water source was switched to a new reservoir at Alpine Lake (Gregory, 2004).

2.3 Previous Investigations

Very little information is available regarding chemicals used or present at the Cannery. Archaeological investigation was completed by Yarborough (1992) and followed up by Staley (1992). Yarborough discovered six archeological sites and gathered information about previously known sites identified by Staley.

An asbestos survey was conducted for the Cannery in 1993 by Med-Tox Northwest (1993). Minimal asbestos was found in boiler cladding, gaskets, a generator exhaust stack, and a freezer door. This asbestos has not been removed.

Another archeological report was conducted in 2009 by PND engineering as reported by the Organized Village of Kake (2009). A key finding was the presence of "some kind of petroleum product" at a depth of approximately 12 feet, adjacent to the Cannery warehouse. The hole was then back-filled with no testing of the reported findings. This report states that KAI environmental services, LLC further investigated this petroleum product, but the KAI report was not available to review as part of this ScERA. PND also found old engines, car parts, and piping buried along the eastern side of the warehouse.

A December 14, 2013 gasoline leak (spill number 13119934801) reported by ADEC spilled approximately 5,500 gallons of gasoline into Kake Harbor, approximately 1.5 miles north of the Cannery. This spill was reported to have been rapidly dissipated by wind and waves.

Several other site summaries were reviewed, primarily related to establishing the Cannery as a National Historic Landmark or needs for restoration. These applications and reports provided no information regarding the potential presence of hazardous chemicals at or surrounding the Cannery.

A Phase I Environmental Site Assessment currently is being conducted by Shannon & Wilson, Inc. (S&W) in conjunction with this ScERA. A site visit was conducted recently by S&W as part of the Phase I assessment and records were searched specifically for the presence of hazardous chemicals associated with the Cannery. Combined with other descriptions of the machinery used over the years for canning operations, the potential hazards include:

- Petroleum products (oil [residual], diesel, and gasoline range organics).
- Creosote-soaked pilings.
- Small electrical (fluorescent light) ballasts containing polychlorinated biphenyls (PCBs).
- Lead-based paint used inside and outside of the buildings.
- Unknown potential solvents
- Freon in two abandoned refrigerators.
- Approximately five gallons of metal shavings from the machine shop, and metal machinery/parts buried upgradient of the Cannery.
- A limited amount of asbestos containing materials.

2.4 Contaminants of Interest

The COIs for the ScERA are those chemicals that may be released into the environment in the event of a Cannery collapse. Based on information provided in previous and ongoing investigations, as listed in the previous section, there are eight hazardous substances of potential concern. Asbestos is not a chemical; but rather represents a potential physical hazard when inhaled into the lungs. When such a low volume such as that present within the cannery is released into a moist, damp, or wet environment such as that surrounding the Cannery, it is highly unlikely that significant ecological effects could occur due to a such a minimal physical hazard. Therefore, asbestos is not considered to be a COI for the ScERA. With the exclusion of asbestos, the COIs include:

- Petroleum products (oil- [residual-], diesel-, and gasoline-range organics, and creosote)
- PCBs
- Freon
- Lead and metals from paint, shavings, and buried parts.

2.5 Ecology

The regional and site-specific ecology are described in this section to provide an understanding of the climate, plants, invertebrates, wildlife, and fish that may inhabit the region surrounding the site, and those potentially found on site.

2.5.1 Regional Ecology

The Alexander Archipelago, an extension of the coastal mountains to the north, is about 300 miles long with hundreds of islands, located in Alaska's southeast ecoregion (ADEC, 1999). The six largest islands (over 1,000 square miles each) include are: Prince of Wales (2,770 square miles), Chicagof (2,062 square miles), Admiralty (1,709 square miles), Baranof (1,636 square miles), Revillagigedo (1,134 square miles), and Kupreanof (1,084 square miles or 2,808 km^2). The islands are separated by a system of marine features such as sounds, straits, canals, narrows, and channels. There are nearly 10,000 miles of shoreline along the islands and mainland.

Kupreanof Island is in the central portion of the archipelago. This island was originally dominated by evergreen forests. However, extensive forestry operations have removed much of the original forest cover and much of the island is now relatively open and in varying stages of forest re-growth. The forest is broken here and there by muskeg bogs, glacial outwash plains, and marshlands in river valleys and deltas.

2.5.2 Site Ecology

On the northwest corner of Kupreanof Island, Kake has a maritime climate characterized by cool summers and mild winters. Precipitation of the region averages about 54 inches per year, with about 40 inches of snow. Average summer temperatures range from 44 to 62 degrees Fahrenheit and for winter range from 26 to 43 degrees. The cool, moist conditions produce lush evergreen forest growth.

Land uses adjacent and nearby the Cannery have noticeably impacted the terrestrial environment and the recent construction of a multi-use dock has exacerbated these impacts. The original nearshore forests have been thinned or cleared over the years to make way for the road and buildings. Little to no habitat is available in this area and essentially no upland wildlife habitat would be impacted by a Cannery collapse.

A Cannery collapse would deposit Cannery remains into the nearshore marine environment of Keku Strait. This nearshore environment is rich in sea life including fish, shellfish, waterfowl, marine algae and other marine plants and invertebrates.

2.5.3 Sensitive Environments

Generally, sensitive environments include areas of particular environmental value where a hazardous substance could pose a greater threat than in other non-sensitive areas. Such sensitive areas may include critical habitat for federally threatened, endangered, or similarly classified state species, parks, monuments, marine sanctuaries, recreation areas, wildlife refuges, wildlife management areas, wilderness areas, wetlands, wild and scenic rivers, estuaries, and other significant open space. There are no particular protected areas near the Cannery, but the nearshore marine environment is considered to be a sensitive environment due its nature and its use for subsistence by Kake residents.

2.5.4 Rare, Threatened, or Endangered Species

The state and federal protected species expected in southeast Alaska include:

- Short-tailed Albatross (state and federally endangered)
- Blue Whale (state and federally endangered)
- Fin Whale (federally endangered)
- Humpback Whale (state and federally endangered)
- Right Whale (state and federally endangered)
- Sei Whale (federally endangered)
- Leatherback Sea Turtle (federally endangered)
- Green Sea Turtle (federally threatened)
- Loggerhead Sea Turtle (federally threatened)
- Olive Ridley Sea Turtle (federally threatened)

These species may pass through the Cannery area, but none are expected to reside in the Cannery vicinity for any length of time. The humpback whale was the only listed species likely to be present in the Kake vicinity on the National Marine Fisheries Service (NMFS) website. Harbor porpoise, killer whale, and Pacific white-sided dolphin are listed by NMFS as being within the Cannery vicinity and protected under the marine mammal protection act.

2.5.5 Local Subsistence Species

Based on recent S&W discussion with Kake village representatives, the following species are important for subsistence use:

- Seals near the Cannary
- Sea Otter (one-half mile from the Cannery)
- Ducks & geese near the Cannery
- Trout, salmon, halibut, rockfish, and herring near the Cannery
- Clams/mussels near the Cannery
- Gumboot chiton near the Cannery
- Spot prawns (5-7 miles from Cannery)
- Dungeness crab near the Cannery
- Octopus (about 1 mile from Cannery)

- Beach asparagus (glasswort) near the Cannery
- Goosetongue near the Cannery
- Sea lettuce/ribbon seaweed/bladderwrack (popweed) near the Cannery

The harvested number or volume of these subsistence species was not obtained.

2.6 Potential Exposure Media

The COIs are currently either inside the Cannery, associated with Cannery piling foundations, or buried in the subsurface soil immediately upgradient of the Cannery. In the event of a Cannery collapse all of the COPECs would become present in the nearshore marine environment, including marine surface water and marine sediment. These are the two ecological exposure media.

2.7 Receptors of Concern

The Alaska default assessment endpoint guidance (ADEC, 1999) provides for functional groups that should be considered for inclusion in an ecological risk assessment, assuming they have likely exposure routes at the contaminated site. The applicable default functional groups (with default indicator and subsistence species) include:

- Marine Aquatic plants (beach asparagus/goosetongue/sea lettuce/sea ribbon/bladderwrack-subsistence)
- Marine Semi-Aquatic plants
- Marine Aquatic invertebrates (clams/mussels/gumboots/shrimp/crab-subsistence)
- Marine Benthic invertebrates
- Marine Fish Detritivore (halibut-subsistence)
- Marine Fish Invertevore
- Marine Avian Invertevore (black oystercatcher; mallard-subsistence)
- Marine Semi-Aquatic Avian Invertevore (semipalmated plover)
- Marine Mammalian Invertevore (sea otter-subsistence)
- Marine Avian Piscivore (pigeon guillem ot)
- Marine Mammalian Piscivore (harbor seal-subsistence)
- Marine Mammalian Carnivore (sperm whale)
- Marine Fish Piscivore (trout/salmon-subsistence)

The sperm whale is highly unlikely to be significantly exposed by chemicals entering Keku Strait due to a Cannery collapse. Thus, the marine mammalian carnivore functional group should be removed from further consideration.

2.8 Conceptual Ecological Exposure Model

The conceptual ecological exposure model (CEEM; Figure 3) depicts the sources of contamination, contaminant release and transport mechanisms, impacted exposure media, and complete exposure routes to ecological receptor at the site.

Upon release from the Cannery into the nearshore marine environment, all of the COIs, except possibly aged creosote in the pilings, would be dispersed by the water, wind, waves, and current. Any solvents likely would dissipate and evaporate rapidly. Metal shavings mostly would rust and dissolve into the water, but some could become entrained in sediment. Metals leaching from the subsurface debris east of the Warehouse would be in dissolved form and would primarily be carried away in water, but some could adsorb to sediment under the Cannery. Petroleum products and freon would also disperse, but some portion of the heavier fractions of these compounds could remain entrained in the marine bottom. The PCB ballasts likely would remain intact and very low amounts of PCBs would be dispersed. But, over time, if the ballasts were not removed from the marine water, they would decay and more PCBs could be released to the environment, albeit, still a very small volume. But PCBs are bioaccumulative and have been detected in long-lived marine species such as seals, sea-lions, and whales. Lead-based paint chips and asbestos containing items would break into smaller and smaller pieces and be dispersed. Some small portion of the lead could dissociate from the paint and dissolve into the marine water. A cannery collapse likely would not result in much creosote being released because of the aged nature of the creosote. However, pulling pilings from out of the bottom sediment could release to the water column, creosote that has long been bound to subsurface sediment surrounding the buried portions of the pilings.

The nearshore marine environment would relatively rapidly spread and dilute these COIs. Therefore, the greatest potential for exposure would be within close proximity to the collapsed cannery, shortly after the collapse. Only marine species would be potentially exposed to COIs in the water column and possibly in sediment.

2.9 Assessment Endpoints and Measures

Assessment endpoints are qualitative or quantitative expressions of the environmental values to be protected and, therefore, assessed in the risk assessment. As such, assessment endpoints link the risk assessment and the risk management processes by highlighting the ecological risks that are of likely concern to risk managers. Assessment measures are characteristics of the site, selected receptors, or exposure scenarios that are measured through monitoring or sampling activities, and then related qualitatively or quantitatively to the selected assessment endpoints. Alaska’s default assessment endpoints guidance were used and augmented with site specific information to select appropriate endpoints and measures.

2.9.1 Assessment Endpoints

For a screening level risk assessment such as will be performed for the Site, assessment endpoints are generalized to reflect the risk-based screening process and protective ecological risk based screening concentrations (ERBSCs). Assuming a collapse of the Cannery, the primary assessment endpoints for the ScERA include:

- The potential for significant adverse effects on marine plant species abundance, diversity, and primary production.
- The potential for significant adverse effects on marine semiaquatic plant species abundance, diversity, and primary production
- The potential for significant adverse effects on marine aquatic invertebrate community abundance and diversity.
- The potential for significant adverse effects on marine benthic invertebrate community abundance and diversity.
- The potential for significant adverse effects on marine fish detritivore growth, reproduction, and survival.
- The potential for significant adverse effects on marine fish invertivore growth, reproduction, and survival.
- The potential for significant adverse effects on marine semiaquatic avian herbivore growth, reproduction, and survival.
- The potential for significant adverse effects on marine avian invertevore growth, reproduction, and survival.
- The potential for significant adverse effects on marine semiaquatic avian invertevore growth, reproduction, and survival.
- The potential for significant adverse effects on marine mammalian invertevore growth, reproduction, and survival.
- The potential for significant adverse effects on marine avian piscivore growth, reproduction, and survival.
- The potential for significant adverse effects on marine mammalian piscivore growth, reproduction, and survival.
- The potential for significant adverse effects on marine fish piscivore growth, reproduction, and survival.

2.9.2 Assessment Measures

Assessment measures are used to evaluate the response of the indicator communities/species when exposed to a stressor. Generally, they are measurable ecological characteristics of exposure and effect, and define what samples and/or data will be collected to address the assessment endpoints. For this ScERA, there are no measured concentrations of the COIs, thus, a risk-based screening is not possible and assessment measures are not utilized. In the event of a Cannery collapse, the concentrations of COIs would need to be measured. Then, risk-based screening concentrations could be selected and compared to the measured COI concentrations. Should more detailed risk assessment be required, additional measures would be needed, such as species-specific toxicity reference values compared to calculated exposure doses. Alternatively, site-specific measures of exposure and effects could be collected to best determine the likelihood of significant adverse effects. Regardless, no quantitative measures have been collected for this ScERA. Only qualitative assessments of the potential for ecological risks will be made.

3.0 QUALITATIVE ASSESSMENT OF POTENTIAL RISKS

Ecological risk is based upon exposure of ecological receptors to stressors (COIs, as well as physical and biological hazards as well), and the toxicity or effectiveness of the stressors. This assessment of the potential risks of a Cannery collapse focuses on the potential effects of the COIs identified in the problem formulation as presented previously.

Through the problem formulation/scoping process COIs have been identified that may be released to the nearshore marine environment in the event of a Cannery collapse. Ecological receptors of concern have also been identified that reside or pass through the same nearshore marine environment. Thus, it has been shown that some level of exposure of the receptors of concern to the COIs is likely to occur in the event of a Cannery collapse, and this, in turn, suggests the potential for ecological risks at some level.

With the potential for ecological exposure having been shown to exist, a risk management decision is now required. This decision point is whether any level of risk is considered to be acceptable. Some stakeholders may be of the mind that any non-natural exposure to stressors is unacceptable. If this becomes the criteria for assessing risks at the Cannery, then all of the COIs, including the pilings underlying the existing Cannery will need to be removed from the nearshore environment, and the cannery could not be rebuilt because the presence of the buildings themselves, over the water, have an impact on ecological receptors. However, the current, though somewhat waning, federal toxicological paradigm is that some level of impact is considered acceptable. And for ecological receptors, this level of impact is measured through assessment of an exposure level and stressor (chemical toxicity, physical impact, or biological effect) that will not result in population level effects, or individual effects for protected species. In the case of subsistence reliance on the ecological receptors, such as is present at Kake, consideration must not only be provided for the ecological receptors, but also for the people who rely on the potentially impacted species for their sustenance.

3.1 Exposure

The potential exposure of ecological receptors to the COIs due to a Cannery collapse has not been measured. Thus, no quantitative estimates of exposure can be made. Qualitatively, it can be surmised that the volume of most COIs within the Cannery are quite low, with the possible exception of creosote in pilings and lead in lead-based paint. But the creosote associated with all the pilings underlying the

Cannery has aged for many years, and the lead-based paint is bound to the paint such that paint chips would have to be eaten for toxicity to occur. In fact, removing the pilings after a collapse may release more creosote than leaving them in place. Thus, the potential for ecological exposure to the COIs could still be considered to be low due to these chemicals, even in the event of a collapse. Regardless, some exposure would occur, particularly in close proximity to the Cannery.

A reduction in exposure potential reduces risk potential. For example, removing and properly disposing of the chemicals would immediately and permanently reduce the potential for exposure to and effects of the removed chemicals on subsistence and other ecological receptors. Careful dismantling and/or repair of the Cannery would nearly eliminate the distribution of lead-based paint into the nearshore marine environment. Cutting off the old creosoted pilings instead of pulling them out of marine bottom likely would reduce the distribution of creosote into the water and surrounding sediment. These actions would essentially eliminate the potential for any new exposure of the ecological receptors to the COIs. Whereas, collapse of the cannery before the COIs are removed would result in some level of exposure and toxicity to ecological receptors, potential exposure of humans through subsistence harvesting, and possibly reduced numbers of subsistence species in close proximity to the Cannery.

3.2 Toxicity

It is beyond the scope of this ScERA to evaluate the toxicity of the individual COIs. Generally, these COIs do not exhibit strong acute effects. Rather, longer-term, consistent (chronic) exposure is required for toxicity to be realized. Such exposure is difficult to obtain for species that range over wider areas where they may be exposed to both clean and contaminated areas. However, immobile species such as semi-aquatic (i.e., rooted) plants and benthic invertebrates cannot move, and therefore, are more likely to be impacted, within areas of contamination. Fortunately, in most cases, these immobile species are present across a very wide area, such that localized exposure and toxicity does not impact their populations. But we still try to protect individuals of protected and subsistence species and humans when they are present or potentially exposed via harvest and consumption of the exposed receptors.

As has been discussed earlier, the effective exposure area is likely to be within close proximity to the collapsed Cannery due to dispersal of the COIs in the marine environment. While dilution is generally not considered to be the solution to pollution, nonetheless, it does indeed limit the potential for toxicity.

Overall, there is a potential for a Cannery collapse to result in exposure of, and effect on, ecological receptors, including subsistence species. Such effect likely would remain in an area within a few hundred feet of the cannery.

4.0 RECOMMENDATIONS

To avoid increasing the potential for ecological risks associated with the Cannery, the following recommendations are made:

1. Remove all hazardous materials from the Cannery as soon as possible and dispose of them properly.
2. Remove, repair, or replace the Cannery buildings immediately using techniques to avoid spreading lead-based paint into the marine environment.
3. Do not pull pilings out of the bottom sediment, but rather, cut them off and leave the buried portion of the pilings in place to avoid redistribution of long buried creosote.
4. If the Cannery is repaired or rebuilt over the water as it is now, use non-toxic pilings to support the new structures.
5. If the Cannery collapses, remove all debris from the water, stop subsistence harvesting within 0.5 miles of the cannery, and initiate the determination of need for further more detailed assessment of the potential for human health and ecological risks due to the collapse.

The determination of need for further ecological assessment in the event of a Cannery collapse needs to be conducted with subsistence users. This is because it is their own exposure to Cannery-related COIs that is at stake.

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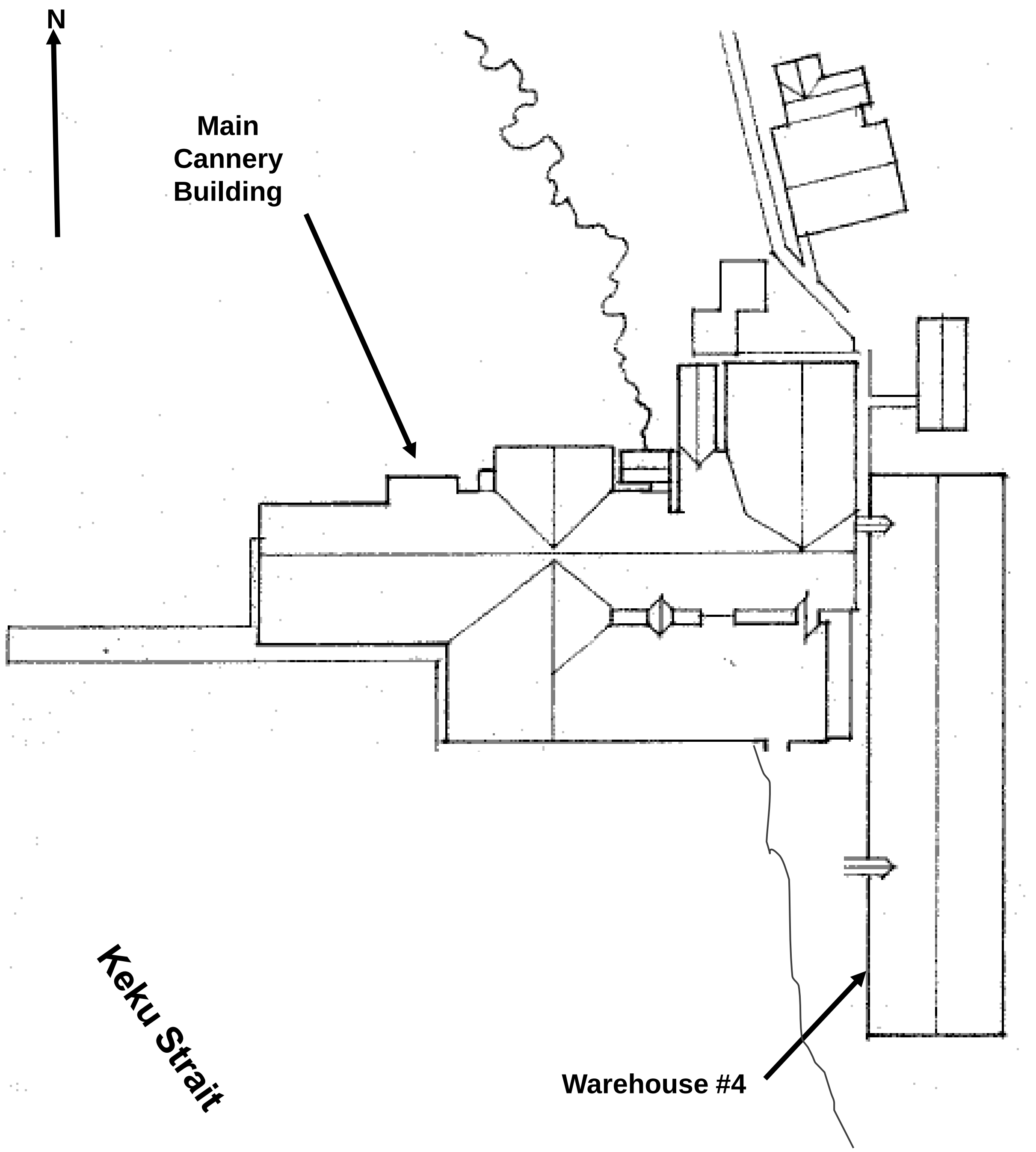
Not to Scale

Vicinity
Kake Cannery
Kake, Alaska

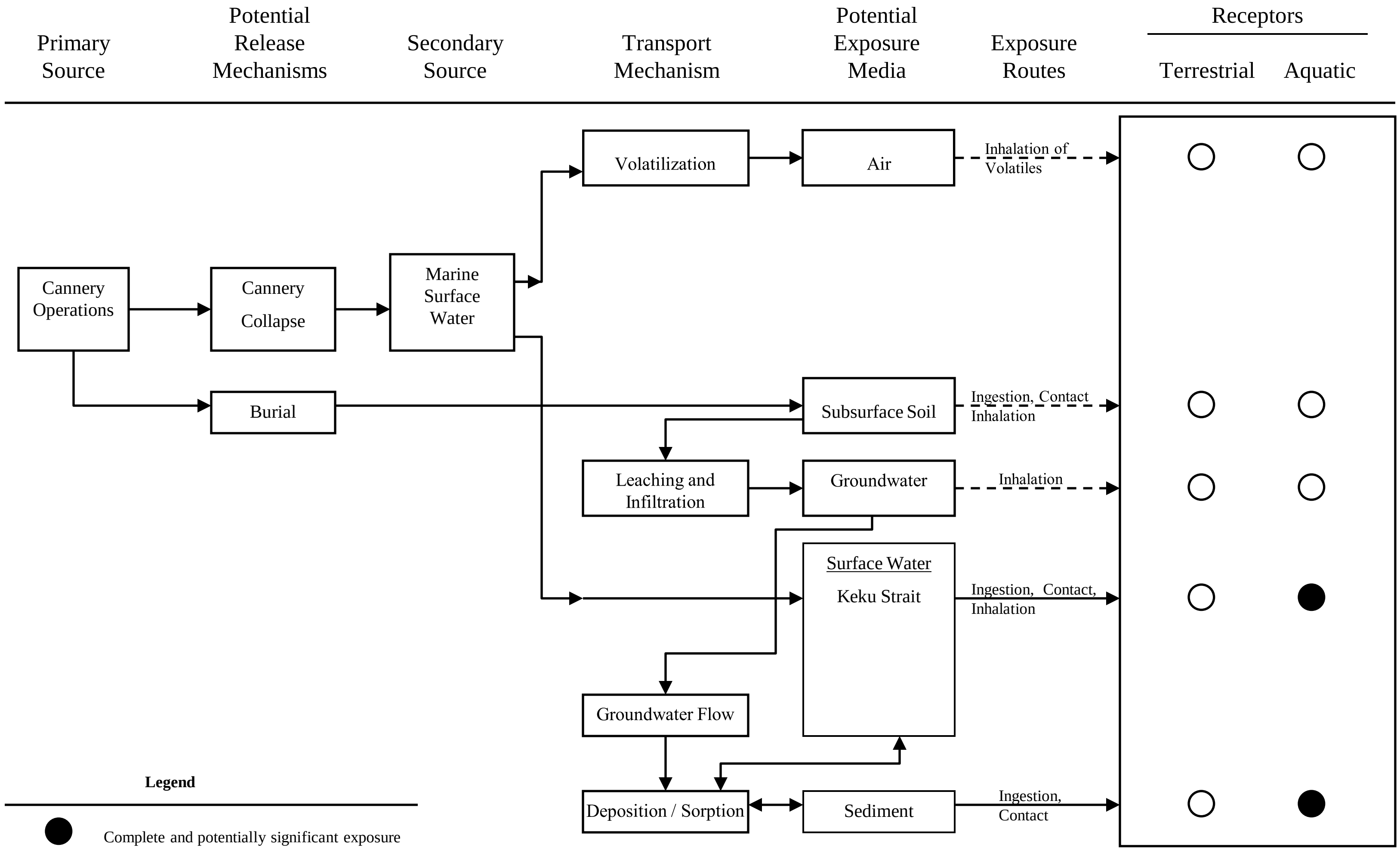
Figure

1



Not to Scale	Kake Cannery Kake, Alaska	**Figure** **2**

Sound Ecological Endeavors, LLC; R. Brewer; 2/17/2014 2:50 PM



Legend

- Complete and potentially significant exposure
- Potentially Complete but insignificant exposure (not to be quantified)
- Incomplete Exposure (not to be quantified)
- Incomplete or Insignificant Pathway
- Complete and/or Significant Pathway

Figure 3

Conceptual Ecological Exposure Model

Kake Cannery
Kake, Alaska

SCOPING ECOLOGICAL RISK ASSESSMENT
KAKE CANNERY COLLAPSE

APPENDIX A

<u>EcoScoping Checklist</u>

ADEC EcoScoping Form

Site Name: Keku Cannery (Under Hypothetical Collapse Conditions)

Completed by: Rone Brewer

Date: February, 2014

Instructions: Follow the italicized instructions in each section below. "Off-ramps," where the evaluation ends before completing all of the sections, can be taken when indicated by the instructions. Comment boxes should be used to help support your answers.

1. Direct Visual Impacts and Acute Toxicity

Are direct impacts that may result from the site contaminants evident, or is acute toxicity from high contaminant concentrations suspected? C*heck the appropriate box.*

☐ *Yes – describe observations below and evaluate all of the remaining sections without taking any off-ramps.*

☒ *No – go to next section.*

Comments:

The Cannery has physically impacted the nearshore marine environment. Creosoted pilings are old enough that impacts due to creosote are considered *de minimis.*

2. Terrestrial and Aquatic Exposure Routes

Check each terrestrial and aquatic route that could occur at the site.

Terrestrial Exposure Routes

☐ Exposure to water-borne contaminants as a result of wading or swimming in contaminated waters or ingesting contaminated water

☐ Contaminant uptake in terrestrial plants whose roots are in contact with contaminated surface water

☐ Contaminant migration via saturated or unsaturated groundwater zones and discharge at upland "seep" locations (not associated with a wetland or water body)

☐ Contaminant uptake by terrestrial plants whose roots are in contact with soil moisture or groundwater present within the root zone (generally no more than 4 feet below ground surface

☐ Particulates deposited on plants directly or from rain splash

☐ Incidental ingestion and/or exposure while animals grub for food, burrow (up to 2 feet for small animals or 6 feet for large animals), or groom

☐ Inhalation of fugitive dust or vapors disturbed by foraging or burrowing activities

☐ Biooaccumulatives (other than PAHs, which bioaccumulate more readily in aquatic environments) taken up by soil invertebrates, which are in turn eaten by higher food chain organisms (see the Policy Guidance on Developing Conceptual Site Models)

☐ Other site-specific exposure pathways

Aquatic Exposure Routes

☐ Contaminated surface runoff migration to water bodies through swales, drainage ditches, or overland flow

☒ Aquatic receptors exposed through osmotic exchange, respiration, or ventilation of surface waters

☒ Contaminant migration via saturated or unsaturated groundwater zones and discharge at "seep" locations along banks or directly to surface water

☒ Deposition into sediments from upwelling of contaminated groundwater Aquatic receptors may be exposed directly to contaminated sediments through foraging or burrowing, or indirectly exposed due to osmotic exchange, respiration, or ventilation of sediment pore water.

☒ Aquatic plants rooted in contaminated sediments

☒ Bioaccumulatives (see the Policy Guidance on Developing Conceptual Site Models) taken up by sediment invertebrates, which are in turn eaten by higher food chain organisms

☐ Other site-specific exposure pathways

If any of the above boxes are checked go on to the next section. If none are checked, end the evaluation and check the box below

☐ OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

3. Habitat

Check all that may apply. See Ecoscoping Guidance for additional help.

☒ Habitat that could be affected by the contamination supports valued species (i.e., species that are regulated, used for subsistence, have ceremonial importance, have commercial value, or provide recreational opportunity).

☐ Critical habitat or anadromous stream in an area that could be affected by the contamination

☐ Habitat that is important to the region that could be affected by the contamination

☐ Contamination is in a park, preserve, or wildlife refuge

If any of the above boxes are checked go on to the next scoping factor. If none are checked, end the evaluation and check the box below

☐ OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

4. Contaminant Quantity

Check all that may apply. See Ecoscoping Guidance for additional help.

☒ Endangered-, threatened-, or species of special concern are present
☐ The aquatic environment is or could be affected
☐ Non-petroleum contaminants may be present, or the total area of petroleum- contaminated surface soil exceeds one-half acre

If any of the above boxes are checked go on to the next scoping factor. If none are checked, end the evaluation and check the box below.

☐ OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

5. Toxicity Determination

Check all that apply.

☒ Bioaccumulative chemicals are present (see Policy Guidance on Developing Conceptual Site Models)
☐ Contaminants exceed benchmark levels (see the Ecological Benchmark Tool in RAIS, available at: http://rais.ornl.gov/tools/eco_search.php)

If either box is checked complete a detailed Ecological Conceptual Site Model (see DEC's Conceptual Site Model Guidance) and submit it with the form to you DEC Project Manager.

If neither box is checked, check the box below and submit this form to your DEC Project Manager.

☐ OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

APPENDIX B

DEMOLITION CLEANUP ESTIMATE BY ALASKA DEMOLITION INC.

ALASKA DEMOLITION
Specializing in Demolition & Construction Services
Phone: 907-274-DEMO Fax: 907-248-6065
2817 Rampart Drive 101 Anchorage, Alaska 99501

February 24, 2014

Shayla Marshall
Shannon & Wilson
5430 Fairbanks Street
Anchorage, Alaska

Subject: **Keku Cannery in Kake, Alaska**
Re: **Demolition Clean-up Estimate**

Alaska Demolition, LLC provides the following estimated cost range based on assumed conditions for the subject structure should it fall into the ocean from neglect.

<u>Assumptions:</u>

1- Structure falls into the water and remains in the basic proximity of its existing location (low range).
2- Structure falls into the water and is deposited in a 1/2 mile proximity of its existing location (high range)
3- Alaska Demolition will be able to walk a Hitachi EX-450 Excavator to the waterline at low tide to perform clean-up operations as possible.

We provide in the following estimate:

Mobilization and demobilization of barge with crane and debris barge with personnel
Mobilization and demobilization of diving barge with divers and equipment
Mobilization and demobilization of demolition equipment operators and laborers
Mobilization and demobilization of Hazardous Materials abatement workers and materials
Room & Board for all workers
Divers to clean the ocean floor of collectible debris
Workers to walk beach line 1/2 mile of collapse site in each direction and collect debris
Removal and disposal of collected hazardous materials and debris in EPA and/or ADEC approved locations

As we can't know what conditions will exist should the structure collapse without having the appropriate equipment on-site at that time, we can only provide a cost range based on what we perceive will be the conditions. As we are all aware, should collapse occur during a severe storm at high tide debris has the potential of drifting and depositing for miles.

Our estimated cost of the clean-up ranges from **$8,400,000.00 to $11, 900.00 and is subject to change based on the actual conditions that exist at the time of mobilization.** Should you have any questions please contact our office.

Respectfully,

Mike Waddell
Alaska Demolition, LLC.

ALASKA DEMOLITION
Specializing in Demolition & Construction Services
Phone: 907-274-DEMO Fax: 907-248-6065
2817 Rampart Drive 101 Anchorage, Alaska 99501

March 7, 2014

Shayla Marshall
Shannon & Wilson
5430 Fairbanks Street
Anchorage, Alaska

Subject: **Keku Cannery in Kake, Alaska**
Re: **Envisioned Scope of Work**

Alaska Demolition, LLC provides the following scope of work based on assumed conditions for the subject structure should it fall into the ocean from neglect and/or a storm event.

We provide in the following description:

Mobilization and demobilization of barge with crane and debris barge with personnel:

- The barge/crane will be used to mobilize/de-mobilize the necessary demolition equipment, materials and other misc. supplies necessary to address the clean-up operation.
- The barge/crane will be used to provide lifting capacity for debris and will be particularly useful where debris is inaccessible to land based equipment.
- The debris barge will be utilized for collection of the multiple types of debris generated during the clean-up operations. It will transport creosote timbers/piles, wood from the structure potentially lead containing, asbestos, waste POL products, salvageable metals and concrete.

Mobilization and demobilization of diving barge with divers and equipment:

- A collapse of the structure will undoubtedly distribute multiple types of debris into the waterway over an undetermined area. The tide levels and severity of any storm conditions that may be present at the time of collapse has the potential for a massive spread. The diving barge will be utilized as a platform from which divers will be able to collect debris from the floor of the sea to minimize the impacts these materials may have on the local sea life and subsistence lifestyle of the indigenous people. The diving operation may be required over a large area and will need to be conducted in a manner that does not cause any damage to sea floor. The diving barge will work in concert with the barge/crane to remove debris from the sea and load it onto the debris barge. The actual time to conduct under water clean-up cannot be reasonably determined prior to a survey of post-collapse conditions!

Mobilization and demobilization of Hazardous Materials abatement workers and 3rd Party testing firm:

- There are already known hazards in the structure such as Asbestos, Lead Paint and POL products spread throughout the facility.
- Asbestos abatement will be necessary for the boilers, some quantity of re-torts and piping. The condition of these items will have to be determined during the post-collapse survey. There is significant asbestos abatement required and it will most likely be hampered after collapse creating conditions that will require re-location of equipment to an area where it can be safely abated. Additionally, asbestos containing materials could be spread over a large area and contaminate the shoreline creating an extensive clean-up to avoid the exposure of the local population should the material become air-borne. Under this scenario there might be a significant quantity materials and contaminated water generated.
- Lead abatement would most likely only be required should there be paint flakes scattered from the structural collapse deposited on the shoreline. It would be most likely that any Lead that made it way to water would be washed out and uncollectible.
- POL products were located in the structure at the time of our site visit in the form of 55 gallon barrels (some that did not have bungs closed) and other smaller containers. Additionally, there were areas in the structure i.e. machine shop and other unidentified rooms that appeared to have contaminated work benches and floors which would need to be removed and packaged appropriately for disposal. Based on a scenario where the open barrels would spill and the other containers may be puncture during the collapse. Both a land and sea clean-up may be necessary to contain the contamination.
- Creosote piling and timbers may also require special handling/disposal after testing.

Mobilization and demobilization of demolition equipment operators and laborers:

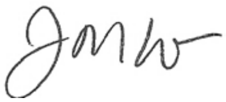
- We would be required to bring multiple pieces of equipment to the site in order to facilitate the varying needs of the clean-up. They would include but not be limited to excavator, loader, hydraulic crane, water truck, transport truck ect.
- The materials would require segregation prior to loading onto the debris barge so that the hazardous materials are not comingled with general debris and recyclable materials.
- Boilers, re-torts, production equipment and piping systems will require cutting to facilitate handling and disposal after hazardous materials abatement operations.
- There will be significant manual clean-up of the immediate site and likely a large swath of shoreline around the site. Dependent upon collapsed conditions and a given storm event, the debris may be small and difficult to collect.

Transportation, Room & Board for all workers:

- The number of workers necessary to conduct the clean-up operation for a collapse event will most likely be well beyond the ability of the community to provide room & board. This will require daily air transport of workers to Sitka where they would have adequate accommodations.

As we can't know what conditions will exist after a structural collapse of the cannery, we can only attempt to provide the necessary services based on what we perceive will occur. As we are all aware, should collapse occur during a severe storm at high tide debris has the potential of drifting and depositing for miles.

Respectfully,



Mike Waddell
Alaska Demolition, LLC.

APPENDIX C

IMPORTANT INFORMATION ABOUT YOUR ENVIRONMENTAL SITE ASSESSMENT/EVALUATION REPORT

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland