

---

## ALEUTIAN ISLANDS RISK ASSESSMENT PHASE B

### Tug of Opportunity Study

PREPARED FOR: Nuka Research & Planning Group Seldovia, Alaska		BY: Garth Wilcox, PE PROJECT TITLE	
 <b>THE GLOSTEN ASSOCIATES</b> 1201 Western Avenue, Suite 200, Seattle, WA 98101-2921 TEL 206.624.7850 FAX 206.682.9117 www.glosten.com		CHECKED: David L. Gray, PE PROJECT TITLE	
		APPROVED: David L. Gray, PE PRINCIPAL-IN-CHARGE	
DOC: Preliminary Draft	REV: -	FILE: 12127.02	DATE: 11 November 2013r

## References

1. *Aleutian Islands Risk Assessment – Phase B Work Plan*, Nuka Research & Planning Group, LLC and Pearson Consulting, LLC, 29 November 2012.
2. Dai, Chen, and Hwang, “Offshore Construction Barge Performance in Towage Operations,” OTC 4164, May 1981.
3. *Guidelines for Marine Transportations 0030/ND*, Nobel-Denton Towing Policy Board, 15 April 2009.
4. *Tug of Opportunity Study Rev A.xlsx*, The Glosten Associates, Inc., File No. 12127.02, 29 August 2013.

## Purpose

This study takes one year of tug location data and calculates the time for each tug to travel to a stricken vessel and the tug’s ability to assist the vessel when it arrives.

## Data

Data is provided by the Marine Exchange in spreadsheets. We have data for all the tugs and towing vessels for each week of 2012, at noon on Wednesday, in the Aleutian area.

These sheets contain the name, date, and location of the tugs. Bollard pull and max speed data have been provided for some of the tugs. Figure 1 shows the tug geographical distribution.

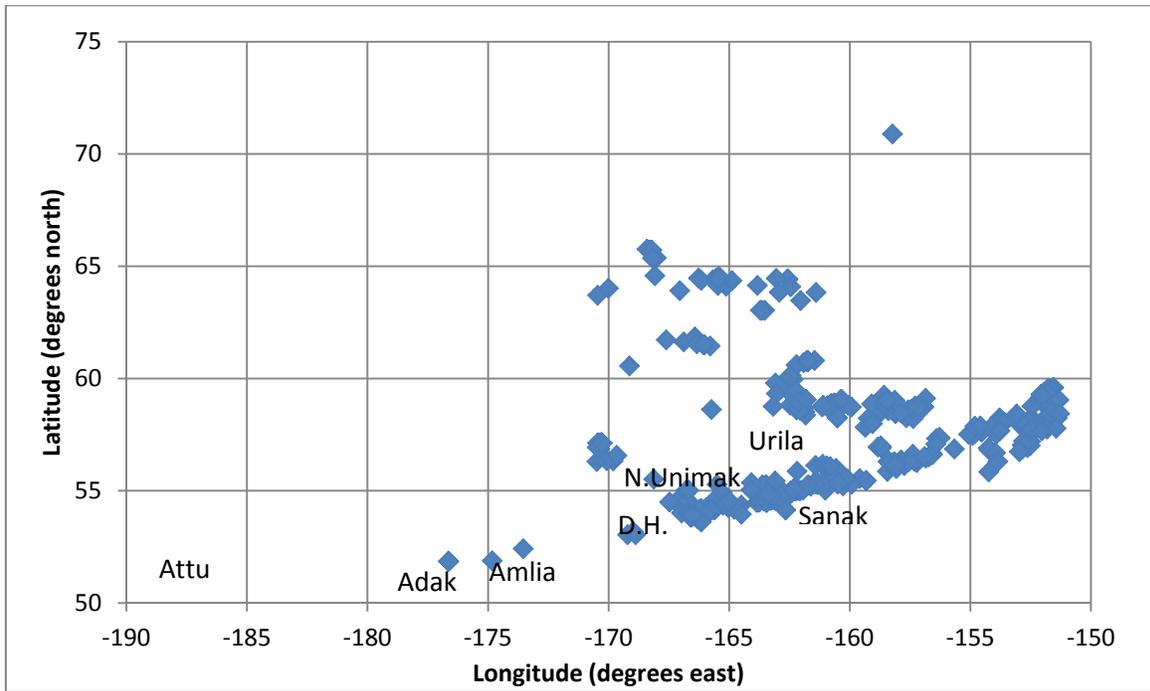


Figure 1 Tug distribution scatter plot

### Scenario Locations

The tug destination will be a stricken vessel located at the six locations defined in the Phase A risk assessment shown in Figure 2.



Figure 2 Scenario locations

### Stricken Vessels

Actual vessels were selected to match the requirements of the work plan. The vessel particulars are taken from Reference 4 and summarized below in Table 1.

**Table 1 Stricken Vessel Particulars.**

	<b>Tanker</b>	<b>Container Ship</b>
Type	NASCO 675,930 BBL	HHI 7,500 TEU Class
Name	<i>Overseas Ohio</i>	<i>Hong Kong Express</i>
Length Overall (m)	272(est.)	320
Length Between Perpendiculars (m)	261	304
Beam (m)	32.2	42.8
Deadweight(MT)	90,000	82,800
Design Draft (m)	15	13
Depth (m)	18(est.)	24.5
Block Coefficient	0.82	0.65(est.)

## **Tug Performance**

Bollard pull and speed are estimated for each tug if it is not provided in the spreadsheet. An average relationship between horse power and bollard pull or speed was derived for a large group of tugs. This relationship was applied to all tugs with missing data.

## **Speed Reduction**

The travel time of the tug vessel is based on its top speed in calm water and its ability to maintain that speed in higher sea states. The speed reduction in waves is estimated based on tests of other vessels, judgment, and experience. The speed reduction values used in this study are based on the Nobel-Denton towing manual, Reference 3 modified by the experience of Alaska tugboat operators.

## **Distances**

Great circle distances are used in this study for all the tug travel. It is assumed that the tugs can pass between the islands without a major course deviation.

## **Time increments**

The following time estimates were assumed in this analysis:

Time in Dutch Harbor or Adak to drop off tow and load emergency towing gear is 2 hours.

Time to hook up to stricken vessel is 2 hours

## **Study Variables**

The study will examine all of the following variables:

- 5 sea states with corresponding wind speeds
- 6 scenario locations
- 2 barge drop off locations

- 2 ships, Panamax containership and tanker
- All the tugs
- Every week

## Assumptions

When we calculate the time to begin towing, we used the following scenario:

- All tugs are towing barges unless we know specifically that they do not tow barges in these waters.
- Tugs will proceed to Dutch Harbor or Adak at towing speeds to drop off tow and pick up emergency towing package.
- Tugs spend minimal time in port and do not refuel.
- Tugs proceed to stricken vessel at top speed, degraded by sea state and heading.
- Tugs hook up to vessel

## Tug Efficiency

The tug efficiency factors taken from Reference 2 include an allowance for the wave and wind drag on the tug, the drag on the tow line, propeller ventilation, and reductions in throttle settings to prevent over-speeding of the engines.

## Results

The study results are contained in a spreadsheet, Reference 4.

## Observations

All of the tugs were assumed to have adequate towing gear for their bollard pull. This may not be the case for the Alex Haley which is included in this study and may not be able to perform well in severe sea states.

Due to the low speeds when towing barges in severe sea states; the tugs without barges have much better results than others. In this study the tugs assumed to be not towing barges are:

---

Alex Haley

Resolve Pioneer

James Dunlap

Nanuq

Tor Viking

Alert

---