

**Proposal for Ship Simulation and Mariner Study of the Places and Ports of Refuge in Prince William Sound for Trans-Alaska Pipeline System Tankers**

**Prepared by:**

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We are pleased to submit the following proposal to perform analysis of the maritime implications for ports of refuge for Trans-Alaska Pipeline tanker vessels transiting Prince William Sound. The proposal includes: the purpose and scope of the study, methods of the study including a timeline, expected outcomes, personnel, past work of Safeguard Marine LLC as well as business information and location, and a budget.

**Purpose and Scope of Study**

Trans-Alaska Pipeline Service (TAPS) tanker vessels transit daily into Valdez Marine Terminal to load oil. The amount of oil has dramatically decreased over the past decade, but according to statistics from the Prince William Sound Regional Citizens Advisory Council approximately 450,000 barrels per day are shipped. This translates into the loading and movement of approximately one oil tanker vessel every day of the year transiting Prince William Sound (PWS). As of June 2015 there were approximately 14 tanker vessels operating at TAPS ranging greatly in both overall length, from 600 feet to 941 feet, as well as dead weight tonnage, from 46,000 metric tonnes to 193,050 metric tonnes. One major concern for these tanker vessels since the grounding of the *Exxon Valdez* in 1989, has been how to respond to an emergency such as a fire aboard the vessel or the vessel losing power. The immediate course of action in an emergency as identified by the Alaska Department of Conservation (ADEC) is for the vessel to enter a port or place of refuge.

A "place of refuge" (POR) is defined as a location where a vessel needing assistance can be moved to, and where actions can then be taken to stabilize the vessel, protect human life, reduce a hazard to navigation, and/or protect sensitive natural resources and other uses of the area (e.g., subsistence collection of mussels, commercial fishing, recreational boating). A POR may include constructed harbors, ports, natural embayment, potential grounding sites, or offshore waters. This section identifies potential docking, anchoring, mooring, and grounding locations that may be selected as Places of Refuge in the Prince William Sound Subarea. Actual designation of a POR will always be an incident-specific decision made by the U.S. Coast Guard Captain of the Port (COP) for PWS.

The POR exact locations available within PWS for tanker vessels have been identified by the ADEC. These were developed in 2004 based upon the "guidelines for places of refuge decision-making" and are included within the "Prince William Sound Subarea Contingency Plan" (2004). These locations are identified for tanker vessels requiring

assistance and where actions can then be taken to stabilize the vessel, protect human life, reduce a hazard to navigation, and/or protect sensitive natural resources. These locations are designated for a tanker vessel to anchor, go alongside docks/piers, or moor and potential grounding sites within the PWS Subarea. Locations requiring analysis of viability for this purpose will be examined to determine their safety for tanker vessels in distress. In such an emergency, the tanker vessel would enter the POR and anchor to promote environmental safety.

Examination of these ports is necessary to provide the U.S. Coast Guard COP for PWS pertinent information required to assist in creating a prudent positive decision prior to directing a disabled tanker vessel to a POR. The U.S. Coast Guard COP has the authority to order a tanker vessel to proceed to a previously identified POR. Such a decision should be made with the knowledge that this action will not further exasperate the situation. As the vessel will be in distress, the amount of time to make this decision will be limited and will probably occur with little or no prior notification of the vessel being in distress. This would mean minimal time for consultation with local experts prior to the directive being issued. All action must be expedient in particular the selection of a POR. Therefore, there is a distinct need for these identified POR to be examined prior to the decision-making process and are essential to protect the human and natural environment of PWS and the safety of ship and crew involved.

Scope of the study will be limited to specific POR, which have been previously determined to be capable of providing for tanker vessels transiting PWS. This was determined within the original study “Prince William Sound Subarea Contingency Plan” (2004) by identifying POR capabilities based upon vessels greater than 20,000 gross tons. The draft and length of the ships identified were stated as ranging from 25 to 60 feet deep and range in length from 450 to 1,000 feet. Twenty one POR were identified as having the capability for tanker vessels of this size to utilize. These POR are listed below in Table 1.

**Table 1. Potential Places of Refuge for vessels larger than 20,000 tons based on “Prince William Sound Subarea Contingency Plan” (2004)**

<b>Port of Refuge</b>	<b>Map</b>
1. Gold Creek Anchorage	#1
2. Valdez Container Terminal	#1
3. TAPS Dock at berth 1	#1
4. TAPS Dock at berth 3	#1
5. TAPS Dock at berth 4	#1
6. TAPS Dock at berth 5	#1
7. North Jack Bay Anchorage	#2
8. South Jack Bay Anchorage	#2
9. Knowles Head Anchorage	#4
10. Port Etches Anchorage	#7
11. Zaikof Bay Anchorage	#7
12. Port Etches Moorage	#7
13. Macleod Harbor Anchorage	#8
14. North Smith Island Anchorage	#11
15. Outside Bay Anchorage	#11
16. McPherson Bay Anchorage	#11
17. Pigot Bay Anchorage	#12
18. Whittier Cruise ship dock	#12

19. Delong Pier	#12
20. South College Fjord Anchorage	#13
21. North College Fjord Anchorage	#13

Tanker vessels participating in the TAPS are required to remain within the vessel traffic scheme. The vessel traffic scheme consists of traffic lanes running in a north to south direction, east of Naked Island, from outside of the entrance of PWS at Cape Hinchinbrook to the Port of Valdez. Only the ports which were previously identified that are within the vicinity of the traffic lanes would be applicable and those in Western PWS would not be within the scope of this study. Six of the ports which would be excluded because they are significantly west of the traffic lanes within Western Prince William Sound, but identified above are the following: (1) Macleod Harbor Anchorage (Map #8); (2) Pigot Bay Anchorage (Map #12); (3) Whittier Cruise ship dock (Map #12); (4) Delong Pier (Map #12); (5) South College Fjord Anchorage (Map #13); and (6) North College Fjord Anchorage (Map #13).

In addition to these six POR, there are an additional seven ports that will not require examination. These identified POR are presently frequently used by tanker vessels, or within the Port of Valdez and will not require further examination because their limitations and capabilities are already well known. This includes the following seven ports: (1) Gold Creek Anchorage (Map #1); (2) Valdez Container Terminal (Map #1); (3) TAPS Dock at berth 1 (Map #1); (4) TAPS Dock at berth 3 (Map #1); (5) TAPS Dock at berth 4 (Map #1); (6) TAPS Dock at berth 5 (Map #1); and (7) Knowles Head Anchorage (Map #4).

Therefore, upon removal of these 13 previously identified POR for either being far removed from vessel traffic lanes or either already being frequently utilized, there remains eight POR that require examination. These eight remaining POR will be the focus of the proposed study. They are: (1) North Jack Bay Anchorage (Map #2); (2) South Jack Bay Anchorage (Map #2); (3) Port Etches Anchorage (Map #7); (4) Zaikof Bay Anchorage (Map #7); (5) Port Etches Moorage (Map #7); (6) North Smith Island Anchorage (Map #11); (7) Outside Bay Anchorage (Map #11); and (8) McPherson Bay Anchorage (Map #11).

The examination of these eight POR will need to be scrutinized as to their capability for the stricken vessel to be safely maneuvered into them. The main variables that will be analyzed are the ship characteristics in terms of dead weight tonnage and empty versus fully loaded. Environmental conditions will be analyzed with particular attention to wind speed and direction. In addition, the type of assist tug boat will also vary. Assist tug boats available to maneuver the vessel into the POR are a crucial consideration as a larger empty vessel will require significantly greater assistance than a loaded smaller vessel during adverse environmental conditions.

Due to the number of POR identified for examination (8), Safeguard Marine proposes to divide the study of these POR into three phases. Due to the vast size of PWS, geographical areas will be utilized. These will be identified as “Northern Prince William Sound”, “Mid Prince William Sound”, and “Southern Prince William Sound”. These three regions correspond to the following POR and maps listed in Table 2 below.

**Table 2. Ports of Refuge and Maps by Region**

<b>Northern Prince William Sound</b>
1. North Jack Bay Anchorage (Map #2)

2. South Jack Bay Anchorage (Map #2)
<b>Mid Prince William Sound</b>
1. North Smith Island Anchorage (Map #11)
2. Outside Bay Anchorage (Map #11)
3. McPherson Bay Anchorage (Map #11)
<b>Southern Prince William Sound</b>
1. Port Etches Moorage (Map #7)
2. Zaikof Bay Anchorage (Map #7)
3. Port Etches Anchorage (Map #7)

Each of these three regions of PWS will require close scrutiny and consideration based upon the environmental conditions and scenarios involving a stricken tanker vessel within the region. Each region will require separate and distinct examination based upon the environmental conditions and POR as identified. The identified POR within each region may include other possible POR based upon input from local maritime experts. It is our belief that other POR as defined above may be available within these three geographical regions. This should be further examined to provide U.S. Coast Guard COP the local experts' knowledge and not limited to the ports identified by the POR committee. The order of examination for these three regions will be the following: Southern Prince William Sound, Mid Prince William Sound, and Northern Prince William Sound. Examination of each region will take approximately one year to complete.

### **Methodology**

This proposed study will provide updated information concerning the safety of the identified POR for anchoring or grounding of disabled tanker vessels utilizing various methods of data collection and analysis including interviews with local maritime experts, maritime vessel simulations, and a focus group with local maritime experts. The reason for having three types of data collection and analysis is for triangulation increasing the validity of the study and each step of data collection informs the next. These three forms of data collection and analysis are necessary to determine the viability and safety of specific POR previously identified by the ADEC.

### **Phase 1: Interviews and Simulation Development (Approximately 2 months)**

**Interviews** will be conducted with a minimum of 15 local maritime experts possessing first-hand knowledge concerning tanker vessel operations in PWS. Interviews will be confidential, but will represent such organizations as: Southwest Alaska Pilots Association members, Crowley escort captains, and ship captains of tanker vessels from a range of companies involved in the movement of tanker vessels within the TAPS. The interviews will be conducted over the telephone or other medium and will take approximately 30-60 minutes each. The interviews will be confidential in order to protect the interviewee. Interviewees will be identified through a coding process as Interview #1, Interview #2, etc.

The interviews will only focus on each specific region and grouping of POR as well as input about other possible POR in the given region not yet identified. The main purpose of these interviews is to collect primary data from those local expert mariners operating tanker vessels in these regions. The data will be used to provide context for the study as previous data may be incomplete, out of date, or may be complimented from the interviewee's unique perspective, and provide input about vessel, environmental conditions, personnel, and emergency procedures and scenarios involved with creating vessel maritime simulations. This input is important for establishing the simulations and ensuring their validity.

## **Phase 2: Simulations (Approximately 1 month)**

**Maritime vessel simulations** will be created by Safeguard Marine. These simulations will be carried out by multiple experienced local maritime experts including Crowley tug boat and tank vessel captains. These simulations will examine each POR in the PWS region and other POR as identified by the interviews. Simulations will include the following variables: vessel characteristics (dead weight in tons, empty versus loaded), environmental conditions including wind direction and speed, tugboat vessels, and various conditions of the vessel under emergency conditions. Approximately 5 - 6 simulations will be conducted for each POR in a given region for a total of 10 - 18 simulations per region. Each simulation takes approximately 45 - 60 minutes to execute. Every simulation will have a specific tank vessel type and two tug boats assisting. The simulation of tug boat assist will vary between using two simulated tug boats assisting on a vessel under distress, and one simulated and one interactive or man controlled tug boat. This will provide further information about tug boat assist as this is a crucial factor for these simulations since the ship is stricken and assumed to be in distress.

Three simulators will be operating simultaneously. One simulator will have a tank vessel under various conditions and will be assisted by two simulated tug boats. These two simulated tug boats will consist of one Prince William Sound Class tug *Nanuq* or *Tanerliq*, and one Alert Class tug boat, *Alert, Aware, and Attentive*. A second simulator will be operating with a different tank vessel under different conditions, and will be assisted by an Alert Class Azimuth drive interactive tug boat that will be operated by two tug boat captains in the third simulator. This will provide variation and examination of tug boat assist for vessels under distress.

Simulations will be conducted at AVTEC, Seward Alaska Maritime Department. This simulator is approved by the U.S. Coast Guard for teaching ice navigation classes and is available for individual and company use. Upon completion of each simulation a screen capture of the movements of the vessel during the simulation will be taken. This image depicting what occurred during the simulation will be utilized during exit interviews. Exit interviews using the image will be conducted asking the mariners about their level of concern and what maneuvers should be recommended for risk mitigation.

In total, Safeguard Marine will spend two days utilizing the simulator. The first day will be to introduce the local maritime experts to the purpose and scope of the study, provide instructions about the simulator and the exit interviews, and acclimate them to the simulators. The second day will be utilized for conducting the simulations of the POR and the exit interviews.

## **Phase 3: Focus Group and Final Report (Approximately 2 months)**

A **focus group** will be conducted to verify, interpret and provide recommendations based on the completed simulations. This focus group will include mariners representing various perspectives and sectors. The group will discuss the results of the simulation and provide recommendations for the final report. The focus group will meet for one day to discuss the results and make recommendations. The perspective of various local mariners provides a check on the validity of the study, additional context and interpretation for the report, and builds support for the recommendations by those implementing them in practice.

Phase 1 interview data, Phase 2 ship simulator data and exit interview results, and Phase 3 focus group interpretation and recommendations will be synthesized into a final report for each PWS region. The final report will provide analysis and recommendations for the maritime implications of the identified POR in a specific PWS region. The report along with the data from the simulations will be submitted to the Prince William Sound Regional Citizens' Advisory Council. In total, there will be three reports submitted, one for each region of PWS as found in Table 2.

### **Expected Outcomes**

The study will identify the risks, potential issues, and maritime perspective recommendations in relation to POR for tanker vessels in distress in PWS. These issues will be chronicled and identified using the methodology above. Safeguard Marine will then make appropriate recommendations from a maritime perspective about the safety for tanker vessels in distress to utilize the identified POR for anchoring to promote environmental safety. Safeguard Marine will prepare and submit a report to Prince William Sound Regional Citizens' Advisory Council, but ownership of the data and results will be retained by Safeguard Marine for possible future use.

### **Personnel**

We will request that tanker vessel company owners (Alaska Tanker Company, Polar Tankers, Sea River, and Maritime Overseas) and Crowley Maritime provide ship captains and tug boat captains as our experts for interview, simulations, and focus group activities. In total, we will seek to utilize one captain from each company and two tug boat captains for a total of six local maritime experts.

The co-primary investigators for this project will be the president and vice-president of Safeguard Marine.

The president of Safeguard Marine is Captain Jeff Pierce. Captain Pierce is a licensed maritime pilot who holds federal licenses' for all Puget Sound waters, South Central and Western Alaskan waters, and an Alaskan state license for South Central Alaska. He has been an Alaskan pilot for thirty years and works with other Southwest Alaska Pilots Association (SWAPA) pilots. He has served as President of SWAPA for multiple terms and has provided expert testimony about maritime navigation and environmental risks to the Alaska State Government. He is identified in the budget as SGM 1.

The vice-president of Safeguard Marine is Jonathan Pierce, Ph.D. Dr. Pierce is an Assistant Professor at the Institute of Public Service at Seattle University where he teaches courses in public policy and research methods and statistics in the Masters of Public Administration and Bachelors of Public Affairs programs. Dr. Pierce received a Ph.D. in Public Affairs from the School of Public Affairs, University of Colorado Denver in 2012 and subsequently served as a post-doctoral fellowship conducting research on the politics of hydraulic fracturing funded by the Alfred P. Sloan Foundation. He is identified in the budget as SGM 2.

In addition, research assistants will be included on this project, identified in the budget as SGM 3. These research assistants will be used during interviews to take notes, edit documents, and assist as deemed necessary in the project. Research assistants may include current students of Seattle University among others.

### Past Work of Safeguard Marine and Location

Safeguard Marine is a licensed LLC in the State of Alaska and operates out of Eagle River, Alaska. Safeguard Marine has errors and omissions insurance. Our Federal ID# is 27-4924275 and our LLC entity number is 133203.

Safeguard Marine has conducted multiple past maritime studies including the following clients:

- (1) Port of Anchorage (2015)
- (2) Hecla Green Creek Mining Company at Hawk Inlet Juneau, Alaska (2014)
- (3) Matanuska-Susitna Borough at Port MacKenzie (2014)
- (4) City of Seward, Seward Marine Industrial Center (2013)
- (5) City of Valdez (2012)
- (6) Alaska Gasline Port Authority (2012)

A complete list of our past projects as well as the completed reports can be found at <http://www.safeguardmarinealaska.com/>

### Budget

Please note that this budget only represents the cost of studying a single region of POR in PWS for the year 2015-2016. In this case the first proposed region is Southern Prince William Sound including the following three POR all within Map 7: Port Etches Anchorage, Port Etches Moorage, and Zaikof Bay Anchorage. Also, this budget is based on winter rates (November - March). Summer rates for work would be different. We are assuming Crowley and the tanker vessel companies will donate the time and cost of captains to participate in this study.

Item and Personnel	Hours	Rate	Total
<b>Phase 1: Interviews and Simulation Development</b>			
<i>Simulator Preparation Labor</i>			
AVTEC Technician	8	\$750 per day	\$750
SGM 1	20	\$200 per hour	\$4,000
<i>Interview Labor</i>			
SGM 1	25	\$200 per hour	\$5,000
SGM 2	25	\$175 per hour	\$4,375
SGM 3	25	\$50 per hour	\$1,250
<b>Subtotal Phase 1</b>			<b>\$15,375</b>
<b>Phase 2: Simulator Use</b>			
<i>Simulator Costs</i>			
Rent Simulator	15	\$1950 (X1.5)	\$2,925
Classroom	15	\$150 (X2)	\$300
Second AVTEC Technician	8	\$750 per day	\$750
Administration Fee		10%	\$473
<i>Simulations Labor</i>			
SGM 1	10	\$200 per hour	\$2,000
SGM 2	10	\$175 per hour	\$1,750

SGM 3	10	\$50 per hour	\$500
Hotel and Food		\$225 per person/day (X9)	\$2,025
Travel to and from Seward, AK			\$2,500
<b>Subtotal Phase 2</b>			<b>\$13,223</b>
<b>Phase 3: Focus Group and Report</b>			
<i>Focus Group Labor</i>			
SGM 1	15	\$200 per hour	\$3,000
SGM 2	15	\$175 per hour	\$2,625
SGM 3	10	\$50 per hour	\$500
Hotel and Food		\$100 per person/day (X9)	\$900
Travel to and from Anchorage, AK			\$2,000
<i>Report Analysis and Writing</i>			
SGM 1	30	\$200 per hour	\$6,000
SGM 2	30	\$175 per hour	\$5,250
SGM 3	20	\$50 per hour	\$1,000
<b>Subtotal Phase 3</b>			<b>\$21,275</b>
<b>Total</b>			<b>\$49,873</b>

To complete examination of all three regions of PWS it will cost approximately \$150,000 over the course of three years (2016 - 2018).