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PWS
Escort and Response Systems: Issues and Policies

December 2006: Task 3

December 21, 2006

Introduction

Due to Prince William Sound Regional Citizens’ Advisory Council (PWSRCAC) concerns about the quality and continuity of the Prince William Sound (PWS) Ship Escort and Response Vessel System (SERVS), the Contingency Plan Project Team has studied and considered key tanker escort and response system issues.

PWSRCAC contracted Nuka Research and Planning Group, LLC to review reports and analyses commissioned by PWSRCAC from 2004-2006, as well as previous relevant documents.

This report proposes policies for consideration by the Board of Directors based on the recommendations of the Contingency Plan Project Team. If adopted, these policies will serve as the basis for future PWSRCAC efforts to ensure that the tanker escort and response system provides efficient and effective oil spill prevention and response in Prince William Sound. This report will also help future PWSRCAC staff and other interested stakeholders understand the key issues considered and decisions taken through the end of 2006.

As a summary document, this report primarily references studies and documents commissioned and reviewed by the PWSRCAC or SERVS.

Overview of SERVS

As the escort and response system is currently configured, two tugs provide escort to laden Trans-Alaska Pipeline System (TAPS) tankers transiting PWS from the Valdez Marine Terminal (VMT) through Hinchinbrook Entrance. Inbound tankers are escorted by one Sentinel tug and all tankers follow a vessel traffic scheme. Certified response barges with towing tugs are on standby for immediate response as well. The Ship Escort Response Vessel System (SERVS), paid for by the TAPS tariff, includes a varied fleet of escort and response vessels with diverse roles. Over almost two decades, SERVS has grown and changed according to a combination of state and federal requirements. Today, it plays a critical role in preventing tanker oil spills in the Sound.
Legal and Regulatory Basis

Immediately after the Exxon Valdez incident, Alaska’s governor passed an Executive Order requiring all laden, single-hull tankers transiting PWS to be accompanied by two escort vessels. Subsequent federal and state lawmakers and regulations have guided the refinement of the system. Oversight of the escort and response system falls to the US Coast Guard (USCG) at the federal level and the Alaska Department of Environmental Conservation (ADEC) for the state.¹

Table 1, below, describes the legal and regulatory foundations of today’s escort and response system.

Table 1. Requirements for the Escort and Response System.

<table>
<thead>
<tr>
<th>Federal Requirements</th>
<th>Citation</th>
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<tbody>
<tr>
<td>The Oil Pollution Act of 1990 requires that:</td>
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<tr>
<td>1) Single-hull laden tankers over 5,000 gross tons must be escorted by at least two towing vessels.</td>
<td>46 USC Sec. 3703</td>
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<tr>
<td>USCG promulgated regulations to this effect and established performance and operating requirements for escort vessels.</td>
<td>33 CFR 168 Parts 40 &amp; 50</td>
</tr>
<tr>
<td>2) Oil spill containment and removal equipment, including escort vessels with skimming capability, must be placed strategically for ready response.</td>
<td>33 USC Sec. 2735</td>
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<tr>
<td>USCG regulations require vessel response plans (VRP), including a response vessel with skimming and on-board storage capability, for oil tankers. This requirement is not tied to single-hull tankers. Thus, there must be one escort for all laden tankers calling at the Valdez Marine Terminal.</td>
<td>33 CFR Part 155.1130(g)</td>
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<th>State Requirements</th>
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<tr>
<td>Tankers transiting Alaskan waters must have an ADEC-approved contingency plan demonstrating sufficient response resources, including tugs, to conduct open-water and near-shore recovery operations, firefighting, and vessel lightering; protect environmentally sensitive areas; and support safety. Scenarios within the plan describe the number, type, and configuration of tugs required to meet the response planning standard. All tugs, other aspects of the escort and response system, and spill prevention and response measures in general, must also be approved by the State as “Best Available Technology,” or BAT. In this separate section of the contingency plan, operators must present an analysis of their systems relative to others used around the world. BAT analysis is based on specific definitions of what can be deemed both “best” and “available” in terms of demonstrated capabilities and cost.</td>
<td>18 AAC 75</td>
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¹ Shippers must have resources available to contain or control and clean-up 300,000 barrels of oil in 72 hours.
SERVS Operations

The SERVS fleet’s key functions are to: identify any indication that a tanker is having problems, assist the tanker as needed, and provide first response in the event of a spill. Each laden tanker has a Primary Escort either tethered or in close escort from the VMT through Hinchinbrook Entrance. A Secondary Escort is in close escort or acts as Sentinel, depending on conditions, location in the Sound, and the number of tankers in the system. One Sentinel, referred to as the Hinchinbrook Tug, will remain on station until the laden tanker reaches 17 miles into the Gulf of Alaska. Figure 1, below, highlights some of PWSRCAC’s concerns about specific aspects of the system.

Figure 1. Overview of SERVS’ Prevention Operations.
Besides performing the traditional workload of a tug, many of the escorts are equipped for spill response, firefighting, and tanker assists in case of inclement weather, icebergs, or other factors that may impair safe navigation. In responding to a spill, the SERVS fleet will maneuver barges for lightering and near shore response, conduct skimming, assist the stricken tanker, maneuver a tanker of opportunity, and escort any other vessels in the system to safety. In case of an accident at the VMT itself, tugs may be involved in docking or undocking tankers in the emergency context or firefighting.

Escort and response system operations are described in the Vessel Escort and Response Plan (VERP) and have been summarized in multiple previous PWSRCAC reports. Additional information about the role of SERVS in prevention and response, including mobilization times, towing techniques, and escort procedures can be found in PWSRCAC’s 2005 internal report, “Prevention and Response Requirements for Prince William Sound (PWS) Tanker Escort System,” and the September 2006 update to the PWSRCAC Board of Directors.

PWSRCAC’s Commitment to the Escort and Response System

The SERVS fleet is a critical component of the current system to prevent oil spills, which, despite technological improvements and refinements in spill response techniques, remain extremely difficult to clean up and can be catastrophic to the environment.

The OPA90 provision that requires tankers transiting the Sound to be escorted by two tugs will expire when the tanker fleet completes the transition to double-hulled vessels. Although the law does not require this change nationwide until 2015, it may be as early as 2007 that the TAPS tanker fleet has fully converted. With the sunset of this critical federal requirement, the use of a two-escort system will hinge on voluntary compliance and state-level requirements.

PWSRCAC is concerned that the shippers may propose to reduce the escort and response system. The upcoming review of the state-mandated shippers’ contingency plan (Tanker C-plan), scheduled for 2007, could provide one such opportunity. However, the RPG has informed PWSRCAC that it does not intend to propose a reduction of the number of tugs until after the 2007 Tanker C-plan review (Coffey, 2006). ADEC has indicated that it will not support significant changes to the tanker escort and response system in the near term (Hutmacher, 2004).

A risk assessment or other data collection and analysis could be used to justify a reduction in the escort and response system. In September 2006, the Board of Directors established a policy that any risk assessment of the tanker escort and response system should be conducted with PWSRCAC involvement throughout the process and according to the highest standards. A risk

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2 A 1998 letter to PWSRCAC from SERVS indicated that the arrival of the higher quality PRTs would allow for a fleet reduction from 12 tugs to 10 tugs “initially” (Jones, 1998).
assessment should not be used to justify a reduction of the system unless it is proved conclusively that this would not result in increased risks.

ADEC has informed PWSRCAC that it supports an updated risk assessment for the continuation of an effective tanker escort and response system in PWS (Hutmacher, 2004). The RPG collected tug data from 2005-2006; however, PWSRCAC was notified recently that this data collection effort has concluded because the justification for continuing it was inadequate (Meadors, 2006).

Proposed PWSRCAC Policies

PWSRCAC’s mission is to promote environmentally safe operations of the VMT and associated crude oil tankers. The Council has worked with the shippers and with state and federal government agencies to identify and address potential weaknesses in the system as it has developed over nearly two decades. Today, Prince William Sound has a world-class escort and response system positioned to prevent or respond to tanker accidents.

PWSRCAC seeks the maintenance and continued improvement of the two-escort system for Prince William Sound. To this end, the Council expresses its commitment to the features of the escort and response system described here.

1. All laden tankers in PWS, including double-hulled tankers, should continue to be escorted by two escorts.

PWSRCAC welcomes technological improvements (including double hulls, redundant engines and steering systems) to TAPS tankers. However, such measures do not guarantee accident prevention. While they can reduce the severity of a spill once it occurs, improved technologies, redundant systems, and enhanced automation cannot eliminate oil spills caused by inescapable human errors. In some cases, technological and engineering improvements in the marine sector have been shown to increase the risk of an oil spill or other accident due to human factors such as fatigue, skill or knowledge deficiencies, or risk compensation (DeCola and Fletcher, 2006). Since 2002, PWSRCAC is aware of two incidents of redundant tanker propulsion loss reported in the State of Washington: one was attributed to improper maintenance with improper equipment use as a contributing factor (Department of Ecology, 2002), and the other to machinery or equipment failure (US Coast Guard, 2006).

Currently, both single-hulled and double-hulled tankers transport oil from the VMT. PWSRCAC appreciates and commends the use of the proven two-escort system for all tankers and the recognition of this procedure as best practice for all tankers in the VERP.\(^3\)

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\(^3\) The introduction to the current VERP states that the procedures described are intended for all tankers transiting the Sound. Referenced in Nuka Research and Planning Group, LLC, Importance of Maintaining the Prince William Sound Escort System for Double-Hulled Tankers: Report to the PWSRCAC, December 3, 2004.
2. A fleet of 10 tugs is the smallest adequate to meet prevention and response needs.

The number of tugs required in the SERVS fleet is based on the number required for prevention and response operations (Coffey, 2006), though it is the response requirements that represent the limiting factor of the SERVS fleet (Harvey Consulting, LLC, 2006). In 1998, PWSRCAC agreed to a SERVS-proposed reduction to a tug fleet of 10 (Stephens, 1998).

A 2005 workshop of agency, industry, and citizen groups concluded that 10 tugs is the smallest number capable of responding to a tanker spill when there are no more than two laden tankers in the system. A hypothetical eight-tug system was considered, but: 1) the conditions were unrealistic, 2) it would be difficult for the barges to meet mobilization time requirements, and 3) the eight-tug system omits the continued escort of a laden tanker in addition to response requirements (Harvey Consulting, LLC, 2006).

In evaluation of spill scenarios at Seal Rocks, where there was more than one laden tanker in the system, it was concluded that a 10-tug system is adequate for mounting the initial stages of a response only if waivers are provided to modify required prevention and response roles. Without waivers, the spill scenario analyzed for Seal Rocks may require 12 or even 13 tugs (MAC Services, LLC, and Nuka Research and Planning Group, LLC, 2006).

A spill that took place in the Gulf of Alaska would require additional ocean-towing tugs to be brought from outside the region (Cape International and Nuka Research and Planning Group, 2006). Appropriate tugs should be identified and pre-contracted for use in the event of such a spill.

3. A 10-tug escort fleet should be configured to ensure that the best possible tug fills each role according to its capabilities. This may require acquisition of additional vessels or replacement of current tugs with more suitable BAT tugs.

- In the near-term, a PWS Class/ETT tractor tug will be the Primary Escort and the PRT tractor tug will be Secondary Escort (and Hinchinbrook Tug). Conventional tugs should not fill these roles, even as back-up. The Protector Class tractor tug could serve as back-up as needed in the near-term.

- In the long term, the 10-tug escort and response system should consist entirely of best available technology (BAT) tractor tugs with high maneuverability, high bollard pull, and, for those used as the Hinchinbrook Tug, ocean-towing capability.

Tugs acting as Primary Escort, Secondary Escort, and Sentinel (including the Hinchinbrook Tug) are all poised to respond to and slow or re-direct a disabled tanker. In the current system, the only BAT tugs for these important roles are the PRT and PWS Class/ETT. These tractor tugs are superior to the conventional tugs in their maneuverability and bollard pull.

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4 The Theriot Class conventional tug was included as an escort in the last Tanker C-plan. ADEC approved this only as a back-up tug to fill these roles on a temporary basis. (Harvey, 2001).
Computer modeling shows that tractor tugs akin to the PRT and PWS Class/ETT used in the Sound have higher predicted maximum braking force as compared to the Theriot and Invader Class conventional tugs. The tractor tugs show a higher braking force at one knot as compared to the conventional tugs, and this relative advantage increases as tanker speed approaches 6 knots (The Glosten Associates, 1995). At 5-6 knots, the tractor tugs also have higher predicted braking force and steering forces as compared to the conventional tugs (The Glosten Associates, 1993).

Tractor tugs are also capable of maneuvers additional to those performed by conventional tugs, providing more options for slowing or redirecting tankers. Tractor tugs can pick up a tanker’s bowline at a higher ship speed and more safely than a conventional tug, and they suffer less risk of being pulled in toward the tanker and becoming vulnerable to “going in irons” or being flipped. Tractor tugs can also run backwards with a line to the tanker stern, thus towing and steering assist can be provided both directly and indirectly depending on the tanker speed (The Glosten Associates, 1993).

However, PWSRCAC is concerned about assessments of tug performance in other regions indicating that at tanker speed above 8 knots, the PRT may not be effective when working to slow or steer a failed tanker. For this reason, the PWS Class/ETT should be the predominant Primary Escort once the departing, laden tanker has passed the 6-knot speed limit of the Narrows.

4. Pending future technological improvements, the Hinchinbrook Tug, which remains on station until a laden tanker is at least 17 miles seaward of Hinchinbrook Entrance, should always be a PRT.

The PWS Class/ETT tug is an excellent Primary Escort to escort laden tankers through Hinchinbrook Entrance (or Escort and Sentinel roles elsewhere in the Sound). The Hinchinbrook Tug must have adequate ocean-towing capability to assist a disabled tanker up to 17 miles into the Gulf of Alaska up to closure conditions (ADEC, 1997 and The Glosten Associates, 1997). The PWS Class/ETT does not have an adequately-equipped aft tow winch to meet the requirements of the Hinchinbrook Tug. In the current SERVS fleet, the PRT should be the only vessel used as Hinchinbrook Tug.

The 2002 Tanker C-plan does not specify any limitations on the use of the PWS Class/ETT for any of the roles in the Hinchinbrook Entrance area.

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5 A review of tugs for Puget Sound consideration also concludes that, “Escort practice has also come to recognize the performance and safety advantages of tractor tugs over conventional tugs for tanker escort.” (The Glosten Associates, 2004).

6 One report indicates that above 8 knots the engines and props may be overloaded and stall when a tug similar to the PRT (a tractor tug with azimuthing propellers) is used in “reverse arrest” mode. However, this same report indicates that the tug can avoid this problem if able to respond in the “transverse arrest” mode (Hensen, 1997). Another study shows that a conventional tug—similar to the PRT but with fixed, open propellers—showed a drop in pulling power at 7 knots (The Glosten Associates, 1991).
5. Crewing during both prevention and response modes should be according to federal regulations and adequate to fill all necessary vessel and personnel roles.

Response barges used in Prince William Sound may have response crews on board ranging from 15-46 members. Certificates of Inspection for all barges require a standby vessel capable of taking on board the entire barge crew (Cape International and Nuka Research and Planning Group, 2006). However, even the largest capacity of the tugs listed as standby vessels is not adequate to accommodate the smallest barge crew. In addition to their own crews, the standby vessels can hold from 4-10 persons. The number of personnel able to conduct response operations from the barges will therefore be limited by the capacity of standby vessels (Cape International and Nuka Research and Planning Group, 2006). Furthermore, the PRT and the conventional tugs do not carry USCG Certificates of Inspection, making it difficult to determine passenger and crew maximum capacity, seaworthiness in exposed conditions (particularly if the vessel has not been assigned a loadline) and adequacy of vessel safeguards that may be affected by the unique conditions of oil spill prevention and response (Eley, 2006).

Clarification may be needed as to whether it is acceptable under US Coast Guard regulations for one standby vessel to serve two barges simultaneously.

For the purposes of safety and prompt response, the escort and response system’s vessels must be adequately crewed to implement planned response measures. The PRTs carry two spill response skiffs on board, each requiring two operators when deployed. With a PRT crew of six or seven, PWSRCAC is concerned about the deployment and operation of all necessary spill response equipment.

6. Spill response should not rely on the assumption that waivers will be granted to allow significant deviation from the approved configuration of the escort and response system.

Spill response scenarios developed by PWSRCAC and its contractors indicate that in some cases, an adequate spill response may rely on waivers to allow deviation from the escort and response system procedures (PWSRCAC OSPR, 2005). Such waivers may be requested for the use of an unsuitable tug for an escort function, allowing an unaffected tanker to remain at the VMT berth during a spill response without tugs, or release of the firefighting tug that is required at the VMT when a tanker is present (the latter is permitted in ADEC regulations at 18 AAC 75.470). During a spill response, the need to alter the PWS tanker escort and response system temporarily may be unavoidable. However, PWSRCAC believes prevention and response planning should not be based on the expectation that waivers will be granted: if the potential impacts of such a reconfiguration are considered as part of the planning

7 Barge 500-2 has capacity for a response crew on board of up to 46 persons; other barge response crews range from 15-28 (Cape International and Nuka Research and Planning Group, 2006).
8 2002 Tanker C-plan, Vol. 2, Part 3, SID 1, Section 1 Equipment.
process, it may be possible to identify compensating measures to avoid a loss of prevention capability when tugs are removed from the escort and response system to provide response functions.

ADEC supported this position during the December 15, 2005 Tug Fleet Workshop in stating that a c-plan holder cannot plan on obtaining one or more waivers to meet the State’s response planning standard or other spill prevention requirements (Harvey Consulting, LLC, 2006).

7. **PWSRCAC will continue to work with government and industry to address issues important to the performance of the escort and response system.**

Outstanding technical issues continue to arise in assessments of various parts of the escort and response system. PWSRCAC will work with SERVS, the Response Planning Group, USCG, and ADEC to gather additional information, demonstrate capabilities with on-water testing or computer modeling, or modify procedures as appropriate. Some current questions that have arisen in PWSRCAC commissioned reports or staff review of documents are provided here as examples of outstanding issues.

- The Utility Class tug is described in the Tanker C-plan as being able to store 3,700 bbls of recovered oil. However, the USCG Certificate of Inspection for this vessel does not permit such storage.

- Any vessel designated in the C-plan to carry recovered oil may require that the vessel be inspected and issued a USCG Certificate of Inspection (Eley, 2006); however, as noted, the PRT and conventional tugs do not carry Certificates of Inspection.

- The open water response limitations need to be further quantified through actual deployment in adverse conditions and through modeling. The response gap needs to be determined in other operating areas of the Sound.

Other technical questions may arise during the upcoming contingency plan review.
Options for Policy Promotion

PWSRCAC has several opportunities to promote Board-approved policies on the escort and response system. While some of these are automatically incorporated in scheduled plan reviews, others would require advocacy for new legislation or regulations at the state or federal level.

### Upcoming Contingency Plan Updates

1) Tanker C-plan will be submitted to ADEC for review in 2007. This is an opportunity to comment on, among other things, the continuation of the two-escort system, use of specific vessels in different roles, and BAT.

### New Regulation or Legislation

2) Federal level: The USCG could develop or amend regulations at 33 CFR 168, specifying use of two escorts for all new double-hull, redundant tankers. New legislation may be required, as the current statute refers to single-hull tankers. OPA90 has been updated periodically and new updates proposed.

3) Federal level: Under 33 CFR 165, the USCG’s Captain of the Port (COTP) able to designate Regulated Navigation Areas (RNA) with operating requirements specific to the local conditions, in this case, Prince William Sound. RNA requirements could include features such as a mandatory two-escort system for all laden tankers, including double-hulls, but could be susceptible to modification at the discretion of a new COTP.

4) State level: ADEC could develop a requirement that all laden tankers have two escorts in PWS. The State’s right to regulate escort vessels in well-defined geographical areas is upheld in case law at both United States v. Locke, 529 U.S. 89 (2000) and Ray v. Atlantic Richfield Co., 435 U.S. 151 (1978) (Nuka Research and Planning Group, LLC, 2004).

### Negotiation with Shippers

5) PWSRCAC could negotiate directly with SERVS/RPG. While this option has the potential benefit of being more efficient than agency rulemakings and reviews and the legislative process, the outcome would be entirely voluntary and thus subject to change without state or federal oversight.

PWSRCAC may choose to promote established policies in two or more ways simultaneously. For example, PWSRCAC could negotiate with SERVS/RPG for changes in the near-term, while advocating for new regulations or legislation to ensure improvements to the system are sustained in the long-term.
References


Eley, Dave. 2006. E-mail communication with author. Cape International. December 19.


Meadors, Michael, SERVS. 2006. Phone call to PWSRCAC. November 16.


