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Research Methods to Develop Measures of Effectiveness of the United States Coast Guard's Vessel Inspection and Boarding Program, Volume 2 – Main Report

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Research Methods to Develop Measures of Effectiveness of the United States Coast Guard's
Vessel Inspection and Boarding Program, Volume 2 - Main Report

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Abstract

The primary objective of this study is to provide Measures of Effectiveness (MOEs) of the U.S. Coast Guard Marine Inspection and Boarding Program based on objective scientific methods. A secondary objective of the study is to provide USCG management with a methodologically and theoretically sound aid to effective policy decision-making. The MOEs constructed in this study are specific to the Marine Inspection and Boarding Program, but the methodology of the study is based on sound theoretical principles that are probably applicable to a range of USCG activities. Hence the methodology applies equally to other important USCG programs and can be similarly used to measure their effectiveness and as an aid to decision-making.

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1.0 Introduction

The purpose of this task is to develop informative measures of the effectiveness of USCG intervention activities. The measures of effectiveness (MOEs) should permit the evaluation of various activities within USCG programs to allow a comparison of the relative effectiveness of the program's activities with respect to each other as well as their overall effectiveness in meeting the primary goals of improving the safety and security of maritime transport on U.S. waters.

We propose to use two techniques to construct MOEs for Level I, II, and III activities:

- (i) Risk-Based Rankings (RBR) of activities, and
- (ii) Econometric Modelling and Estimation of the effect of activities on the occurrence of casualties

This report details the methodology behind these techniques, and reports on the results in developing a three-phased process based on statistical analysis and econometric modeling of existing databases on deep draft vessel casualties and operations. We describe the varying degrees of detail to be addressed to the construction of MOEs for each of the Level I, II, and III intervention activities. Conceptual differences between Level I, II and III activities, require us to tailor our proposed techniques to individually suit them.

This report, in conjunction with a companion volume "Decision Support for Utilizing Measure of Effectiveness", describes the methodology employed and the prototype decision support system developed to aid USCG program management in using the econometric models that generated the measures of effectiveness. In addition, alternative models and displays are presented as well as a discussion of two analytical approaches to resource allocation that employ the measures of effectiveness.

1.1 Level I MOEs

The purpose of Level I MOEs are to provide a high level perspective of the effectiveness of USCG inspection and boarding programs in the promotion of safety and life at sea. The priority at this level is to fundamentally understand how effective the USCG is at the highest level of distinction between the resources expended on the U.S. fleet and resources expended on foreign vessels in U.S. waters. There are two ways to conceptualize Measures of Effectiveness of the entire USCG inspection and boarding programs in the promotion of safety and life at sea.

The first approach is that the USCG inspection and boarding program is an aggregate of several well-defined component activities, specifically those listed as Level II and Level III activities. Under this approach, an assessment of the overall effectiveness of the USCG inspection and

boarding program requires the assessment of the effectiveness of its component activities, and whether resources expended on these activities are being efficiently allocated. The first step is therefore a construction of MOEs for Level II and Level III activities. The second step is to infer the overall effectiveness (Level I) from these component MOEs.

The second approach is to start with the premise that component activity data are just not available, only data pertaining to overall inspection and boarding activities are available, together with data on casualties. It may seem that since the second approach uses much less information than the first approach, inferences from the second approach will be inferior. While this is true if both approaches are used to make the same kind of inferences, we will use the second approach to make a different set of inferences than those we make from the first approach. Examples of the types of inferences are given in Section 2.2.7, once the risk-based ranking and the econometric methodologies have been described in detail.

1.2 Level II MOEs

The next level of perspective on program effectiveness is an understanding of the importance of the principle activities that constitute the deep-draft vessel inspection and examination programs:

A. Inspection Program

1. Certificate Of Inspection (COI),
2. Annual Vessel Reinspection,
3. Hull Examination.

B. Foreign Vessel Boarding Program Activities

1. Annual Foreign Freight Vessel Examinations,
2. Annual Foreign Tanker Vessel Examinations.
2. Annual Foreign Passenger Vessel Examinations.

The distinguishing feature of Level II activities, particularly A1, A2, and A3, is that they are measurable as duration data, for example, time elapsed between a hull exam and a casualty or time elapsed between a COI and a casualty. For this reason the Risk-Based Rankings (RBR) does not apply to these activities. The mapping from these activities to the cause of a casualty is problematic both conceptually as well as in its implementation using the MSMS database. The RBR methodology befits a situation where the cause of the casualty can be attributable with high probability to a particular activity. MOEs for Level II activities will therefore be constructed using the Econometric methodology. A special class of econometric models are used for Level A and B activities above, namely, duration or time-to-failure models.

1.3 Level III MOEs

1.3.1 Definition

Level III establishes a perspective of the effectiveness of inspection and examination sub-activities as defined below:

Level III Inspection/Boarding Activity

- 1) Cargo Handling/Pollution Control,
- 2) Steering/Navigation,
- 3) Document/Paperwork,
- 4) Drills/Human Factors,
- 5) Auxiliary Systems (U.S. Flag Only),
- 6) Power Plant (U.S. Flag Only),
- 7) Fire Fighting And Prevention,
- 8) Hull (U.S. Flag Only),
- 9) Life Saving.

The MSMS database provides information that allows RBRs as well as econometric modelling of Level III activities. In describing the RBR and econometric methodologies we use examples pertaining to Level III activities to make the applicability of the methods immediately obvious. Level II activities fit into the methodology in the same way as Level III activities do, except that the duration-based measure for Level II activities necessitates the use of different estimation techniques.

1.3.2 Risk-Based Importance Measures Of Level Three Inspection/Boarding Activities

An importance measure represents a quantitative estimate of the significance of the contribution made to a quantity of interest. In risk analysis, several importance measures have been defined to assist modelers and decision makers in understanding the potential for effecting change in the risk associated with a process or activity. Risk can be defined as the product of the frequency of an event's occurrence and the outcome or consequences associated with a particular event. A measurement of risk can be combined with a weighting factor that accounts for the level of significance of Level III inspection/boarding activities to develop a quantitative perspective of

each Level III activity's contribution (or "importance") to risk. The combination of a risk measure and a weighting factor of an activity's significance to casualties yields a powerful risk management perspective regarding optimal allocation of resources for affecting the maximum desired change in risk. The importance measures applied here to the Level III inspection/boarding activities are based on the concept of risk-based ranking (RBR) of dominant contributors to risk. The RBR method is developed in [Wheeler, 1993], and is discussed in detail in Section 2.1.

The frequency of maritime casualties can be quantified in different ways for the purpose of developing varied representation of risk. Different representations of risk provide information necessary to achieve different risk management objectives. Two frequencies of maritime casualties were developed for this study:

- 1) Casualty Frequencies - Casualty frequency rates are defined in terms of the number of casualties associated with a particular unit (e.g., District, MSO) per number of inspections performed by that unit. This enables the occurrence of maritime casualties to be evaluated within the context of the quantity of resources expended specifically on inspection and boarding activities by the USCG at specific units. This frequency offers a perspective of a unit's performance with respect to inspections/boardings relative to other units.
- 2) Relative Frequencies - Relative Frequencies are defined in terms of the number of casualties associated with a particular unit (e.g., District, MSO) normalized by the total number of casualties occurring within the USCG's jurisdiction. This value establishes a conditional probability that, given that a maritime casualty occurs, it is linked to the inspection activity at a particular unit. This frequency offers a perspective of a unit's contribution to total casualty frequency across the entire USCG jurisdiction.

Frequency rates can be defined at various levels of data aggregation. The highest level would simply be overall casualty frequencies for U.S. and foreign flag vessels, with no distinction between the USCG Districts or MSOs that conduct the inspections. More detailed assessments of casualty data yield casualty frequency rates that are defined in terms of casualty consequences (e.g., pollution, deaths) and the location of the last inspection of a vessel prior to a casualty. The result is a variety of perspectives from which to view the effectiveness of USCG inspection and boarding programs. These two probability measures are discussed in further detail in Section 2.1.2.

The idea of linking a vessel casualty to the last District or MSO to inspect the vessel prior to the casualty should not be confused with identifying that inspection as having failed in its purpose. The casualty reports in the Marine Investigation Module (MINMOD) of the MSMS database are not designed to definitively identify inspection faults or short comings that may have contributed

to a casualty. Indeed, the occurrence of undesirable events during vessels operations that contribute to maritime casualties does not necessarily mean that a potential problem was missed during a vessel inspection. Random failures of ship components and human error can occur even if inspection activities designed to detect such flaws are successful in uncovering problems.

Linking maritime casualties to the USCG units that inspected the vessels does not establish a causal relationship between the inspection and the casualty. However, it does establish an understanding of the importance of specific inspection/boarding activities to maritime risk.

The casualty frequency estimates presented in this report are preliminary and represent an illustrative application of the MSMS database to estimate measures of effectiveness of the USCG's deep draft vessel inspection program for U.S. flag vessels. However, the fundamental method applied for U.S. flag vessels here will also be applied to foreign flag vessels data.

1.4 Decision Support Utilizing Measures of Effectiveness

The purpose of this program element is to provide decision support for those responsible for managing USCG responsibilities in maintaining and improving the safety and security of maritime transport in U.S. waters, in particular the Marine Inspection and Boarding Program. In so doing, it will focus on supporting USCG efforts in the analytic measurement of the effectiveness of their activities. The nature of the program is such that the costs and benefits of the service provided are long term in nature and their output is the prevention of an undesirable occurrence. It is understood that it is difficult to identify a single output measure that characterizes the effectiveness of USCG activities. It is also recognized that data are not available to establish benchmarks or baselines for comparison purposes. Furthermore, the true cost of program activities is difficult to determine due to the multi-mission nature of USCG responsibilities and activities.

However, relative measures of performance can be identified and observed, and the effects of USCG activities designed to affect them analyzed. This effort developed a prototype decision support system in a spreadsheet format that allows USCG program management to use the econometric models described in Section 4.0 for resource allocation. Resource allocation modeling is discussed in Section 5.0.

Another analytical approach is to design an investment strategy to explicitly meet stated goals of the Inspection and Boarding program. Goal programming (GP) formulations set target ranges for the performance in specific program areas. Benefits accrued for achieving the goal are specified as well as penalties for under-achievement and diminished returns for over-achievement. Optimization techniques (e.g., linear programming) are used to decide what combination of activities will best meet the goals, given logistical and budgetary constraints. Section 5.0 presents a GP formulation of the resource allocation problem.

Interaction with the models was done via a "spreadsheet" format. Graphical capabilities of the spreadsheet format were employed to their fullest extent. Various table shells were proposed for review by USCG management.

The use of the measures of effectiveness in the problem solving and decision making process involved in resource allocation was explored. A simple method using the spreadsheet format and calculating benefit/cost relationships was described. However, this method does not support decision makers in making tradeoffs between various USCG activities that impact marine safety. Two analytical approaches, one using convex resource allocation and the other goal programming were presented with associated advantages and disadvantages. Recommendations were included on implementation of the prototype DSS and resource allocation methodologies.

2.0 Methodology

In Section 2.1 a discussion of the Risk Based Ranking method for the development of Level III MOEs is present. In Section 2.2 a discussion of the econometric theory and modeling methods to be applied to all of the MOE Levels (I, II, and III) is presented.

2.1 Risk Based Ranking Of Level III Inspection And Examination Sub-Activities

2.1.1 Overview

We will use as examples Level III activities while describing the risk-based-ranking (RBR) and the econometric methodologies. The same method applies to Level II activities, except that the techniques are different owing to the difference in the way Level II and Level III activities are measured. Level II activities are measured as discrete duration and/or count data, while Level III activities are data from a continuously distributed process.

The RBR methodology yields two important pieces of information:

(1) It associates a measure of risk, called Importance, with each Level III activity. This measure of risk possesses a strict definition in this methodology, which is provided below. These risk measures are themselves a valid MOE of each Level III activity. If the risk associated with an activity is low, then that activity may be inferred as being effectively performed. But does that mean that other activities are inadequately performed, or simply that even if the Coast Guard did a perfect job they would still reflect a higher risk relative to other activities? To understand this define Total risk associated with an activity as the sum of its I-risk (Intrinsic risk) and R-risk (Reducible risk), or $\text{Total risk} = \text{I-risk} + \text{R-risk}$. If one believes that the number of deaths associated with Level III activity "A" could be reduced to zero (so that its I-risk would be 0), then Total risk associated with A would be simply R-risk. Obviously, different Level III activities may have different levels of I-risk, so that the risk-based rankings do not rank on the basis of R-risk which is useful policy information. The ultimate goal is a ranking of activities on the basis of R-risk, but to achieve this we need to make the assumption that all Level III activities possess the same I-risk (which is the case if, for example, all Level III activities have zero or the same base-level of I-risk).

A solution to this problem is to construct measures of risk for Level III activities for each of several years. These risk measures can be normalized by the total number of inspections each year so that the risk measures are themselves comparable across years. Those activities that experience a reduction in the risks associated with them may be inferred as being effective, while those that show increases may be inferred as being less effective. Those that maintain a fairly

constant level of risk may be inferred as having achieved their I-risk levels (unless the Coast Guard is of the opinion that in fact a certain amount of R-risk still remains).

(2) It ranks Level III activities in order of the risk associated with them. The natural inference is that the allocation of resources should reflect the risk associated with each activity. Again, the above comments apply. The solution proposed above is also relevant here. The rankings, however, have the additional use as inputs into decision support, once the econometric estimation is completed. This will be explained subsequently.

2.1.2 Detailed Description of the RBR Methodology

Figure 2.1 describes an event tree for the binning of marine casualties from the MINMOD tables of the MSMS database. This is the first step in the construction of measures of risk and the relative rankings of Level III activities based on those measures. The RBR method is flexible enough to allow any hierarchical structure, and any level of branching or aggregation. However, it is generally useful that the tree be compact enough that the tree itself usefully provides interesting summary information.

Each casualty is binned at the right end of the tree. There is a probability measure associated with each bin. It is possible to use different probability concepts since what is important is the likelihood of a casualty occurring in one bin relative to another bin. Two such measures are:

(a) Relative Frequency of each bin, that is, the number of casualties in a bin divided by the sum total of casualties across all bins. This is the most direct and intuitive probability measure and naturally satisfies norms such as bin frequencies summing to one. In Figure 2.1 and for the example calculations in this section the Relative Frequency measure of bin probability is used. (The probabilities in Figure 2.1 do not sum to one because the events in this tree are not exhaustive. Figure 2.1 contains a selection of a subset of bins from the complete tree, which would include a symmetric expansion of the foreign flag branch. In order to simplify the exposition we have selected only a branch.)

(b) Casualty Frequencies normalize casualties by the number of inspections associated with each bin and therefore add further information that is absent from the Relative Frequency measure in (a). Casualty Frequencies answer the following question: Of the total *inspections* associated with a bin, how many represent the last inspection conducted on a vessel prior to that vessel experiencing a casualty. This measure clearly does not sum to one across all bins, and probably sums to a very small number. Casualty Frequencies can be interpreted as probabilities, but should not be normalized to sum to one. (A sum equal to one implies that an inspection will lead to a casualty.)

Maritime Casualty	Vessel Flag	Vessel Service	Last Port Of Inspection	No.	OUTCOME	PROB
<u>MSMS DATA</u>	US	Freight	N.O.	1	\$ 3.1 mil	4.900E-02
			NYC	2	\$ 6.1 mil	5.200E-02
			All Others	3	NA	8.990E-01
		Passenger	N.O.	4	\$ 0.08 mil	4.600E-03
			NYC	5	\$ 0.2 mil	1.500E-02
			All Others	6	NA	9.800E-01
		Tanker	N.O.	7	\$ 0.15 mil	8.200E-03
			NYC	8	\$ 0.5 mil	4.200E-02
			All Others	9	NA	9.498E-01
	Foreign			10	NA	1.000E+00

Figure 2.1. Event Tree of Maritime Casualties Referenced to Last Port Of Inspection.

(The Outcome is total damage in millions of dollars. The bin probabilities are the product across the three branches of their probabilities conditional on the preceding branches. For example, $P(\text{Casualty is a U.S. Flag Passenger vessel with its last Inspection from N.O.}) = P(\text{last Inspection from N.O.} | \text{casualty is Passenger vessel with U.S. Flag}) \times P(\text{Passenger vessel} | \text{casualty is U.S. Flag}) \times P(\text{casualty is U.S. Flag})$).

The basic difference between measures (a) and (b) is that measure (a) associates damage (loss of life, number of injuries, vessel and/or cargo damage) with a *casualty* while measure (b) associates damage with an *inspection*. The relative likelihood of a bin may differ substantially depending upon which measure, (a) or (b), is used and may lead to different rankings of the importance of Level III inspection/boarding activities to risk.

Define Bin Risk as (Bin Outcome $\times$ Bin Probability measure). Bin Outcome may be measured separately as (i) Number of Deaths, (ii) Number of Injuries, (iii) Vessel and Cargo Damage (\$), and (iv) Volume of Pollutant Spilled, or a combination of all (in \$) or some of these types of casualties. In principle, it is possible to compute separate RBRs for Level III activities for each type of casualty, (i) – (iv). The objective of the RBR is to rank USCG interventions/activities based on Importance of each activity. *An activity's Importance is a statistical measure of that activity's effectiveness.* and for activity *j* is given by the sum over all bins of (Bin Risk $\times$ Likelihood that activity *j* is associated with that bin).

Table 2.1 and Table 2.2 demonstrate the computation of activity Importance. Suppose four of the nine Level III activities are to be ranked here in this example (a fifth "activity" has been added in this example for completeness):

1. Cargo Handling (CH)
2. Steering/Navigation (SN)
3. Drills/Human Factors (DH)
4. Documents/paperwork (DP)
5. None of the above

In Bin 1 of Figure 2.1 (US/Freight/N.O.), there are 39 casualties out of a total of 7797 casualties involving U.S. flag vessels reported in the CIRT table of MINMOD over the period covered by this analysis (fiscal years 1991, 1992, and 1993). Of these factors relating to CH occurred in 9% of the cases, SN occurred in 20% of the cases, DH occurred in 47% of the cases, DP occurred in 0% of the cases. These probabilities can be defined as cause frequencies. Cause frequencies can sum to more than one because they are not necessarily mutually exclusive in "causing" the casualty. This mapping from USCG activities to bins is key to this task (See Appendix C). We can similarly compute these percentages for each bin. Multiplying the BIN Risk column, element-wise, with the cause frequencies under the activity column in Table 2.1 we get the per bin Importance of each activity recorded in Table 2.2. This information establishes a measure of the contribution of each MSO's various inspection and activities to risk. Summing down Table 2.2 across all bins we get the total Importance of each activity for the entire USCG nationwide inspection program. The activities can be ranked according to total Importance. A nice feature is that the activities can be ranked by the total Importance of any sub-group bins.

Table 2.1 Computing Bin Importance: Intermediate calculations

Bins	Bin Risk (\$)	Cause Frequency ¹				
		CH	SN	DH	DP	None
B ₁	151,905	0.09	0.2	0.47	0	
B ₂	317,205	0.12	0.13	0.42	0	
B ₃	368	0	0.56	0.11	0	
B ₄	3000	0	0.7	0.2	0	
B ₅	1230	0.13	0.19	0.5	0	
B ₆	21,040	0.12	0.15	0.37	0	

Note:

1. Activity columns indicate the Cause Frequency, or proportion of casualties in a bin with which that activity is associated.

Table 2.2 Total Importance of Each Activity

Bins	CH	SN	PP	DP	None
B ₁	13,671	30,381	71,395	0	
B ₂	38,064	41,237	133,226	0	
B ₃	0	206	40	0	
B ₄	0	2100	600	0	
B ₅	180	234	615	0	
B ₆	2525	3156	7785	0	
Importance	54,440	77,314	213,661	0	

Note

- Units are dollars. However, the values are discounted, not absolute. RBRs of USCG activities can be based on subset of rows to assess important MSOs.
- There is information in the *absolute* Importance values and therefore the method yields more than just a ranking. MOEs can even be constructed using Importance values.

The total Importance provides natural MOEs for Level III activities, although this statement must be qualified in light of the comments in (1) of Section 2.1.1. Under probability measure (a), the Importance of activity *j* may be described as the expected loss associated with a casualty that is attributable to activity *j*. This is conditional on a casualty having occurred. Under probability measure (b), the Importance of activity *j* may be described as the expected loss associated with an inspection activity that is attributable to activity *j*. This is conditional on an inspection (but not a casualty) having occurred. The expected loss can be interpreted as an MOE subject to the caveats of Section 2.1.1. By itself, these measures of expected loss offer little information. But a comparison over time, perhaps yearly, of activity Importance can yield substantial information about whether *risk (expected loss) has been reduced, increased, or maintained by a reorganization of inspection and boarding activities*. This is necessarily a long-term measure of effectiveness, but can be used to assess improvements in the way in which the USCG performs its marine safety activities.

This measure is superior to the more appealing and simpler MOE such as "number of deaths" because it incorporates the randomness that is a distinct characteristic of maritime casualties. For example, each bin has a different probability associated with it. Reduction of risk (as defined by activity Importance) is therefore the objective. We believe measures taken to reduce expected number of deaths (stochastic), say, will work towards the goal of reducing actual number of deaths (deterministic).¹

2.1.3 Normalization Of Casualty Data and the Concept of an "Inspectible Fleet"

This section contains a discussion on issues related to the identification of vessel exposure to the inspection process. This can be defined as the "inspectible fleet", or the opportunity for performing inspections or examinations on deep draft vessels. Data on the fleet available for inspection is important because it defines the context within which to quantify vessel casualty rates. Three possible approaches are discussed here:

- 1) number of inspections conducted on the inspectible fleet (used in the preliminary calculations in Section 3.0),
- 2) number of port calls made by the inspectible fleet between either two successive inspections/examinations or between the last inspection/examination and the occurrence of a vessel casualty, and
- 3) amount of "vessel time" accumulated by the inspectible fleet (vessel time is defined here

¹ In the literature in Financial Economics, individual investors seek out a portfolio of assets that maximizes expected rate of return *given* a certain level of variance in the portfolio's returns (or select that portfolio that minimizes the variance associated with a given expected return). Conditionally on the variance, these optimal portfolios form an "efficient" frontier. In this literature, the term "risk" refers to the variance of the portfolio's rate of return. For our risk-based ranking methodology, the term "risk" is used to refer to the expected loss/damage from a casualty rather than the variance of the loss/damage from a casualty.

as the total amount of time between either two successive inspections/examinations or the time between the last inspection/examination and the occurrence of a vessel casualty).

The casualty frequencies in the preliminary calculations were estimated by dividing the number of casualties by the appropriate number of inspections performed by the USCG. The number of inspections performed was selected as the denominator for the casualty frequencies because such information provides a basis for vessel exposure to the USCG inspection and examination programs. Other types of vessel exposure data could be used as well. For example, the number of port calls between the occurrence of a casualty and the last inspection prior to the casualty would establish a measure of vessel use that could be used to estimate vessel casualty frequencies. Another approach could be to account for the amount of time between the last inspection and the occurrence of a vessel casualty. However, the latter two approaches it would be difficult to link casualty frequencies to resources committed to inspections and examinations. The first approach incorporates a measure of resources expended on inspections to estimate casualty frequencies in terms of vessel casualties per vessel inspections. The latter two approaches would incorporate a measure of vessel reliability (i.e., amount of vessel use before occurrence of a casualty) to estimate vessel casualties per port call or per unit time.

The first approach establishes a casualty frequency that accounts for all vessel inspections, including those inspections for which no casualty occurs before the vessel receives another inspection. In theory, the same type of information would be desired using either of the latter two approaches, but linking those inspections for which vessels do not experience a casualty prior to the next inspection would require data sufficient to quantify the number of port calls or vessel time in terms of both inspections/examinations for which no casualty occurs prior to the next inspection/examination and for which a casualty does occur.

This illustrates a problem related to linking vessel exposure data to the level of resources committed to inspections and examinations by particular MSOs and Districts. An "inspectible fleet" of vessels must be defined for each MSO and District. The inspectible fleet defines the exposure or the number of opportunities for conducting inspections or examinations. For the approach using port calls as normalizing data, vessel port call data is not contained in the MSMS database. Such data would have to be incorporated into the analysis from the U.S. Army Corps of Engineers' vessel exposure data. However, the Corps of Engineers data is only on U.S. flag vessels. Furthermore, the port call data would have to be related to each relevant vessel casualty record and vessel inspection record in the CIVT and IRIT tables. This could result in an unmanageable task without the benefit of linked databases. In fact, unless specific dates are available for each port call it could prove impossible to correctly link port call information to the last port of inspection. Furthermore, to include those inspections for which casualties do not occur prior to the next inspection, port call data on each vessel inspected at each MSO or District would have to be tabulated so that all port calls could be "assigned" to a specific unit based on the date of each port call and the date of the last inspection prior to each port call. Similarly, for the approach using vessel time as the denominator, it would be necessary to track the total time between inspections for all vessels inspected at a particular unit that were not involved in a casualty prior to their next inspections or examinations. This would require a very involved querying process of the IRIT records, and it is not readily clear that an accurate compilation of

total "vessel time" between inspections or the occurrence of a casualty could be compiled for the inspectible fleet for each USCG unit.

The method of normalizing casualties by the number of inspections performed offers the most direct way to link the occurrence of casualties to the inspecting USCG units and to link the "successful" outcomes (i.e., all vessel inspections/examinations for which no casualty occurs prior to the vessel's next inspection/examination). However, unlike the other two methods, which incorporate a measure of vessel safety performance into the quantification of casualty frequencies (i.e., amount of safe "vessel time" or number of successful port calls), this method only establishes safety within the context of resources committed to the inspection/examination programs. If such information is not carefully evaluated it would be possible to arrive at erroneous conclusions regarding vessel safety. Suppose that at a particular USCG unit the decision was made to double its rate of examinations over past practice. If the number of casualties that occurred from the set of all vessels examined by that unit were to remain constant (or even increase) compared to the past, then the resulting casualty frequency would be lower than the casualty frequency estimated from past data, despite the fact that the actual number of casualties remained constant. However, meaningful insights could readily be gained from the data by studying the change in casualties compared to the change in resources committed to examinations. Furthermore, the concept of an "inspectible fleet" is important here. In the example here, the USCG unit "decided" to double the rate of examinations. Current USCG policy allows each MSO to determine which foreign flag vessels that call within a unit's jurisdiction should be examined. Furthermore, these same foreign flag vessels could potentially be examined at any port call. Hence, for a foreign flag vessel casualty it could become unclear as to which MSO unit the casualty should be "assigned". For the U.S. flag fleet, the concept of an inspectible fleet is much more clearly defined, especially if only periodically prescribed inspections such as the COI, the Annual Reinspection, and the Hull inspection are used as the inspection benchmarks. U.S. vessels receive these inspections based on regulated time periods. Thus, the number of such inspections conducted by a particular unit cannot be increased or decreased based on a decision of the local unit. For this situation, the number of inspections establishes a sound basis for evaluating the success of inspections. As in the example above for foreign flag examinations, suppose that the rate of U.S. flag inspections was increased based on a new prescribed schedule. If the actual number of casualties associated with vessel inspections were to remain the same for such a situation, then the resulting decrease in casualty frequency would provide valuable insight into the benefits of increasing resources for inspections since the number of inspections would provide a true indication of the inspectible fleet.

2.2 Theory and Methodology of the Econometric Modelling of Level I, Level II, and Level III USCG Activities

This section is comprised of the following sub-sections:

- 2.2.1 The behavioral theory underlying the estimating equations.
- 2.2.2 The econometric specification of the estimating equations, and the main issues.

- 2.2.3 Econometric problems inherent in (ii) and data problems
- 2.2.4 Robust and sturdy estimation of the main issue/s.
- 2.2.5 Level III MOEs.
- 2.2.6 Level II MOEs.
- 2.2.7 Level I MOEs.

2.2.1 The Behavioral Theory

The theoretical ideas borrow heavily from the work on monitoring oil spills during oil transfers contained in Epple and Visscher (Epple, 1984) (henceforth EV). We have applied the EV theory to the case of marine safety, particularly USCG activities devoted to monitoring and controlling casualties associated with deep draft vessels. A behavioral model forms a strong foundation for the empirical analysis. Changes in the behavioral model must be accompanied by changes in the empirical analysis. A formalization of the behavioral model provides not only a framework for the empirical analysis but brings to fore the key issues which need to be resolved by means of the empirical analysis.

Here we formally model the problem that the Coast Guard faces in its inspection and boarding activities. We believe a principal-agent model which brings out the agency problem that the Coast Guard must solve, is the appropriate model here.

The principal-agent problem is a well-known one in regulatory economics. A typical example is as follows. The *principal*, the manufacturer, has its *agent*, the distributor, sell its products. The manufacturer cannot perfectly observe the sales effort of the distributor and realizes that its agent may try to take advantage of the principal's incomplete information about the agent's actions. For example, the distributor may advertise less than it is supposed to, in order to save money and thus *free ride* on the manufacturer's reputation. Free-riding occurs when one firm benefits from the actions of another without paying for it. In this example, the problem is to design an optimal contract that prevents free-riding. That is, the contract offers the *same* incentive to the agent to maximize sales as the principal possesses. That is, it is as if the principal itself were doing the distribution (agent's job). The failure of designing such optimal contracts is often advanced as a reason for vertical integration by firms. Principal-agent problems are the main economic reason why centrally planned economies (eg. Russia) are highly inefficient and wasteful.

The manufacturer-distributor example is simplistic. A more realistic scenario is where the outcome (sales) is a random variable, with a range of possible outcomes, each with a distinct probability. The agent can affect these probabilities - favorably by taking action desired by the principal, and unfavorably by not doing so. The problem is compounded by the fact that usually the principal has no way of telling whether the agent actually took the desirable action or not. He can only infer that from the realized outcome. This is probably the case with the Marine Inspection and Boarding program.

The counterpart to free-riding in the case of the Marine Inspection and Boarding Program (the USCG is the principal) is shirking or concealing their vessel inadequacies by vessel owners (the agents). The problem is to design an optimal monitoring/inspection/enforcement strategy to

minimize shirking. The idea is to have shipowners behave in the same manner as would the USCG if it were in charge of operating the vessel. That is, most casualties then would be as close to random given attributes beyond the USCG's control, such as the weather, etc.

Epple and Visscher (Epple, 1984) and Cohen (Cohen, 1987) apply this theory to econometrically model oil spills and design a strategy to prevent them. Their data is for approximately 4500 spills between 1974–1977, and both papers voice concerns about data inadequacy. The methodology employed for assessing Level II and Level III USCG activities is based on the theory in the Epple and Visscher and the Cohen papers. We have made some modifications to their statistical assumptions, and we estimate a broader range of specifications to check for the robustness of the results.

Here we present a summary of the principal-agent models as applied to the Marine Safety program. The objective of this exercise is to provide a basis for the empirical analysis, or more specifically, provide a foundation for the econometric specification. That is, the statistical model, the choice of variables in that model, and what inferences the model may allow on the basis of theory.

I. Deterministic variables

(i) Agent incurs expenditures M1 and M2 to prevent a casualty.

Eg. M1_T : expenditure to reduce probability of spill
M2_T : expenditure to reduce size of spill
M1_P : expenditure to reduce probability of casualty
M2_P : expenditure to reduce intensity of casualty (deaths/injuries)

Assume M1 does not affect M2

Eg. M1 = installation of sophisticated navigation equipment
M2 = training crew to reduce damage given casualty occurred

(ii) **Z1** and **Z2** are sets of exogenous variables affecting casualty.
Note that **Z1** ∩ **Z2** may be non-empty, or **Z1** ⊂ **Z2**, or **Z1** ⊃ **Z2**, or both.

Eg. Z_T = {Vessel size, Price of oil, Vessel age, Vessel design, Waterway, Weather}

(iii) W = Coast Guard enforcement effort

- (a) Total number of inspection hours
- (b) Number of inspection hours by Type II activity (W is a vector)
- (c) Type of inspection (Binary indicator): COI, Hull, etc.

II. Random variables

$$(i) \quad R = \left\{ \begin{array}{ll} 0 & \text{if no casualty occurs} \\ 1 & \text{if casualty occurs} \end{array} \right\}$$

$$(ii) \quad S = \left\{ \begin{array}{ll} 0 & \text{if casualty undetected | } R=1 \\ 1 & \text{if casualty detected | } R=1 \end{array} \right\}$$

$$(iii) \quad A = \left\{ \begin{array}{ll} 0 & \text{if nopenalty assessed | } R=1, S=1 \\ 1 & \text{if penalty assessed | } R=1, S=1 \end{array} \right\}$$

$$(i) \quad E(R) = \rho(M1, Z1) \quad (-)$$

$$(ii) \quad E(S) = \psi(W) \quad (+)$$

$$(iii) \quad E(A) = \phi(W, X) \quad (+)(+)$$

Note:

- (a) See (Cox, 1993) for flow chart information on probability of shirking by agent.
- (b) S is important since if $\text{Prob}(S=0)$ is high then agent will not fear the consequence (legal, monetary) of shirking or concealing information leading to effective inspection by principal.
- (c) R, S, A describe three distinct events, and the need for modelling these events separately is clearly seen in the case of oil spills (Epple and Visscher).
- (d) Dependence of mean of S on just W and of A on W and X .

(iv) X = Intensity of casualty

- (1) Tankers: Spill size
- (2) Freighters: Cargo and environmental damage
- (3) Passenger: deaths/injuries

$$\ln X \sim \text{Normal}(\mu, \sigma^2), \quad \text{where } \mu = \mu(M2, Z2) \quad (-)$$

The signs below the variables indicate expected signs on coefficients on these variables.

(v) $P.X$ = direct cost of casualty

- (1) Tankers: $(P \text{ of Oil} \times X) + \text{Vessel damage}$
- (2) Freighters: $(P \text{ of Cargo} \times X) + \text{Vessel damage}$
- (3) Tankers: $(P \text{ of Life} \times X) + \text{Vessel damage}$

(vi) $H = \$ \text{ penalty, or } \$ \text{ legal costs, or } \$ \text{ other action (eg. cleanup of spills)}$
 Let H be termed "Penalty costs", and let these costs be a function of X .
 $H = H(X) = c_0 X^{c_1}$

This is a "constant elasticity" cost: a 100% increase in X leads to a $c_1\%$ rise in H .
 c_0 and c_1 are parameters that can be estimated.

Then, the *casualty-related cost* to the agent, K , is given by

$$\begin{aligned} K &= R.S.A(H) + R.P.X + M1 + M2 \\ &= (\text{Prob of getting hit by } H) \times (H) + (\text{Prob of casualty}) \times (\text{Direct cost of Casualty}) \\ &+ \text{prevention expenditures (decision variables } M1 \text{ and } M2) \end{aligned} \quad (*)$$

Note: K is a random variable, since X is also.

Agent chooses $M1$ and $M2$ to minimize $E(K)$, since $M1$ reduces R and $M2$ reduces X and A (and possibly S , but here assume not). To get $E(K)$ need to specify probability distribution of random variables in (*): (R, S, A, X) (see above)
 Now we can write $E(K)$ analytically as

$$\begin{aligned} E(K) &= \rho(M1, Z1) \cdot \psi(W) \cdot \phi(W, X) \cdot c_0 \exp\{c_1 \mu(M2, Z2) + c_1^2 \sigma^2/2\} \\ &+ P \cdot \rho(M1, Z1) \cdot \exp\{\mu(M2, Z2) + \sigma^2/2\} + M1 + M2 \end{aligned}$$

Choose $M1$ and $M2$ at $M1^*$ and $M2^*$, respectively to minimize $E(K)$ to get
 $M1^* = G1(W, Z1, Z2, \sigma^2)$, and
 $M2^* = G2(W, Z1, Z2, \sigma^2)$,

From these we get expressions for (1) mean casualty frequency, and (2) mean casualty intensity

$$\begin{aligned} E(R) &= \rho(W, Z1, Z2, \sigma^2) & (**) \\ E(\ln X) &= \mu(W, Z1, Z2, \sigma^2). & (***) \end{aligned}$$

These form the basis for the econometric analysis.

Notes:

(1) These equations are "reduced form" equations. The economic logic for inclusion of variables is not directly obvious from the equations themselves. The logic must go through the "structural model" upon which the reduced form is based. For example an increase in Coast Guard effort, W , increases probability of detection, probability of

a penalty, and size of the penalty. This, in turn, leads the agent to increase M1 (and/or M2) that should lead to reduction in $E(R)$ (and/or $E(\ln X)$).

(2) σ^2 enters because of the log-normality of X . This is unobservable and may cause problems in the estimation.

2.2.2 Econometric Specification

The following models are theoretically possible in the estimation of equations $E(R)$ in (**) and $E(\ln X)$ in (***) above (see Greene, 1993 for technical details on their estimation):²

- (i) (**) Probit/Logit with rhs variables in levels
- (**) Probit/Logit with rhs variables in logs of levels

- (ii) (***) Linear with lhs and rhs variables in logs of levels
- (***) Poisson model
- (***) Duration model

We estimate the function $E(R)$ (probability of personnel and pollution casualties) using the Probit model and $E(\ln X)$ (number dead and missing, number injured, number of pollution incidents) using both, a Poisson model, and a Duration model.

The general specification is as follows:

$$\text{lhsvar} = f(W, Z1, Z2, \sigma^2)$$

For the $E(R)$ function, lhsvar is a binary indicator of casualty occurrence. Estimation is by a nonlinear Probit model (that keeps the prediction between 0 and 1). In principle we can use more than 2 levels, eg 5 levels of intensity of the casualty (ranging from "Not serious" to "multiple deaths") and can model them as Ordered Probit.

For the $E(\ln X)$ function, we use a Poisson model because the number of incidents is usually a small number (usually less than 10), and the outcomes are thus easily modelled using a discrete distribution such as the Poisson. Time-to-casualty is the lhs variables in the analysis of Level II activities, and Duration models are employed for that purpose.

The issue of interest is the coefficient on W . W can be a scalar (total inspection hours, total boarding hours), or a vector (hours for each Level III activity).

Inspection hours are obtainable from table CRST, and type of inspection from IRIT.

Z1 and **Z2** can theoretically include the variables such as Vessel size, Vessel age, Kind of waterway (qual.), Weather (qual.) Vessels of different service may require the inclusion of different variables. For example, for Tankers the price of oil may be included, for Freighters the price of cargo, and for Passenger the number of passengers. But our choice of variables is

² See e.g. William Greene's text, *Econometric Analysis*, Macmillan, 1993, for technical details pertaining to these and other econometric models.

restricted to data available from the MSMS database.

2.2.3 Econometric Problems

(1) The presence of σ^2 is a problem. Epple and Visscher propose an ad hoc solution to this and though it is possible to implement their solution here, we do not do so. It is the lognormality of X that causes σ^2 to appear on the rhs, but since we do not use a lognormal model for estimation (we use a Poisson model), we hope the problem is resolved. In any case, we feel that ignoring this problem will not qualitatively affect our results.

(2) Different assumptions about the prob. distributions of r.v.'s lead to different *functional forms* of ρ and μ . Doing so is cumbersome and most probability distributions will not lead to closed-form analytic solutions for $E(R)$ and $E(\ln X)$ anyway. Hence, instead of deriving functional forms for each assumption about the r.v.'s, we experiment with different reduced forms as outlined in Section 2.2.2.

(3) Our feeling is that there is a lot of randomness about the occurrence and intensity of casualties. This is good and bad. If the lhs variable (number of personnel and pollution casualties) showed great range and variance, we would be very confident of getting strong estimates on $Z1$ and $Z2$. But imagine that the USCG is doing a perfect job. Then W would pick up very little if anything, since the accidents are purely random (or purely random conditional on Z). Our feeling is that USCG is not perfect, and hence W will indicate sources of improvement. But there will be enough noise and randomness that the equation is probably not going to have a strong measure of fit.

2.2.4 Robust and Sturdy Estimation

We will perform the following in order to investigate the fragility or robustness of the econometric estimates. The data for the regression model is a matrix with N "observations" (rows) and $K+1$ "variables" (columns), where K is the number of variables on the right-hand-side (rhs variables are termed "independent variables", and the lhs variable is the "dependent variable") of the $E(R)$ and $E(\ln X)$ equations.

(i) Sensitivity to outlier: Block-at-a-time deletion of observations and inspection of resulting estimates to see whether there are influential "outliers" driving the results.

(ii) Exogeneity of variables: This problem arises if a rhs variable is not truly an independent variable. An example is where the numbers of hours spent on an inspection is higher precisely because that vessel has a higher *a priori* likelihood of casualty. Hence the number of activity hours is itself "caused" by the probability of occurrence of a casualty, and, simultaneously, the number of activity hours act to reduce the probability of occurrence of a casualty. This is the well-known problem of simultaneity or "endogeneity of regressor" in the econometric literature. The estimated models will be tested for regressor endogeneity where possible. (This is not a

simple task for nonlinear models like the ones we propose to estimate.)

2.2.5 Level III MOEs

(i) The coefficients on W , where W is a vector with each element representing the amount of a Level III activity, are natural measures of effectiveness. They answer the question of how much the lhs variable (e.g. number of injuries) will decrease if an element of W (that is, a specific Level III activity) were to increase marginally or, conversely, how much the lhs variable will increase if an element of W were to decrease marginally. It must be emphasized that these are estimates for marginal changes, not large changes that push the hypothetical values of the W variables outside the "range of experience".

(ii) The above coefficients can be used for simple but very informative cost-benefit analysis. For example, suppose W , a scalar, measures the number of total inspection hours, and lhs variable is number of deaths. The coefficient on W tells the effectiveness of an increased W in reducing the number of deaths. Suppose 100 additional hours of W reduce deaths by .1. If the cost of 100 additional hours of $W < (.1 \times 2,500,000)$ then increasing W is effective in terms of this simple cost-benefit analysis.

(iii) It is possible to use the Bin Risk (Bin probability $\times$ Bin consequence) in the RBR method as a dependent variable (which takes the value zero if there is no casualty) in the econometric analysis. This would point out how much "expected loss" can be reduced by different Level III activities. These could usefully supplement the analysis in Section 2.2.2, but at this stage we expect this to be secondary to those results.

It is to be noted that while the econometric analysis yields useful MOEs, the use to which they may be put depends on the RBRs. The econometric analysis tells us what could happen due to changes in Level III activities, but does not offer a clear answer to the question of which activities *should* be changed, given a budget constraint. The RBR usefully supplements the econometric results by indicating those activities that are most frequently associated with undesirable consequences of casualties. If it turns out that the activities with the highest risk-based rank are also those that the econometric analysis points out to be the most economically significant (large), then the policy conclusion is unambiguous. A conflict between the RBR and the econometric results can arise when, for example, the econometric analysis concludes that an increase in activity A can significantly lower casualties while the RBR analysis ranks activity A low in its ability to reduce the risk of casualty. In this case we need to resolve the conflict within a budgeting or programming framework where the marginal costs of (increasing) each activity and a budget constraint are explicitly spelled out. The Resource Allocation model in Section 5.2.2 is one such model that achieves this.

2.2.6 Level II MOEs

As mentioned in Sections 1.2 and 2.1.1, the essential difference between Type III and Type II

activities is the way in which we measure them. Level II activities (labelled "A" and "B" in Section 1.2) are measured as "duration" data, that is, time elapsed between an activity and a casualty. This is how the variable W is measured in the econometric analysis of Level II activities. The appropriate technique for estimation is duration models or time-to-failure models. The underlying theory is the same as proposed in Section 2.2.1, and the form of the estimating equations is the same as proposed in Section 2.2.2. The conclusions are interpreted similarly as in Section 2.2.4 for the Level III activities, except that these MOEs now answer the question of how adversely a longer time period between inspections may affect the probability $[E(R)]$ of occurrence and the intensity $[E(\ln X)]$ of a casualty.

It is to be noted that if there is sufficient variability in W then statistically significant estimates, and hence meaningful MOEs, are possible. Since U.S. flag vessels are required to undergo major inspections (i.e., COI, Annual Reinspection) over fixed periods, W does not vary adequately (except of course for the casualty cases, where the time from the last inspection to the casualty probably varies widely across casualties). The time between Hull inspections may show greater variance since the requirement does not stipulate an exact time between two such inspections.

2.2.7 Level I MOEs

For the purpose of describing the construction of Level I MOEs, recall the discussion in Section 1.1 about the two approaches to achieve this.

(i) The first approach is to make an assessment about the overall effectiveness of the marine safety and inspection program from the Level III and Level II MOEs. One way to assess this is to obtain econometric estimates annually, say, over 10 years. If the level III MOEs [from Section 2.2.5 (i)] show a consistent improvement (coefficient on most elements of the vector W decrease over the years), then we may conclude that the program is succeeding in achieving its marine safety goals. The difference between using econometric analysis to conclude thus, rather than using a naive indicator such as the actual number of deaths, or injuries, or damage, is that the econometric analysis *controls* for influences outside the ability or purview of the Coast Guard program, that is, factors that contribute purely to I-risk (see Section 2.1.1), and focuses on what the Coast Guard program can achieve by way of reducing R-risk (see Section 2.1.1).

(ii) The second approach is to make an assessment about the overall effectiveness of the marine safety and inspection program from aggregate information. While the RBR method does not apply anymore, the econometric methodology is applicable. Two methods are theoretically possible here:

(1) In the econometric analysis, simply use W as a one-dimensional (scalar) variable that measures total inspection effort, or total boarding effort. Then construct MOEs just as for Level III activities as described in Section 2.2.5.

(2) Use Casualty Frequency rates as the dependent variable in the econometric analysis. Essentially, think of the following experiment. We would like to see an

experiment where we could change resources expended on various kinds of inspections, and observe the effect on the occurrence of casualties. Such an experiment exists, although unlike a lab experiment, where we can isolate other factors which may cause "disturbances" in the occurrence of casualties, the existing experiment is not so controlled and therefore the data from it contains a lot more noise in addition to information. Inspections categorized by MSO provides such an experiment. To make MSOs comparable, we normalize by the number of inspections, and therefore obtain Casualty Frequencies. These have been tabulated in great detail and offer a variety of information. However, by themselves they may not point to "weak" MSOs simply because there may be more noise (outside factors causing casualties, rather than some deficiencies at that MSO) than information (casualties that could be prevented by improving the quality and quantity of inspections). The econometric methodology tries to isolate the factors causing the noise and hence make the relevant inferences from the actual information in the data. It is possible to do an econometric analysis for each MSO and then compare MSOs for their overall effectiveness. We propose to pool the Casualty Frequency and other data across MSOs, and then estimate the effect of a change in W on the Casualty Frequency (using other variables to isolate out the noise). Doing this estimation annually over several years of data can indicate, as in (i) above, whether the Coast Guard is improving over time in achieving its overall marine safety goal.

In the econometric analysis presented in Section 4, we implement method (1) in great depth, but do not implement method (2). This is a probably rewarding approach, and we leave its implementation for the future.

3.0 Risk-Based Ranking Analysis

3.1 Application Of Risk-Based Ranking Method to the MSMS Data Base

Risk-Based Rankings, or RBRs, were developed to establish an understanding of the importance of the Level III U.S. flag (inspection) and foreign flag (boarding) intervention strategies. Level III intervention strategies are summarized in Table 3.1.

Table 3.1 Level III Inspection/Boarding Activity

<u>Intervention Activity</u>	<u>Intervention Program*</u>
1) Cargo Handling/Pollution Control,	Inspection/Boarding
2) Steering/Navigation,	Inspection/Boarding
3) Document/Paperwork,	Inspection/Boarding
4) Drills/Human Factors,	Inspection/Boarding
5) Auxiliary Systems,	Inspection
6) Power Plant,	Inspection
7) Fire Fighting And Prevention,	Inspection/Boarding
8) Hull,	Inspection
9) Life Saving.	Inspection

- * Even though Activities 5,6,8, and 9 are associated with the U.S. flag Inspection program only these activities were included in the foreign flag RBR analyses since the MSMS MINMOD CEVT records use the same set of casualty cause keywords for U.S. and foreign flag vessels.
-

Aggregation of Data

Data was aggregated and analyzed at three different USCG "Unit" levels for both inspection and boarding activities; the whole USCG as a single unit, each USCG District, and each MSO. Figures 3.1, 3.2, and 3.3 illustrate the logic by which MSMS MINMOD casualty data was characterized to aggregate the data for the three different unit level perspectives.

The highest level of data aggregation is to simply distinguish between the U.S. flag ships and foreign flag ships. Figure 3.1 shows how casualty data is aggregated to define the bins and calculate the relative frequencies and casualty frequencies by U.S. or foreign flag. The logic diagram of Figure 3.1 is simplified for illustration purposes. The structure shown in Figure 3.1 for U.S. flag vessels would be repeated for foreign flag vessels. Casualty reports from the

Maritime Casualty	Vessel Flag	Casualty Consequence	Vessel Service	No.
MSMS MINMOD	US	Property	Freight	1
			Passenger	2
			Tanker	3
		Pollution	Freight	4
			Passenger	5
			Tanker	6
		Death	Freight	7
			Passenger	8
			Tanker	9
		Injury	Freight	10
			Passenger	11
			Tanker	12
		None		13
	Foreign	ALL Consequences	ALL Services	14

Figure 3.1. Data Aggregation Logic For U.S. Versus Foreign Flag Deep Draft Vessels.

Maritime Casualty	Vessel Flag	Casualty Consequence	Vessel Service	Last District Of Inspection	No.
MSMS MIMMOD	US	Property Loss	Freight	Dist 1	1
				Dist 2	2
				Dist 5	3
				Others	4
			Passenger	Dist 1	5
				Dist 2	6
				Dist 5	7
				Others	8
			Tanker	All Dists	9
		Pollution	All services	All Dists	10
		Death	All Services	All Dists	11
		Injury Only	All Services	All Dists	12
		None			13
	Foreign	All Consequences	All Services	All Dists	14

Figure 3.2. Data Aggregation Logic For USCG Districts For Deep Draft Vessels.

Maritime Casualty	Vessel Flag	Casualty Consequence	Vessel Service	Last MSO Of Inspection	No.
MSHS MINMOD	US	Property	Freight	ANC	1
				BAL	2
				MOB	3
				WNC	4
				Others	5
		Passenger	Passenger	ANC	6
				BAL	7
				MOB	8
				WNC	9
				Others	10
		Tanker	Tanker	ANC	11
				BAL	12
				MOB	13
				WNC	14
				Others	15
	Foreign	Pollution	ALL Services	ALL MSOs	16
		Death	ALL Services	ALL MSOs	17
		Injury	ALL Services	ALL MSOs	18
		ALL Consequences	ALL Services	ALL MSOs	19

Figure 3.3. Data Aggregation Logic For USCG Marine Safety Offices For Deep Draft Vessels.

Casualty Investigation Report Table (CIRT) of MSMS MINMOD are aggregated into groups or "bins" that represent the various outcomes of the logic tree. This binning process is accomplished by designing queries of the MSMS database that identify the appropriate logic tree casualty and vessel characteristics that are relevant to each CIRT record so that each record is "tracked" to the appropriate bin. For example, path 1 characterizes all freight casualties, path 2 all passenger vessel casualties, and path 3 all tanker casualties involving U.S flag vessels where property loss was a consequence of the casualty. The detailed queries that were developed to assign vessel casualties to the various bins and to count the number of inspections performed by each relevant USCG unit are in Appendix B.

It is important to understand that the outcomes of the logic trees in Figures 3.1, 3.2, and 3.3 are not necessarily mutually exclusive. The trees are designed to define various ways in which the data can be aggregated to achieve different perspectives on maritime safety. Thus, any single CIRT record might be filtered into more than one outcome and be incorporated into the estimates of multiple casualty frequencies depending on the characteristics of the casualty. For example, any CIRT record for a vessel casualty that resulted in one or more deaths and property loss would be filtered through both the "Death" and "Property Loss" paths in Figure 3.1. This does not constitute double counting of casualties because the relative and casualty frequencies are separately estimated for each type of casualty (e.g., death, injury, property loss). Thus, the binning of MINMOD casualty data as depicted in Figure 3.1 represents four distinct RBR analyses, one for each of the specific consequences chosen for this analysis; property loss (in dollars), pollution (in gallons of pollutant spilled), number of deaths, and number of injuries. These analyses provide four distinct perspectives by which the casualty data can be aggregated to achieve an understanding of maritime safety.

Summary of Risk-Based Ranking Analyses

For each intervention activity regime (U.S. flag inspections vs. foreign flag boardings) eight different RBR analyses were performed. These are summarized in Table 3.2. These analyses were performed for each of the 3 unit level designations (USCG, District, and MSO level) for a total of 48 risk-based ranking analyses of the Level III intervention strategies. The MSMS data was surveyed for the period 1991 through 1993. This represents the time frame over which the MSMS MINMOD data tables have been used.

Scope of MSMS Inspection/Boarding Records Included in the Analysis

The risk based ranking importance analyses were limited in scope to those inspection and boarding activities that were considered sufficiently comprehensive in scope so as to cover the full range of Level III intervention strategies. For U.S. flag vessel inspections the MSMS Marine Inspection Report Identification Table (IRIT) Inspection Of Vessels keywords were used to identify and tabulate the number of inspections performed by each unit. The inspection activities that were searched on were "Initial Inspection", "Certification Inspection", "Re-inspection", and "Hull Inspection". The MSMS Port Safety Resource Supplement Table

Table 3.2 Summary of Risk-Based Ranking Analyses For Each Unit Level Assessment

<u>Vessel Flag</u>	<u>Bin Probability Measure</u>	<u>Casualty Consequence</u>
U.S.	Relative Frequency	Deaths Injuries Property Loss Pollution
	Casualty Frequency	Deaths Injuries Property Loss Pollution
Foreign	Relative Frequency	Deaths Injuries Property Loss Pollution
	Casualty Frequency	Deaths Injuries Property Loss Pollution

(BRST) was used to search for and tabulate foreign flag vessels for each USCG unit. The boarding activities were identified from the BRST Activity Type keywords. The analysis of boarding activities was limited to "Annual Container", "Annual Freight", "Annual Passenger", "Pass Frgt", and "TANK VESS". These activities were defined as representative of comprehensive intervention activities the purpose of which are to inspect vessels for all aspects of marine safety. Other inspection and boarding activities were considered to be either too specific in nature or too peripheral in scope to permit a meaningful linking between casualty reports, nature of incident information (taken from the "Nature of Incident" keywords in the Marine Casualty Event Record Table [CEVT]), and the Level III intervention strategies.

3.2 Risk-Based Ranking Results

3.2.1 Data Aggregation and Relative Frequency and Casualty Frequency Estimates

The aggregation of the data as illustrated in Figure 3.1 for the USCG level analysis, Figure 3.2 for the District level analysis, and Figure 3.3 for the MSO analysis, becomes progressively more

detailed as the unit is defined more specifically. For each type of casualty consequence (deaths, injuries, property damage, and pollution) the USCG level analysis involves 6 bins, 3 for each category of flag (U.S. and foreign) as defined by the three service categories of vessels (freight, passenger, and tanker). At the next level of detail (District), 60 bins were defined by the 2 flag categories, 10 districts, and 3 vessel services. At the MSO level, 156 bins were defined by the 2 flag categories, 3 vessel services, and 52 MSOs. Each of these bin sets (6 for the top level [USCG], 60 for District, and 156 for MSO) was analyzed for 8 different risk based rankings as defined in Table 3.2. Because of the large amount of information generated by these analyses, only the results of the top-level assessment (USCG) will be discussed here. The District and MSO level results are documented in Appendix A, including data summary tables similar to Tables 3.3 and 3.4 (see Tables A.1.1, A.2.1, A.3.1, and A.4.1).

The summary of bin data used in the risk-based ranking calculations (number of inspections performed, number of casualties, relative frequency, casualty frequency, and consequence values) are in Table 3.3 for U.S. flag vessels and in Table 3.4 for foreign flag vessels. The results of the top-level USCG wide risk-based ranking analysis are summarized in Tables 3.5 and 3.6 (Relative Frequency weighting) and Tables 3.6 and 3.7 (Casualty Frequency weighting). The results in Tables 3.5 through 3.8 show the intervention strategy importance rankings normalized to the Level III intervention strategy most important to risk.

A comparison of the results for Relative Frequency Weighing and Casualty Frequency Weighing (Tables 3.5 and 3.7 for U.S. flag vessel, and Table 3.6 and 3.8 for foreign flag vessels) indicates that there is no significant difference between the importance rankings for either method of weighing casualty bin consequences, despite the fact that certain bins have significantly different Relative and Casualty frequencies, as shown in the **Relative Frequency** and **Casualty Frequency** columns of Tables 3.3 and 3.4. The results of the risk-based ranking are not informative about contributors to specific types of consequences (i.e., deaths, injuries, property damage, and pollution). The Relative Frequency Weighing results in Tables 3.5 and 3.6 illustrate very minor variations in the importance of the various inspection activities based on type of casualties. The Casualty Frequency Weighing results yielded exactly the same importance measures for the inspection activities regardless of the type of consequence. Thus, the results in Tables 3.7 and 3.8 are not differentiated on the basis of consequences.

The lack of distinguishing information on the basis of consequence type is attributable to the nature of the mapping of casualty causal data to the Level III Intervention Strategies. This mapping process is introduced in the discussion of the methodology in Section 2.1.2 and the application of this process to the MSMS MINMOD CEVT table is illustrated in Appendix C. Ideally, a detailed mapping for each type of consequence would be performed to develop specific measurements of the importance of Level III Strategies for each type of consequence. However, for this analysis a single aggregate mapping was performed. Casualty causal data was mapped only once to each bin, and the mapping was based on whether or not specific causal data was relevant to the casualties in a each bin. No distinction was made to delineate causal data on the basis of consequence type. The results are heavily influenced by the limited detail of the linking of casualty cause keywords of the MSMS MINMOD CEVT table and the Level III Intervention Strategies.

Table 3.3 Risk-Based Ranking Bin Data Summary - USCG Wide Aggregation, U.S. Flag

Service	Inspections	Casualties	Relative Frequency	Casualty Frequency	Casualty Frequency Standard Deviation	Consequences			
						Deaths	Injuries	Property Losses	Pollution Releases (gal.)
FREIGHTER	1924	985	0.5072	0.51195	0.0114	11	324	\$27,708,561	47,676
PASSENGER	4685	337	0.1735	0.07193	0.0038	2	50	\$2,863,371	1259
TANKER	1204	620	0.3193	0.51495	0.0144	4	167	\$6,554,482	8599
Total	7813	1942	1.0	-	-	17	541	\$37,126,414	57,534

Table 3.4 Risk-Based Ranking Bin Data Summary - USCG Wide Aggregation, Foreign Flag

Service	Boardings	Casualties	Relative Frequency	Casualty Frequency	Casualty Frequency Standard Deviation	Consequences			
						Deaths	Injuries	Property Losses	Pollution Releases (gal.)
FREIGHTER	17,916	870	0.67	0.05	0.0016	9	23	\$23,959,892	440,208
PASSENGER	99	62	0.05	0.63	0.049	1	28	\$13,020,000	300
TANKER	2557	363	0.28	0.14	0.0069	3	15	\$2,679,945	161,471
Total	20,572	1295	1.0	-	-	13	66	\$39,659,837	601,979

Table 3.5 Risk-Based Ranking - USCG Wide Aggregation, US Flag, Relative Frequency Weighting

Service	Consequence	Level III Intervention Strategies									
		Cargo/ Poll.	Steering/ Nav.	Documents/ Paperwork	Drills/ Human Factors	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
Freight	Deaths	0.29	0.50	0.00	1.00	0.00	0.08	0.04	0.10	0.00	0.08
	Injuries	0.30	0.48	0.00	1.00	0.00	0.08	0.04	0.13	0.00	0.07
	Property	0.37	0.57	0.00	1.00	0.00	0.11	0.05	0.14	0.00	0.07
	Pollution	0.22	0.43	0.00	1.00	0.00	0.05	0.03	0.08	0.00	0.07
Passenger	Deaths	0.09	1.00	0.00	0.42	0.00	0.05	0.07	0.07	0.00	0.07
	Injuries	0.10	1.00	0.00	0.38	0.00	0.16	0.08	0.10	0.00	0.03
	Property	0.10	1.00	0.00	0.36	0.00	0.16	0.08	0.07	0.00	0.03
	Pollution	0.17	1.00	0.00	0.36	0.00	0.12	0.06	0.03	0.00	0.06
Tanker	Deaths	0.51	0.67	0.00	1.00	0.00	0.05	0.01	0.18	0.00	0.14
	Injuries	0.55	0.71	0.00	1.00	0.00	0.10	0.03	0.21	0.00	0.08
	Property	0.59	0.99	0.00	1.00	0.00	0.10	0.03	0.22	0.00	0.09
	Pollution	0.80	0.74	0.00	1.00	0.00	0.13	0.05	0.31	0.00	0.08

Table 3.6 Risk-Based Ranking - USCG Wide Aggregation, Foreign Flag, Relative Frequency Weighting

Service	Consequence	Level III Intervention Strategies									
		Cargo/ Poll.	Steering/ Nav.	Documents/ Paperwork	Drills Human Factors	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
Freight	Deaths	1.00	0.84	0.00	0.11	0.00	0.08	0.02	0.06	0.00	0.07
	Injuries	0.94	1.00	0.00	0.15	0.00	0.10	0.02	0.06	0.00	0.08
	Property	1.00	0.87	0.00	0.13	0.00	0.09	0.02	0.07	0.00	0.06
	Pollution	1.00	0.88	0.00	0.10	0.00	0.10	0.01	0.05	0.00	0.07
Passenger	Deaths	0.00	0.14	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
	Injuries	0.05	0.16	0.00	1.00	0.00	0.01	0.02	0.00	0.00	0.00
	Property	0.00	0.14	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pollution	1.00	0.29	0.00	0.46	0.00	0.14	0.29	0.00	0.00	0.00
Tanker	Deaths	1.00	0.76	0.00	0.14	0.00	0.05	0.06	0.04	0.00	0.06
	Injuries	1.00	0.92	0.00	0.18	0.00	0.04	0.11	0.08	0.00	0.08
	Property	1.00	0.91	0.00	0.17	0.00	0.05	0.12	0.07	0.00	0.08
	Pollution	1.00	0.68	0.00	0.11	0.00	0.07	0.04	0.03	0.00	0.03

Table 3.7 Risk-Based Ranking - USCG Wide Aggregation, U.S. Flag, Casualty Frequency Weighting

Service	Level III Intervention Strategy									
	Cargo/ Poll.	Steering/ Nav.	Documents/ Paperwork	Drills/ Human Factors	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
Freight	0.36	0.58	0.00	1.00	0.00	0.12	0.05	0.15	0.00	0.07
Passenger	0.14	1.00	0.00	0.29	0.00	0.15	0.07	0.10	0.00	0.04
Tanker	0.63	0.72	0.00	1.00	0.00	0.15	0.04	0.22	0.00	0.08

Table 3.8 Risk-Based Ranking - USCG Wide Aggregation, Foreign Flag, Casualty Frequency Weighting

Service	Level III Intervention Strategies									
	Cargo/ Poll.	Steering/ Nav.	Documents/ Paperwork	Drills/ Human Factors	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
Freight	1.00	0.89	0.00	0.13	0.00	0.08	0.03	0.08	0.00	0.06
Passenger	0.33	0.21	0.00	1.00	0.00	0.04	0.08	0.00	0.00	0.00
Tanker	1.00	0.71	0.00	0.13	0.00	0.04	0.06	0.04	0.00	0.05

3.2.2 U.S. Flag Risk Based Rankings - USCG Wide Data Aggregation

The results of the U. S. Flag risk-based ranking analysis indicate that Drills/Human Factors and the Steering/Navigation inspection intervention strategies are the two most dominate contributors, regardless of the service of vessel. The Cargo Handling/Pollution Control intervention activity is also dominant for freighters and tankers, but not for passenger vessels. Other intervention activities that have relatively small risk rankings are Power Plant, Fire Fighting/Prevention, Hull, and "Other" (the "Other" category was defined to account for CEVT records for which no casualty cause keywords mapped into any of the Level III Intervention Activities. There were no casualty keywords in CEVT that were relevant to the Documents/Paperwork, Auxiliary Systems, and Life Saving intervention strategies (see Appendix C). The ranking of the dominant contributors to risk are similar regardless of the casualty consequence, although there are some differences in ranking based on the consequences.

For example, based on the Relative Frequency weighted results in Table 3.5, all risks (deaths, injuries, property loss, and pollution) for both freight and tanker services are most dominated by Drills/Human Factors related causes. Steering and Navigation causes are the next most dominant for these services, ranging from 43% to 57% as important as Drills/Human Factors for Freight and ranging from 67% to 99% as important for Tankers (the range is established by variations in importance for different risks). For passenger vessels the ranking is dominated by Steering and Navigation causes for all risks, followed by Drills/Human Factors causes (ranging from 36% to 42% as important as Steering and Navigation). The ranking results for the Casualty Frequency weighted results in Table 3.6 are very similar.

3.2.3 Foreign Flag Risk Based Rankings - USCG Wide Data Aggregation

The risk-based ranking results for foreign flag vessels are essentially the same for the Relative Frequency weighted and Casualty weighted analyses. Only minor shifts in rankings are observed. For example, injury risk for freighters Cargo Handling/Pollution Control causes is most dominant for Casualty Frequency weighting with Steering/Navigation causes 89% as important. For Relative Frequency importance Cargo Handling/Pollution Control is the second most important cause for injury risk for freighters, 94% as important as Steering/Navigation.

3.2.4 Data Issues and Uncertainties

3.2.4.1 Statistical Uncertainty of the Casualty Frequency Estimations

Several data issues must be considered when evaluating the significance of the risk-based ranking results. One issue is the uncertainty associated with the Casualty Frequency for each bin. The

degree of uncertainty for this term can be measured by calculating its standard deviation. Using the following approximation for standard deviation for a binomial random variable:

$$(p*(1-p)/n)^{1/2}$$

where:

p ≡ Casualty Frequency, and
n ≡ number of inspections.

The results of these calculations are shown in Tables 3.3 and 3.4 (similar calculations for District and MSO level data aggregation are in Appendix A). The results show that as the number of inspections increases, the standard deviation decreases, establishing a greater confidence in the statistical validity of the casualty frequency estimates.

3.2.4.2 Uncertainty Regarding Validity of Inspection and Casualty Data

The validity of the risk-based ranking analysis is highly dependant on the quality of the data incorporated into the analyses. The most noticeable issue encountered in the data queries of the MSMS MINMOD database was inconsistent logging of casualty information. For both the Relative Frequency and Casualty Frequency bin probability measures, the number of casualties "attributable" to each bin was calculated by linking casualty reports in CIRT to the unit of the last relevant inspection in IRIT. The RBR importance ranking used casualty cause keywords in CEVT to link the casualty causes to the Level III Intervention Strategies. However, casualty data was not consistently entered for all casualty reports. Of the 1942 casualties identified in this study that involved relevant U.S. flag vessels, 492 (25%) of these reports had no record entered in to the CEVT table. For foreign flag vessels, 358 out of 1295 identified casualties (28%) had no CEVT record. These data were included in the estimation of the bin probability measures because they reflect real information on the rate of casualty occurrence, but they could not be used in developing the risk-based ranking to identify the importance of the Level III Intervention Strategies to risk.

Another data uncertainty issue is the validity of the data used in the risk-based ranking analysis, specifically regarding the accuracy of the number of inspections and casualties assigned to each bin. An example that clearly indicates a problem regarding identifying which inspections and casualties belong to each bin is illustrated by the data results for the MSO level bin **MSO-Honolulu-Passenger**. A total of 19 relevant boardings on foreign flag passenger vessels were identified for this bin, but a total of 28 casualties involving foreign flag passenger vessels were "attributed" to this bin as well, for a casualty frequency of 1.5 casualties/inspection. This suggests that a problem exist with either the data entered into the database or the query process is missing a subtlety involving the relationship of the data links between tables. The results for this bin raise an obvious flag regarding data quality or the complexity of the querying process. The data for Honolulu is obviously flawed, however, the accuracy of data for other bins should also be scrutinized and verified before the risk-based ranking results can be accepted at face value.

4.0 Econometric Models and Estimates

In this section we present estimates from the econometric models. This together with the RBR results form the basis for measures of effectiveness (MOEs) at all three levels of the USCG inspection and boarding program. These results are also the basis for policy recommendations and the decision support system (DSS) methodology we develop. We also offer observations and recommendations pertaining to data quality, data deficiency, and data strengths, from the perspective of users of the MSMS database.

4.1 Overview

We present the results in two parts - one set of estimates for the Marine Inspection Program for U.S. flag deep-draft vessels, and another for the Port Safety Program covering Foreign flag deep-draft vessels. We do this for two reasons. Firstly, the Level I, II, and III activities described in Section 1 naturally segment into these two flag-separated groups. Secondly, and perhaps more importantly, information pertaining to U.S. flag vessels is more "complete" or "more certain" than for Foreign flag vessels. We will make this distinction clear in the discussion of the results, but the upshot is that we obtain quite different inferences for U.S. flag vessels than for Foreign flag vessels.

The econometric analysis is designed to answer the following question: How effective is the USCG inspection and boarding program in controlling or reducing Personnel casualties and Pollution casualties ? A second and possibly more important question that the analysis helps to answer is the following: How can the USCG reprogram its activities to become more effective in reducing Personnel and Pollution casualties ?

Two classes of econometric models are employed to provide quantitative answers to these questions. Poisson models are used to infer the effectiveness of USCG resources devoted to the inspection and boarding program in reducing or controlling the *number* of Personnel casualties and Pollution casualties. The Poisson distribution has been usefully applied to problems such as marine accidents, number of successful oil explorations, number of product failures, to name a few examples. A Poisson model is appropriate for a discrete random variable where the value of the random variable is generally small, which fairly represents Personnel and Pollution Casualties. Duration models are used to infer the effectiveness of USCG resources in *increasing the time between such casualties*. These are variations of time-to-failure models which have been extensively used in engineering.

Poisson models provide appropriate Level I and Level III MOEs, and duration models provide appropriate MOEs for Level II activities. In addition to Poisson models, we have experimented with other nonlinear models such as Probit and Logit models ³ but their results are not qualitatively different from the Poisson results, and have not been reported.

³ For descriptions and technical details of these and other models see e.g. Greene, William, 1993, Econometric Analysis. New York: Macmillan.

The actual models estimated are based on the theory provided in Section 2.0. The econometric models are based on cross-sectional data across deep-draft vessels. The estimating equations for both the Poisson and Duration models differ in the measurement of the dependent or left-hand-side (lhs) variables: for the Poisson model the lhs variable is the number of occurrences of casualties and for the Duration models the lhs variable is time-to-casualty. These different measurements necessitate different estimation techniques, which are detailed subsequently. Both the Poisson and Duration models have identical explanatory or right-hand-side (rhs) variables. Variations in the lhs variable are explained by the number of resource hours expended by the USCG inspection/boarding program, and a set of control variables that measure vessel characteristics, such as vessel age, and gross tonnage. The estimated coefficients on the resource hour variables *are* MOEs from the econometric models. They quantify the response of the dependent variable, namely occurrence of or duration between casualties, to changes in resource hours, and therefore measure the effectiveness of USCG activities in controlling or reducing Personnel and Pollution casualties.

4.2 Data Construction

4.2.1 Data Construction for the Poisson Model

For the Poisson model the data are arranged by vessel. 951 deep draft U.S. flag vessels, and 10907 deep draft Foreign flag vessels are included in the analyses. Table 4.0 describes the variables used in the econometric analysis. For each U.S. flag vessel, resource hours devoted to Marine Inspection hull activities (HULL_HR), machinery activities (MACH_HR), and administrative activities (ADMIN_HR) between 1989 and 1993 are computed from table CRST. Vessel characteristics such as gross tonnage (REG_GT), and vessel age (AGE) are computed from table VIDT. For each U.S. flag vessel, the number of Personnel casualties (DEATHS, MISSING, INJURED) and Pollution casualties (POLLOCCS) are computed from the MINMOD tables, particularly CIRT, between 1991 and 1993. For each Foreign flag vessel, resource hours devoted to Port Safety activities, mainly annual examinations, (REG_HR, RES_HR, ADMIN_HR) between 1989 and 1993 are computed from table BRST. Vessel characteristics and casualty data are constructed in the same manner as for U.S. flag vessels.⁴

Essentially each vessel is considered an independent "experiment". So we have 951 experiments on U.S. flag vessels (Marine Inspection, or MI, cases) and 10907 experiments on Foreign flag vessels (Port Safety, or PS cases). The Poisson model is estimated separately for the MI and PS

⁴ Other data that have been constructed for both U.S. and Foreign flag vessels and employed in the simultaneous models are as follows: number of deficiencies from an inspection/boarding (from tables IRIT, AVST), number of COI inspections, number of Reinspections, number of Hull Exams, number of Administrative inspections, number of Initial inspections, number of Construction inspections, number of Defective inspections, number of Other inspections (all from IRIT), number of Annual Freight exams, number of Annual Passenger Exams, number of Annual Tank Exams (all from BRST).

experiments. From the MI experiments we infer from the estimated coefficients on the resource hours whether MI activity has been effective in reducing or controlling Personnel and Pollution casualties on U.S. flag deep-draft vessels. For Personnel casualties, separate analyses are provided for (i) number of deaths and missing (D&M) and (ii) number injured (INJURED). PS cases are similarly analyzed.

4.2.2 Data Construction for the Duration Model

i. Marine Inspection Cases:

For MI cases, three types of inspections are considered: COI, Reinspection, and Hull Exam. These are in fact Level II.A type activities. The indicators in table IRIT are used to select these inspections. The data is arranged not by vessel as for the Poisson model, but by vessel inspection. The experiment unit is not a vessel, but the *inspection* of a vessel. Hence a vessel may appear more than once in a duration data set if it underwent two inspections during 1989-1993. The lhs variable is duration to casualty from the last inspection. The following example make clear the construction of this duration measure. Suppose vessel A undergoes inspection of type I1 on date ID1, and then inspection of type I2 on date ID2, these are counted as two different experiments. The duration from the date of inspection, Iritdate (from table IRIT), to date of casualty, Cirtdate (from table CIRT), is the lhs variable in the Duration model. Suppose vessel A experienced a casualty (say, pollution casualty) on date CD1, then corresponding to the two inspections we get two duration data (CD1-ID1) and (CD1-ID2), respectively. All inspections since 1/91 are considered since casualties beginning 03/91 are in MINMOD (where CIRT resides). If a vessel has no casualties till the period 12/93 (the last date in the database we consider), then the "duration" associated with inspections on that vessel are the days between the inspection date and 1/1/95. This rather ad hoc assumption needs to be made since most Duration models are confronted with precisely this problem of assigning durations to events that have not yet been completed. A long duration is therefore indicative of a "failure that has a weak link with an inspection". This is the correct interpretation of duration and applies not only to non-casualties, but to casualties that happen long after an inspection. Suppose vessel A underwent inspection of type I1 on 1/1/92. It underwent the same inspection again in 1/1/93. Suppose it met with a casualty on 1/3/93. The duration associated with its 1993 inspection is then 60 days, while the duration associated with its 1992 inspection is 425 (365+60) days. The latter indicates a weak link, if any, with the 1992 inspection but a strong link with the 1993 inspection. This is consistent with the treatment of non-casualties as explained above. A possible improvement, which requires better information concerns the linkage between an inspection and a casualty. But this information is unavailable from the MSMS database.

The rhs resource variables are computed similarly as for the Poisson model, except that hours spend on each Level II activity (rather than on a vessel) is computed from CRST and IRIT.

ii. Port Safety Cases:

The analysis for PS cases is the same except for the following differences:

(a) the resource hours data is constructed from BRST, BRIT, and AVST (CRST and IRIT are used for MI cases), and

(b) three types of examinations are considered: Annual Foreign Freight Exams, Annual Foreign Tank Exam, Annual Foreign Passenger Exam. These are in fact the Level II.B type activities. Whereas for Level II.A activities (MI cases) the selection is based on indicators in IRIT, for Level II.B activities (PS Cases), a mapping from BRST inspection types to Level II.B activities is used. This mapping is provided in the appendix.

4.3 Statistical and Estimation Details

4.3.1 Poisson Model:

Used to analyze count data, e.g. number of accidents, number of strike days, number of customer complaints, number of oil wells, number of doctor visits.

A Poisson model is used to analyze number of deaths, injuries in casualties involving personnel, and number of pollution incidents in casualties involving pollution.

$$Prob(Y_i = y_i) = \frac{e^{-\lambda_i} \lambda_i^{y_i}}{y_i!}, \quad y_i = 0, 1, 2, \dots$$

In a Poisson distribution there is one parameter, λ . A Poisson r.v. has the property that its mean (and variance) are both equal to λ .

$$E(y_i) = \lambda_i$$

Here λ is subscripted by i to show that the expectation of y varies across observations i . It is hypothesized that λ_i is related to other characteristics of i , measured by the vector x_i , as follows:

$$\ln \lambda_i = \beta' x_i$$

The Poisson model is applied to a data set that comprises of inspections and casualties on 951 deep draft vessels for which such data is available. A unique vessel appears once in the data set and is indexed by i . Hull, machinery, and administrative hours between 1989 and 1993 together with the variables vessel age, and gross tonnage make up the vector of *explanatory variables* x_i .

The *dependent variable* is the number of personnel casualties for each vessel since 1991. For example the range for personnel deaths is between 0 and 7.

It is clear that the response of the expected value of the dependent variable to a change in an independent variable, say, x_i is given by

$$\frac{\partial E(y_i | x_i)}{\partial x_i} = \lambda_i \beta$$

The parameter vector β is estimated by maximum likelihood, and the responses are calculable from the last equation. The responses on the variables measuring inspection hours can thus estimate, for example, "the reduction in the expected number of personnel casualties with an increase of one hour of an inspection".

4.3.2 Duration Model: ⁵

We use the form of the Duration model used in King, Alt, Burns, and Laver (1989).⁶

Let y_i , $i=1, \dots, n$ take on any non-negative real number representing a duration. Often y_i is measured as an integer (as we do), such as the number of days or months. Even so, if the dependent variable is a measure of time, duration models, and not event count models (like Poisson), are called for. Let y_i be distributed exponentially with mean μ_i . Then we can write the density of y_i as

$$f(y_i) = \frac{1}{\mu_i} e^{-\frac{y_i}{\mu_i}}, \quad \mu_i > 0, \infty > y_i \geq 0$$

The exponential density is often useful for modelling the length of life of electronic components. Suppose that the component is such that the length of time it has already operated does not affect the component's chance of operating at least b additional time units. That is, the probability that

⁵ For details on Duration models see Kalbfleisch J. D. and R. L. Prentice, 1980, The Statistical Analysis of Failure Time Data. New York: Wiley. For duration models in econometrics see N. Keifer, 1988, "Economic Duration Data and Hazard Functions", Journal of Economic Literature, 26, pp. 646-679.

⁶ King, Gary, James Alt, Nancy Burns, Michael Laver, 1989, "A Unified Model of Cabinet Duration in Parliamentary Democracies", mimeograph, Kennedy School of Government, Harvard University.

the component operates for more than $a+b$ time units, given that it has already operated for at least a time units, is the same as the probability that a new component will operate at least b time units if the new component is put into service at time 0. We feel that this "memoryless" property of this distribution is an attractive feature and appropriate for modelling time to casualty of U.S. flag and Foreign flag vessels.

If we model μ_i , which is a positive number, as a log-linear function of the explanatory variable x_i ,

$$E(y_i) \equiv \mu_i = \exp(x_i \beta)$$

then we get an exponential regression model. Estimation is by maximum likelihood. Elements of the vector β measure the percent response of duration-to-casualty to a change in the corresponding rhs variable. For example, an estimate of the vector β directly provides an answer to the question "by what percent will the duration to a casualty increase if we increase the number of hours devoted to hull-related activity (i.e. HULL_HR) by 1000 hours".

4.4 U.S. Flag Vessels: Econometric Results and Level I, II, and III MOEs

4.4.1 Data Description: Marine Inspection of U.S. Flag Deep-Draft Vessels

Figures 4.0.1-4.0.3 display number of Personnel and Pollution casualties by vessel service for U.S. flag deep-draft vessels. Casualties are constructed from the MINMOD tables in the MSMS database, which is a relatively new component of the database and includes casualties beginning 1991. Freight ships account for 75% of all Dead and Missing (D&M) casualties, and about 60% of Injured casualties. Pollution casualties are equally shared by Freight and Tank ships. Figure 4.1.1 shows the breakdown of our sample by service. Of 951 deep-draft U.S. flag vessels, 53% are Freight ships, 32% are Tank ships, and 15% are Passenger ships. Hours devoted to Marine Inspections between 1989 and 1993 are displayed in aggregate in Figure 4.1.2 and by service in Figure 4.1.3. The three main types of hours - Hull hours, Machinery hours, and Administrative hours - are included in the empirical analysis. Nearly 1.2 million hours were devoted to Hull activities, 800,000 hours to Machinery activities, and 1.15 million hours to Administrative hours (hours that did not involve actual inspections). This works out to approximately 250 Hull hours, 167 Machinery hours, and 240 Administrative hours per deep-draft vessel per year. Note that these numbers include activities such as Construction and Initial Inspections which are very resource-intensive and inflate the averages. Typically about 100-150 Hull hours, 50-100 Machinery hours, and 100-150 Administrative hours is expended annually per deep-draft U.S. flag vessel. Vessel characteristics such as gross tonnage and age are displayed in Figures 4.1.4 and 4.1.5. Passenger vessels are the smallest of deep-draft U.S. flag vessels in terms of gross tonnage (they are dwarfed in size by Foreign flag Passenger vessels). The U.S. fleet of deep draft vessels is both smaller (in number of vessels as well as size of vessels) and older than the world's fleet, perhaps reflecting the fact that it is more costly to own and operate deep-draft vessels in the regulatory environment that exists in the U.S. that prevent economies of scale that are essential to success in this industry.

Average duration to Personnel casualty after each Type II.A activity is displayed in Figures 4.1.6-4.1.8. Conditional on the fact that there is a casualty, on the average it occurs about 250 to 300 days from an inspection, depending on service. This is indicated by the bar labelled "Dur-cas". Where there is no casualty, we compute the "duration" as the number of days between that inspection and 1/1/1995. This results in an average of about 950 to 1000 days (the bar labelled "Dur-nocas") for inspections that do not see a casualty at all.

The corresponding durations to Pollution casualty that appear in Tables 4.1.9-4.1.11 show that the average duration to a casualty is about 300 to 400 days.

Figure 4.0.1 MI Cases: Number of DEAD & MISSING, 1991-93

Figure 4.0.1

MI Cases: Number DEAD & MISSING, 1991-93

Figure 4.0.2 MI Cases: Number of INJURED, 1991-1993

Figure 4.0.2

MI Cases: Number INJURED, 1991-1993

Figure 4.0.3 MI Cases: POLLUTION Casualties, 1991-93

Figure 4.0.3

MI Cases: POLLUTION Casualties, 1991-93

Figure 4.1.1 Deep Draft Vessel, MI Cases

Figure 4.1.1

Deep Draft Vessels, MI Cases

Total = 951

Figure 4.1.2 Total Inspection Hours, MI Cases, 1989-1993

Figure 4.1.2

Total Inspection Hours, MI Cases, 1989-1993

Figure 4.1.3 Inspection Hours by Service, MI Cases, 1989-1993

Figure 4.1.3

Inspection Hours by Service, MI Cases, 1989-1993

Figure 4.1.4 Average Cross Tonnage by Service, U.S. Flag

Figure 4.1.5 Average Age of Vessel, U.S. Flag

Figure 4.1.5

Average Age of Vessel, U.S. Flag

Figure 4.1.6 Average Duration to Personnel Casualty

Figure 4.1.6
Average Duration to Personnel Casualty

Figure 4.1.7 Average Duration to Personnel Casualty

Figure 4.1.7

Average Duration to Personnel Casualty

Figure 4.1.8 Average Duration to Personnel Casualty

Figure 4.1.8
Average Duration to Personnel Casualty

Figure 4.1.9 Average Duration to Pollution Casualty

Figure 4.1.9
Average Duration to Pollution Casualty

Figure 4.1.10 Average Duration to Pollution Casualty

Figure 4.1.10
Average Duration to Pollution Casualty

Figure 4.1.11 Average Duration to Pollution Casualty

Figure 4.1.11
Average Duration to Pollution Casualty

4.4.2 Level I MOEs for U.S. Flag Deep-Draft Vessels from Poisson Models

i. Personnel Casualties: Deaths and Missing (D&M), and Injured

Level I MOEs measure the overall effectiveness of the Marine Inspection and Port Safety Program is an aggregate measure. We use the Poisson model to quantify the response of Personnel and Pollution Casualties to aggregate resources input by the USCG into this Program. From estimates of the coefficient on these aggregate hours, namely aggregate hull hours (HULL_HR), aggregate machinery hours (MACH_HR), and aggregate administration hours (ADMIN_HR), we can infer their effectiveness in reducing or controlling casualties. Table 4.1.1 presents estimates from a cross-sectional Poisson model of Personnel casualties. 951 deep draft U.S. flag vessels are covered in the cross-section. The "Deaths and Missing" (D&M) column reports the results where the dependent (or lhs) variable is the number of personnel deaths and missing reported (for each of the 951 vessels) between 1991 and 1993, and the "Injuries" column reports the results where the lhs variable is the number of personnel injuries between 1991 and 1993. A description of the variables is provided in Table 4.0. Estimation is by maximum likelihood.⁷ Asterisks denote statistical significance, the log of the likelihood ratio (*LLR*) statistic measures the significance of the entire model, and a pseudo R-squared measure (*Mad. R²*) provides a rough measure of fit. The *LLR* statistic is distributed as a chi-squared random variable. Since the critical value at the 5% level of the chi-squared statistic with 5 degrees of freedom is 11.07, clearly the model passes the basic test that the explanatory variable each do not have a coefficient equal to zero, that is, the model performs much better with the collection of variables than a model with just the intercept term. The pseudo R² statistic is low, but our model here is very parsimonious relative to the number of observations. As the number of variables increases in the estimating equations (or model specification), the R² measure also increases.

If USCG resources are effectively employed, we should see statistically significant negative

⁷ All computations were performed on a HP 9000, 735 series UNIX platform. The matrix processing software GAUSS for UNIX v. 3.x.x. was employed to perform all statistical estimation. The Poisson models and Duration models are well-behaved nonlinear optimization problems, and convergence is fast. No model took longer than 2 minutes to converge. Alternatively, other statistical software may be used and provide a wider range of event count models (of which Poisson is one) and Duration models to choose from. One package that is popular, powerful, and easy to use, is LIMDEP.

The data sets were constructed from the MSMS database tables using the same platform. The database software package used was INFORMIX-ISQL and INFORMIX-4GL. ISQL is an SQL-based language and very close in logic to database packages such as SYBASE. Their syntax is quite similar although there are some differences. ISQL was used for the construction of most data sets. The time taken to construct the data sets ranged from 60 minutes for the U.S. flag aggregate resources and casualties data set to nearly 300 minutes for the Level III U.S. flag data set.

coefficient estimates on those resources if there are a "significant" number of casualties in the data set. We wish to refer the reader to Section 2.2.3, and the discussion relevant to the case where there are very few casualties in the data set relative to the number of observations in the data set. For example, there are 14 observations (total number of D&M=24) in the data set of 951 observations in Table 4.1.1. Is this a small number or a significant enough number that we can conclude outright that the USCG is effective? Do statistically insignificant coefficients mean that we cannot say anything about the USCG's effectiveness in reducing casualties? It may be hypothesized that if the number of casualties is low, then that is itself evidence that the USCG is effective to a large degree, and whatever casualties do happen, are largely random events. In this case coefficients on resources (as well as on other variables such as REG_GT and AGE) should show up as statistically insignificant. For the D&M column, although this is the case with the coefficients on HULL_HR and MACH_HR, the variables REG_GT and ADMIN_HR appear strongly positively. This refutes the hypothesis that most deaths and missing are purely random event. The positive coefficient on ADMIN_HR in fact indicates that administrative hours do not contribute to controlling deaths and missing. In the second column, however, MACH_HR is statistically significant and shown to be effective in reducing injuries. From the expression for the response in Section 4.3.1, an increase of 1000 machinery hours will reduce expected number of Injured by $\beta \times \lambda_i = \beta \times \exp(\beta' x_i)$ on vessel i . To obtain an average for the data set, we average λ_i over the 951 vessels, which works out to .538. Hence an increase of 1000 machinery hours will reduce the expected number of Injured by $.238 \times .568 = .135$,⁸ or 100,000 additional machinery hours will reduce Injured by about 13.5. Again ADMIN_HR is statistically significant has the opposite sign. Indeed this is a constant feature of all the equations estimated and presents a puzzle. This puzzle is resolved subsequently.

Tables 4.1.2 and Tables 4.1.3 present results using different specifications of rhs variables. Although based on a well-founded theory, the true specification is really unknown, and the theory is silent on the precise form of the true specification. Therefore the presentation of results for a range of specifications indicate the robustness of results to variations in the specification. In both these tables, the *LLR* (likelihood ratio) statistic attests to the validity of the model. In Table 4.1.2, dummy variables (binary indicators) for Passenger vessels (DP) and Freight ships (DF) are added. For example, DP takes the value if the vessel is a Passenger vessel, and 0 otherwise. In graphical terms, inclusion of dummies has the effect of allowing different intercepts for each of the three services. The results clearly show that Passenger vessels and Freight ships both have a higher level of Personnel casualties that Tank ships *even after controlling for size, age, and inspection resources*. Table 4.1.3 interacts each resource hour by service by multiplying each resource hour variable by the three service dummy variables. For example, $MACH_P = MACH_HR \times DP$. In graphical terms these interaction terms allow differential coefficients on the resource hour variable across different services. The first column of Table 4.1.3 shows that hull hours are successful in preventing D&M casualties on Freight ships. The second column indicates that machinery hours are effective in preventing injuries on

⁸ Therefore the average value of λ_i in the expression for the response in Section 4.3.1 is .568 here. Note that although this example is instructive, since the DSS graphs focus on such computations they are not performed for other estimates in this section.

Passenger vessels, and machinery hours are effective in preventing injuries on Freight ships. The administrative hour puzzle remains, and in addition machinery hours have the opposite sign in the first column. Estimates on the dummy variables in the second column indicate that something other than the included variables is responsible for a higher incidence of injuries on Tank ships than the other services.

The set of results contained in Tables 4.2.1-4.2.3 and 4.3.1-4.3.3 are motivated by the puzzling sign on the administrative hour variable (and sometimes other resource hour variables). Even before doing any estimation, our interactions with the USCG team comprising of LT Chris Rodriguez, LT Wyman Briggs, and Mr. Athar Pirzada had led us to consider the possibility of *positive* coefficients on the hour variables.⁹ The reason for expecting positive coefficients is that when an inspection occurs, it is quite logical for a high number of hours to be spent on precisely those vessels that are likely to have higher casualties. Hence if we regress the number of casualties on resource hours, we actually capture this relationship in the positive coefficients. In econometrics this is known as the problem of *simultaneity* between a lhs and rhs variable. If simultaneity is present, a single equation is no longer appropriate for correct inference.¹⁰ In order to rid the resource hour variables of simultaneity, we need an auxiliary regression that *predicts* each resource hour variable. The predictions from these auxiliary regressions is then substituted in place of the original resource hour variables, and the Poisson model estimated. This two-stage process is commonly used in simultaneous econometric model. Tables 4.2.1-4.2.3 present the results from this two-stage process.¹¹ The one striking difference is that HULL_HR is seen to be effective in reducing D&M, and this holds for the first column in Tables 4.2.1-4.2.3. From Table 4.2.3, it is seen that HULL_HR is effective in preventing D&M for Freight ships. However, the problem of positive coefficients on resource hour variables, particularly on ADMIN_HR, is not solved by this simultaneous equation estimation method.

The second approach to solving the problem of positive coefficients on resource hour variables is to consider the possibility that resource hours are highly correlated with REG_GT and/or AGE.

⁹ Epplé and Visscher (1984) also faced the same problem in their preliminary estimates of determinants of oil pollution. However, their solution is different from ours.

¹⁰ A simple example, much cited in economics, is if we regress price on quantity, we do not know whether we are estimating a demand relationship or a supply relationship.

¹¹ The auxiliary prediction regression uses the following variables on the rhs: number of deficiencies, number of COI inspections, number of Reinspections, number of Hull Exams, number of Administrative inspections, number of Initial inspections, number of Construction inspections, number of Defective inspections, number of Other inspections. These variables are consistent with the opinions from a survey of seven USCG officers with substantial inspection/boarding/examination experience. Although this auxiliary regression is not reported, the fit for each resource hour, HULL_HR, MACH_HR, and ADMIN_HR, is strong with R^2 's .64, .59, and .84, respectively, and with signs on the variables consistent with the opinions of the officers surveyed.

If so, then the resource hour variables will pick up the effects of these other variables, rather than exhibiting their own effects. This problem can be solved by orthogonalizing each resource hour variable with respect to REG_GT and AGE. The residual from a linear regression of resource hours on these two variables achieves precisely that since residuals from a regression are constructed to be orthogonal to the rhs variables. Tables 4.3.1-4.3.3 display results from the Poisson model where the resource hour variables are replaced by their orthogonalized counterparts. The results are clearly very close to those in Table 4.1.1-4.1.3, probably because the fit on the regressions from which the residuals are taken is so poor that the residuals very closely resemble the original resource hour variables.

The third approach is one that is often applied in econometrics to prevent influential or "large" values of the rhs variables to determine the coefficients. (It is well known that "large" values exert undue influence over the position of a regression line since a regression line minimizes squared error and hence discourages large errors. Outlying values are therefore influential in the position of a regression line). There are two variations of this argument. One is that a few large outlier values can determine the outcome, and since the results are not representative of the sample (and therefore the population), the solution often adopted is to drop these outliers. Fortunately, our data set does not suffer from an outlier problem.¹² The second variation, and one that is more subtle and not easily recognized is that a regression may suffer from "scale effects" and give spurious results. An example is if we tried to explain the determinants of trade using data on imports and exports, and measures of labor and capital across countries. Clearly regressing trade (import + exports) will be greatly influenced by countries with large values of labor and capital stock, for example the U.S. The estimates are spurious on account of the scale effect, a problem often afflicting regressions that do not scale the rhs variables so they are "equal" across observations. In the above example, if the rhs variables are scaled by a measure of country size, for example GDP, then any observation (say, the U.S) is "equal" to another (say, Mexico). To prevent scale effects, we scale (divide) the resource hour variables by gross tonnage, REG_GT. These scaled hours are now used in the estimation. However, after scaling, the resource hour variables become highly collinear with correlation among them exceeding .85. This poses problems for estimation, but an even greater problem in terms of interpreting the results, since collinearity causes the coefficients to be extremely sensitive to specification changes and adding and dropping variables that are highly correlated. The natural solution, and one that we adopt here, is to include the resource variables one at a time rather than lump them all in a model.¹³ These estimates are provided in Tables 4.4.1 and 4.4.2, and the results are striking.

¹² To find this out, we used the drop-one observation-at-a-time methodology recommended by Belsley, Kuh and Welsch (1980) to check for sensitivity of estimates to outliers. We estimated each model in Table 4.1.1-4.1.3 95 times, after dropping a block of 10 observations at a time (in descending order of REG_GT). An influential set of observations will be indicated by a large change in the size or sign of coefficient estimates. The estimates are surprisingly robust in this regard.

¹³ Although in the unscaled case, the resource hour variables are correlated, their
(continued...)

Six specifications are estimated in each table. In Table 4.4.1 although no significance at 10% is achieved, the first three columns come close to achieving statistical significance with the expected negative signs on all three resource hours. The *LLR* values attest to model adequacy, since they are all greater than their critical chi-squared values. In Table 4.4.2 the first three columns clearly shows that each resource hour is effective in reducing injuries, and are therefore resources well spent unless, of course, effort to reduce injuries costs more than the "value" of the injury reduction. Models 4, 5, and 6 indicate that Hull hours and Machinery hours are both effective in reducing injuries on Freight ships and Tank ships. Scaling also reverses the earlier results on Administrative hours, which are here shown to effective in reducing injuries, particularly for Freight ships and Tank ships. Since the scaled resource hours are so highly correlated, it may be expected that their estimated coefficients will have similar patterns and this is borne out by the results here. From Tables 4.4.1 it is seen from the estimates of DP and DF in the first three columns that Passenger and Freight ships have larger intercepts than Tankships, but this conclusion is not robust to changes in specification. A robust result from Table 4.4.2 is that the age of the vessel is inversely related to the number of personnel injured. U.S. deep-draft vessels are older compared to the world stock of deep-draft vessels, and it may be that they enjoy a longer life because they are better maintained than newer vessels. Or it may be true that the older the vessel the more careful the USCG inspections of these vessels. Both these arguments would support the negative coefficients on AGE.

For the remaining results, on both U.S. flag and Foreign flag vessels, we present estimates with resource hours unscaled as well as scaled by REG_GT. We omit further presentation of the simultaneous model or the model using orthogonalized resource hours, for they are not qualitatively very different from the results that we do present.

ii Pollution Casualties

In the analysis of Pollution casualties for U.S. flag deep-draft vessels, we drop from consideration Passenger vessels, since they account for only 9 of the 204 pollution occurrences between 1991 and 1993. Hence the data set comprises of 804 Freight ships and Tank ships. Table 4.5.1 presents results using unscaled resource hours. The first two columns show that MACH_HR is effective in reducing pollution occurrences. However the signs on HULL_HR and ADMIN_HR are counterintuitive. The third column offers no clear inferences. However, results using scaled hours presented in Table 4.5.2 are considerably sharper. The first three columns clearly indicate that all three resource hours are effective in reducing pollution casualties. The last three columns indicate that the resource hours are particularly effective on Tank ships (even though both services have almost equal number of pollution casualties in the data set). The coefficient estimates on resource hours possess the expected signs for Freight ships, but they are not statistically significant at the 10% level.

¹³(...continued)

correlations do not exceed .6 and do not pose a problem. The collinearity is not per se caused due to the scaling. The collinearity problem in the PS cases, for example, is not nearly so severe.

It may be relevant at this point to assess whether generally accepted statistical criteria such as 5% or 10% significance values should be blindly applied to the problem at hand. From our interactions with the USCG team and other USCG officers, we understand that a primary objective of USCG inspections is to prevent events of great significance, for example large oil spills. USCG inspection and boarding policy is thus necessarily conservative, since the "penalty" to err on the side of caution is the cost of excessive inspection hours, whereas the cost (in terms of reputation, morale, integrity of the USCG) is considerable. What does this imply about statistical significance criteria?

The hypothesis that is being tested by the t -statistics in the tables presented is the following:

H_0 : β_{Hours} equals 0

H_1 : β_{Hours} not equal to 0

or, verbally,

H_0 : Hours (HULL, MACH, or ADMIN, respectively) do not affect casualties

H_1 : Hours (HULL, MACH, or ADMIN, respectively) do affect casualties

Two types of errors can be made while testing this hypothesis, called Type I, and Type II errors, respectively. Type I error occurs when we reject a true null hypothesis, and Type II error occurs when we accept a false null hypothesis. The probability of Type I error is the probability of rejecting the null hypothesis, H_0 , that is, the probability of making the erroneous inference that Hours do matter when in fact they don't. A Type I error leads to an erroneous decision to increase hours. Conventionally, Type I errors are considered "grave" errors, and the 5% or 10% cutoffs are meant to minimize this kind of error. But for the USCG, Type I error is an error on the side of caution and, as such, insignificant compared to a Type II error, which can have grave consequences. The probability of Type II error is the probability of accepting the null hypothesis, H_0 , when in fact the null is false, that is, the probability of making the erroneous inference that Hours do not matter when in fact they do. The power of the test is $[1 - \text{Prob}(\text{Type II error})]$. It is imperative that for the kind of decisions the USCG makes, we minimize Type II error, or what is the same thing, maximize the power of the test. It is well-known that there is a trade-off between the significance level (that is, the probability of Type I error) and the probability of Type II error. A small significance level (that is, probability of Type I error) will cause a larger probability of Type II error. Should we then adhere to the conventional 5% or 10% cutoffs in assessing whether USCG activities are effective in preventing casualties? We think not. Recognizing the extreme aversion to large casualties, and the effort of the USCG to minimize Type II error, we should apply a significance cutoff of 20%, maybe even 30% in assessing USCG effectiveness, simply because the USCG is willing to err on the side of caution to prevent Type II error. We recommend the use of a critical t -statistic of 1.00 (approximately 30% probability of Type I error for a two-tailed test, and 15% for a one-tailed test) to test the

above hypotheses.¹⁴

By this standard, the last three columns in Table 4.5.2 show that Hull, Machinery, and Administrative hours are each highly effective in reducing pollution occurrences by both Freight and Tank ships. Going back to Table 4.4.1, we see that Hull, Machinery, and Administrative hours are each highly effective in reducing Personnel D&M casualties, particularly in Passenger and Freight ships. Since the USCG desires to minimize Type II error with D&M casualties, which it considers a grave consequence, a low *t*-value of 1.00 is the appropriate critical value in testing effectiveness.

¹⁴ This discussion raises two issues. Firstly, that the casually held view of conventional 5% and 10% cutoffs as "objective" criteria is false. Their choice is in fact subjective and should suit the way in which decisions are made. Secondly, the power of the test is an important ingredient in making decisions, and the probability of Type I error must be reported in combination with the power function. This is beyond the scope of the present study, and is left for future implementation. Note that differential cutoffs can be applied. For example, in the case of Personnel casualties, for Deaths and Missing a 15% (in one tail) cutoff may be applied while a cutoff of 5% (in one tail) can be applied for Injured. This is recommended because Type II error in the case of D&M is of graver consequence than a Type II error in the case of Injured.

Table 4.0
Description of Variables

DEATHS	Number of deaths from a casualty. From CIRT.
MISSING	Number of missing from a casualty. From CIRT.
D&M	Number of deaths and missing from a casualty. From CIRT.
INJURED	Number of injuries from a casualty. From CIRT.
POLLOCCS	Number of pollution casualties. From CIRT.
DURCAS	Duration to casualty from last inspection. From CIRT, CRST.
DURNOCAS	Duration measure if no casualty. From CIRT, CRST.
REG_GT	Gross Tonnage of vessel. From VIDT.
AGE	Age of Vessel=1993-Year vessel built. From VIDT.
HULL_HR	Inspection hours on hull activities. '000 Hours. From CRST.
MACH_HR	Inspection hours on machinery activities. '000 Hours. From CRST.
ADMIN_HR	Administrative hours. '000 Hours. From CRST (MI), BRST (PS).
REG_HR	Examination hours by active duty personnel.'000 Hours. From BRST.
RES_HR	Examination hours by reserve personnel. '000 Hours. From BRST.
DF	Dummy variable. 1 if vessel is Freightship.
DP	Dummy variable. 1 if vessel is Passenger Ship.
DT	Dummy variable. 1 if vessel is Tankship.
hour_F	Hours (HULL, MACH, ADMIN, REG, RES) $\times$ DF
hour_P	Hours (HULL, MACH, ADMIN, REG, RES) $\times$ DP
hour_T	Hours (HULL, MACH, ADMIN, REG, RES) $\times$ DT

Note:

1. DEATHS, MISSING, INJURED, POLLOCCS are sum of casualties between 1991-1993.
2. HULL_HR, MACH_HR, ADMIN_HR, REG_HR, RES_HR are sum of resource hours between 1989-1993.

Table 4.1.1

MOEs from a Poisson Model of Personnel Casualties (MINMOD)
MI Cases, U.S. Flag

Cross Section of 951 Deep Draft Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-9.149 (-3.92)**	-2.949 (-8.62)**
Reg_gt	0.477 (2.19)**	0.246 (7.50)**
Hull_hr	-0.107 (-0.60)	0.016 (0.31)
Mach_hr	0.282 (0.90)	-0.238 (-2.60)**
Admin_hr	0.391 (1.73)*	0.442 (7.12)**
Age	0.010 (0.56)	-0.013 (-3.50)**
<i>N</i>	951	951
<i>k</i>	5	5
<i>LLR</i>	25.379	258.741
<i>Mad. R²</i>	0.098	0.108
Obs. with y>0	14	247

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Madalla's pseudo R-square.

Table 4.1.2

MOEs from a Poisson Model of *Personnel* Casualties (MINMOD)
MI Cases, U.S. Flag

Cross Section of 951 Deep Draft Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-14.653 (-3.97)**	-4.050 (-9.04)**
Reg_gt	0.843 (2.46)**	0.323 (7.46)**
Hull_hr	-0.286 (-1.20)	0.002 (0.04)
Mach_hr	0.251 (0.78)	-0.274 (-2.96)**
Admin_hr	0.572 (2.21)**	0.466 (7.32)**
Age	0.013 (0.71)	-0.013 (-3.46)**
DP	2.608 (2.05)**	0.725 (3.70)**
DF	2.347 (3.01)**	0.564 (5.53)**
<i>N</i>	951	951
<i>k</i>	7	7
<i>LLR</i>	40.539	294.00
<i>Mad. R²</i>	0.156	0.122
Obs. with y>0	14	247

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Madalla's pseudo R-square.

Table 4.1.3

MOEs from a Poisson Model of Personnel Casualties (MINMOD)
MI Cases, U.S. Flag

Cross Section of 951 Deep Draft Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-12.187 (-3.14)**	-4.396 (-8.70)**
Reg_gt	0.758 (2.30)**	0.330 (7.34)**
Hull_P	0.272 (0.65)	0.120 (1.23)
Mach_P	-0.329 (-0.44)	-1.371 (-3.41)**
Admin_P	0.124 (0.17)	0.667 (4.69)**
Hull_F	-0.907 (-2.06)**	0.139 (1.47)
Mach_F	0.745 (2.29)**	-0.241 (3.52)**
Admin_F	1.027 (2.92)**	0.348 (3.52)**
Hull_T	0.850 (1.12)	0.053 (0.63)
Mach_T	-4.052 (-1.37)	-0.047 (-0.27)
Admin_T	0.787 (0.66)	0.409 (3.67)**
Age	0.013 (0.73)	-0.013 (-3.44)**
DP	1.527 (0.79)	1.536 (4.79)**
DF	0.178 (0.12)	0.772 (3.58)**
<i>N</i>	951	951
<i>k</i>	13	13
<i>LLR</i>	52.074	315.014
<i>Mad. R²</i>	0.201	0.131
Obs. with y>0	14	247

Note:

(1) See Notes for Table 4.1.1.

Table 4.2.1

MOEs from a Poisson Model of Personnel Casualties: MI Cases, U.S. Flag
Predicted Hours from auxiliary regression

Cross Section of 951 Deep Draft Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-12.728 (-3.90)**	-2.898 (-8.40)**
Reg_gt	0.831 (2.71)**	0.245 (7.19)**
Hull_hr	-3.458 (-3.28)**	-0.008 (-0.04)
Mach_hr	1.815 (1.06)	-0.130 (-0.36)
Admin_hr	2.531 (3.08)**	0.383 (2.00)**
Age	0.019 (1.06)	-0.013 (-3.56)**
<i>N</i>	951	951
<i>k</i>	5	5
<i>LLR</i>	42.022	223.019
<i>Mad. R²</i>	0.162	0.093
Obs. with y>0	14	247

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Madalla's pseudo R-square.

Table 4.2.2

MOEs from a Poisson Model of Personnel Casualties: MI Cases, U.S. Flag
Predicted Hours from auxiliary regression

Cross Section of 951 Deep Draft Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-16.585 (-4.27)**	-4.027 (-8.96)**
Reg_gt	1.069 (2.90)**	0.324 (7.31)**
Hull_hr	-2.840 (-2.59)**	0.312 (1.42)
Mach_hr	0.416 (0.23)	-0.650 (-1.76)*
Admin_hr	2.798 (3.27)**	0.389 (1.99)**
Age	0.024 (1.32)	-0.013 (-3.48)**
DP	2.177 (1.88)*	0.799 (3.99)**
DF	1.928 (2.54)**	0.559 (5.30)**
<i>N</i>	951	951
<i>k</i>	7	7
<i>LLR</i>	52.211	256.391
<i>Mad. R²</i>	0.201	0.107
Obs. with y>0	14	247

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Madalla's pseudo R-square.

Table 4.2.3

MOEs from a Poisson Model of Personnel Casualties: MI Cases, U.S. Flag
Predicted Hours from auxiliary regression

Cross Section of 951 Deep Draft Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-15.018 (-3.47)**	-4.808 (-9.36)**
Reg_gt	0.093 (2.47)**	0.333 (7.20)**
Hull_P	3.023 (1.32)	-0.747 (-1.44)
Mach_P	-5.085 (-0.78)	0.262 (.22)
Admin_P	0.683 (0.21)	0.646 (1.02)
Hull_F	-5.822 (-3.74)**	0.910 (2.74)**
Mach_F	2.054 (0.99)	-1.351 (-2.90)**
Admin_F	4.285 (4.01)**	0.289 (1.02)
Hull_T	-1.231 (-0.34)	-0.080 (-0.19)
Mach_T	-0.717 (-0.11)	1.223 (1.57)
Admin_T	1.827 (0.65)	-0.082 (-0.26)
Age	0.028 (1.53)	-0.012 (-3.10)**
DP	2.148 (0.93)	1.753 (4.96)**
DF	1.759 (0.91)	1.201 (4.44)**
<i>N</i>	951	951
<i>k</i>	13	13
<i>LLR</i>	66.965	281.875
<i>Mad. R²</i>	0.258	0.117
Obs. with y>0	14	247

Note:

(1) See Notes for Table 4.2.1.

Table 4.3.1

MOEs from a Poisson Model of Personnel Casualties: MI Cases, U.S. Flag
Hours Orthogonal to REG GT and AGE
 Cross Section of 951 Deep Draft Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-9.0278 (-3.69)**	-2.711 (-7.82)**
Reg_gt	0.540 (2.37)**	0.269 (8.29)**
Hull_hr	-0.088 (-0.51)	0.015 (0.30)
Mach_hr	0.279 (0.90)	-0.242 (-2.64)**
Admin_hr	0.386 (1.71)*	0.441 (7.06)**
Age	0.005 (0.27)	-0.016 (-4.26)**
<i>N</i>	951	951
<i>k</i>	5	5
<i>LLR</i>	26.491	258.536
<i>Mad. R²</i>	0.102	0.107
Obs. with y>0	14	247

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=~~Mad. R²~~ pseudo R-square.

Table 4.3.2

MOEs from a Poisson Model of Personnel Casualties: MI Cases, U.S. Flag
Hours Orthogonal to REG GT and AGE
 Cross Section of 951 Deep Draft Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-14.321 (-3.87)**	-3.848 (-8.41)**
Reg_gt	0.885 (2.65)**	0.347 (8.25)**
Hull_hr	-0.273 (-1.17)	-0.007 (-0.13)
Mach_hr	0.245 (0.76)	-0.286 (-3.06)**
Admin_hr	0.573 (2.21)**	0.468 (7.28)**
Age	0.008 (0.44)	-0.016 (-4.17)**
DP	2.544 (2.02)**	0.750 (3.82)**
DF	2.304 (2.95)**	0.543 (5.33)**
<i>N</i>	951	951
<i>k</i>	7	7
<i>LLR</i>	40.937	291.841
<i>Mad. R²</i>	0.158	0.121
Obs. with y>0	14	247

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Maddala's pseudo R-square.

Table 4.3.3

MOEs from a Poisson Model of Personnel Casualties: MI Cases, U.S. Flag
Hours Orthogonal to REG GT and AGE
 Cross Section of 951 Deep Draft Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-13.280 (-3.48)**	-3.968 (-8.14)**
Reg_gt	0.753 (2.24)**	0.359 (8.10)**
Hull_P	0.282 (0.67)	0.111 (0.75)
Mach_P	-0.314 (-0.43)	-1.101 (-3.21)**
Admin_P	0.116 (0.15)	0.665 (4.89)**
Hull_F	-0.889 (-2.09)**	0.134 (1.42)
Mach_F	0.738 (2.28)**	-0.245 (-1.95)*
Admin_F	1.051 (2.99)**	0.348 (3.51)**
Hull_T	0.676 (1.06)	-0.017 (-0.19)
Mach_T	-2.446 (-1.26)	-0.099 (-0.54)
Admin_T	0.710 (0.65)	0.417 (3.51)**
Age	0.007 (0.40)	-0.016 (-4.17)**
DP	3.045 (1.99)**	0.890 (4.07)**
DF	2.241 (2.06)**	0.552 (5.06)**
<i>N</i>	951	951
<i>k</i>	13	13
<i>LLR</i>	51.575	306.017
<i>Mad. R²</i>	0.199	0.127
Obs. with y>0	14	247

Note:

(1) See Notes for Table 4.3.1.

Table 4.4.1

MOEs from a Poisson Model of Personnel Casualties: MI Cases, U.S. Flag
Hours Scaled by Gross Tonnage.

Cross Section of 951 Deep Draft Vessels
 Dependent variable = Number of Personnel Deaths and Missing

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-4.573 (-5.90)**	-4.608 (-5.93)**	-4.566 (-5.89)**	-4.538 (-5.11)**	-4.042 (-3.70)**	-4.383 (-4.50)**
Hull_hr	-1.167 (-1.59)					
Mach_hr		-1.444 (1.57)				
Admin_hr			-1.033 (-1.58)			
Hull_P				-0.831 (-1.04)		
Mach_P					-1.326 (-1.11)	
Admin_P						-0.886 (-1.09)
Hull_F				-2.313 (-0.98)		
Mach_F					-1.462 (-1.01)	
Admin_F						-1.242 (-0.99)
Hull_T				-1.880 (-0.31)		
Mach_T					-17.655 (-0.61)	
Admin_T						-3.643 (-0.37)
Age	-0.007 (-0.52)	-0.008 (-0.58)	-0.008 (-0.56)	-0.006 (-0.44)	-0.008 (-0.54)	-0.008 (-0.52)
DP	2.148 (2.09)**	2.063 (2.05)**	2.134 (2.10)**	1.828 (1.48)	1.424 (1.05)	1.807 (1.40)
DF	1.732 (2.33)**	1.739 (2.34)**	1.723 (2.32)**	1.774 (1.99)**	1.164 (1.08)	1.549 (1.60)
N	951	951	951	951	951	951
k	4	4	4	6	6	6
LLR	17.66	15.77	17.60	18.19	16.34	17.78
Obs. y>0	14	14	14	14	14	14

Table 4.4.2

MOEs from a Poisson Model of Personnel Casualties: MI Cases, U.S. Flag
Hours Scaled by Gross Tonnage

Cross Section of 951 Deep Draft Vessels
 Dependent variable = Number of Personnel Injuries

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-0.106 (-0.98)	-0.092 (-0.85)	-0.104 (-0.96)	0.127 (1.02)	0.050 (0.41)	0.058 (0.49)
Hull_hr	-0.212 (-5.03)**					
Mach_hr		-0.528 (-5.44)**				
Admin_hr			-0.169 (-4.80)**			
Hull_P				0.295 (5.13)**		
Mach_P					0.041 (0.35)	
Admin_P						0.161 (4.03)**
Hull_F				-0.534 (-4.36)**		
Mach_F					-1.076 (-4.26)**	
Admin_F						-0.612 (-4.34)**
Hull_T				-2.998 (-2.76)**		
Mach_T					-3.506 (-2.49)**	
Admin_T						-2.063 (-2.65)**
Age	-0.022 (-6.38)**	-0.023 (-6.58)**	-0.023 (-6.52)**	-0.022 (-6.12)**	-0.022 (-6.12)**	-0.021 (-5.91)**
DP	0.259 (1.62)	0.454 (2.71)**	0.260 (1.63)	-0.904 (-4.03)**	-0.275 (-1.27)	-0.667 (-3.19)**
DF	0.292 (2.94)**	0.305 (3.06)**	0.287 (2.89)**	0.115 (0.94)	0.193 (1.62)	0.178 (1.53)
N	951	951	951	951	951	951
k	4	4	4	6	6	6
LLR	128.31	137.77	123.60	208.78	173.59	203.38
Obs. y>0	247	247	247	247	247	247

Table 4.5.1

MOEs from a Poisson Model of Pollution Casualties (MINMOD)
MI Cases, U.S. Flag

Cross Section of 804 Deep Draft Vessels
 Dependent variable (y) = Number of Pollution Incidents

rhs variables	Model 1	Model 2	Model 3
Constant	-3.535 (-6.22)**	-3.187 (-5.55)**	-3.120 (-5.29)**
Reg_gt	0.148 (2.65)**	0.134 (2.47)**	0.129 (2.37)**
Hull_hr	0.279 (3.34)**	0.260 (3.15)**	
Mach_hr	-0.330 (-2.16)**	-0.293 (-1.90)*	
Admin_hr	0.400 (3.57)**	0.378 (3.38)**	
Age	0.003 (0.52)	0.002 (0.42)	0.002 (0.41)
DF		-0.319 (-2.17)**	-0.382 (-1.31)
Hull_F			0.180 (1.04)
Mach_F			-0.323 (-1.42)
Admin_F			0.509 (2.83)**
Hull_T			-0.215 (-0.95)
Mach_T			-0.215 (-0.95)
Admin_T			0.292 (1.92)*
<i>N</i>	804	804	804
<i>k</i>	5	6	9
<i>LLR</i>	76.200	80.870	81.762
<i>Mad. R²</i>	0.074	0.079	0.079
Obs. with y>0	144	144	144

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Madalla's pseudo R-square.

Table 4.5.2

MOEs from a Poisson Model of Pollution Casualties: MI Cases, U.S. Flag
Hours Scaled by Gross Tonnage.

Cross Section of 804 Deep Draft Vessels
 Dependent variable (y) = Number of Pollution Incidents

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-0.837 (-5.35)**	-0.838 (-5.35)**	-0.830 (-5.30)**	-0.816 (-5.22)**	-0.826 (-5.27)**	-0.807 (-5.16)**
Hull_hr	-0.138 (-2.82)**					
Mach_hr		-0.258 (-2.51)**				
Admin_hr			-0.132 (-2.81)**			
Hull_F				-0.075 (-1.30)		
Mach_F					-0.178 (-1.34)	
Admin_F						-0.067 (-1.26)
Hull_T				-0.223 (-2.37)**		
Mach_T					-0.350 (-2.03)**	
Admin_T						-0.230 (-2.28)**
Age	-0.007 (-1.37)	-0.008 (-1.49)	-0.008 (-1.42)	-0.007 (-1.30)	-0.008 (-1.46)	-0.007 (-1.33)
DF	-0.551 (-3.85)**	-0.544 (-3.80)**	-0.553 (-3.86)**	-0.611 (-4.09)**	-0.579 (-3.87)**	-0.618 (-4.15)**
<i>N</i>	804	804	804	804	804	804
<i>k</i>	3	3	3	4	4	4
<i>LLR</i>	31.98	29.21	32.86	34.05	29.86	35.38
Obs. with $y > 0$	144	144	144	144	144	144

4.4.3 Level II MOEs for U.S. Flag Deep-Draft Vessels from Duration Models

1. Activity II.A.1: COI

Duration to Personnel casualty is defined as the duration from a Level II activity to the closest casualty involving either personnel death, missing, or injury. No separate analysis is done for D&M and Injured as in the Poisson models. Duration to Pollution casualty is defined as the duration from a Level II activity to the closest casualty involving a pollution incident. For details on construction of the duration variable and the duration data sets the reader is referred to Section 4.2.2. The usefulness of the duration model lies in its ability to answer the question of how a change in the deployment of resource hours affects the time to a Personnel or Pollution casualty. The duration model is employed because Level II activities are naturally defined in terms of duration. A COI is required once every two years, Reinspections (Activity II.A.2) are required once every year, Hull Exams (Activity II.A.3) are required twice every five years with the requirement that not more than 3 years elapse between two inspections, and Annual Exams (Activity II.B.1-3) are required of Foreign flag vessels every year. Hence the effectiveness of these activities is best measured in how much longer they are able to prolong the event that a casualty occurs. Additionally, estimates from a duration model may form the basis of an economic decision of allocating resource hours by changing the duration over which these activities take place. For example, if a COI is shown to extend the expected duration to casualty by 2 years, then COIs may be carried out less frequently, thus saving resources. The converse argument can also be made to shorten the duration between two COIs. The results presented in the tables in this section provide MOEs for Level II activities in terms of the effectiveness of resource hours in extending the expected duration of a casualty.

Results from the duration analysis given that a Certificate of Inspection was performed is presented in Tables 4.6.1-4.6.3 for duration to Personnel Casualty since that activity, and in Tables 4.7.1-4.7.3 for duration to Pollution casualty since that activity. A *positive* coefficient on the resource hour variables conveys the information that USCG resources devoted to the COI activity is effective in prolonging time to casualty. Tables 4.6.1 and 4.6.2 contain estimates based on unscaled resource hours while Table 4.6.3 contains estimates using scaled hours. 1278 COI inspections between 1989 and 1993 are covered in the data set of which 585 were conducted on Freight ships, 332 on Passenger ships, and 361 on Tank ships. Table 4.6.1 shows strong support for the effectiveness of Machinery hours in increasing duration to a Personnel casualty, particularly on Freight ships and Tank ships. If we employ a critical *t*-value of 1.00, then Machinery hours are effective for all services. Although Hull hours exhibit the right sign, their standard errors are too large to make a strong inference from this unscaled data set. Administrative hours reappears with the opposite sign, and this question is further examined by scaling the data.¹⁵ Model results based on subsets of the data set, split by vessel service are presented in Table 4.6.2. The results are very similar to those in Table 4.6.1. Results from the scaled model are presented in Table 4.6.3. Again, due to the high degree of correlation among the resource hour variables, the scaled models were estimated by including these variables one at a time. Using the usual 5% and 10% significance levels, Machinery hours and Administrative hours are both shown to be strongly effective in increasing time to Personnel casualty, particularly in Freight ships. If a 30% significance level is used ($t=1.00$) then each resource

¹⁵ The simultaneous model and the model using orthogonalized hours are not reported here, but their results are not strikingly different, and the Administrative hour variable still has the wrong sign.

variable is effective in increasing time to Personnel casualty on vessels of almost all services.

The Pollution casualty results are weaker for the COI data set. Only Machinery hours are shown to be effective in Table 4.7.1, but this result is not robust across the different models in Tables 4.7.2 and 4.7.3. The scaled hour data set yields very weak inferences in Table 4.7.3

In sum, the COI activity is shown to favorably influence duration to Personnel casualty, but has little effect in prolonging duration to Pollution casualty.

2. Activity II.A.2: Reinspection

The duration data sets for Activity II.A.2 covers 1021 Reinspections between 1989 and 1993, of which 437 were conducted for Freight ships, 272 for Passenger ships, and 312 for Tank ships. Results for based on the unscaled resource hour variables in Table 4.8.1 provide some inferences on the effectiveness of Reinspections in increasing time to Personnel casualty. The third column in Table 4.8.1 does indicate that Hull hours favorably affects Freight ships, and Machinery hours favorably affects Tank ships. Results in Table 4.8.2 based on observations disaggregated by service provide very weak inferences about effectiveness. However the data set with scaled hours indicates that all three resource hour variables are effective in prolonging time to Personnel casualty on vessels of each service (using a cutoff of $t=1.00$). This strong result attests to the overall effectiveness of Reinspections in increasing time to Personnel casualties.

The Pollution results are nowhere as strong. Results based on the unscaled variables in Table 4.9.1 and 4.9.2 provide weak inferences, if any. Results based on the scaled resource hours in Table 4.9.3 support the effectiveness of each resource hour in prolonging time to Pollution casualty only for Passenger vessels. But since Freight ships and Tank ships account for most pollution incidents, this result is probably less useful from a policy point of view.

Reinspections seem to be biased towards Passenger vessels in terms of their success in achieving their pollution safety goals. However, in terms of duration to Personnel casualty, Reinspections are successful for all services.

3. Activity II.A.3: Hull Exam

The duration data sets for Activity II.A.3 cover 856 Hull Exams between 1989 and 1993 of which 425 were conducted for Freight ships, 147 for Passenger ships, and 284 for Tank ships. We would certainly expect Hull hours, which is the largest component of a Hull Exam to be effective in prolonging duration to casualty, and the results, particularly those based on scaled hours, fairly robustly allow such an inference for duration to Personnel and Pollution casualties. In Table 4.10.1 results based on unscaled hours strongly indicate that Machinery hours of a Hull

Exam is effective in increasing the time to Personnel casualty on Tankers. Although the results for unscaled Hull hours are weak, the results based on scaled hours in Table 4.10.3 are strong and impressive. Hull hours, and indeed Administrative hours are effective in increasing time to Personnel casualty in vessels of all services, while Machinery hours is effective for Freight ships.

In Tables 4.11.1 and 4.11.2, unscaled Hull hours are shown to be effective in increasing duration to Pollution casualty, particularly for Freight ships (using a cutoff of $t=1.00$). Machinery hours devoted to a Hull Exam are also favorably affect Tank ships. Results using scaled hours contained in Table 4.11.3 also corroborate the effectiveness of Hull hours particularly for Freight ships and Passenger ships, but reverse the results for Machinery hours, which are no longer effective for Tank ships, but are effective for Freight ships. The Administrative hours are now shown to favorable affect Passenger and Tank ships.

Clearly Hull Exams successfully achieve their safety goals in increasing time to Personnel as well as Pollution casualties. The results using scaled hours strongly attests to the effectiveness of each component resource hour of a Hull Exam.

Table 4.6.1MOEs from an Exponential Duration Model of Personnel Casualties

MI Cases, U.S. Flag, 1991-1993

Cross Section of 1278 II.A.1 Activities (COI)

Dependent variable (y) = Duration to Personnel Casualty (Deaths, Missing, Injured)

rhs variables	Model 1	Model 2	Model 3
Constant	7.164 (103.32)**	7.155 (97.28)**	7.141 (94.22)**
Reg_gt	-0.054 (-8.45)**	-0.054 (-8.40)**	-0.055 (-8.36)**
Hull_hr	0.147 (0.74)	0.155 (0.77)	
Mach_hr	0.893 (3.79)**	0.890 (3.78)**	
Admin_hr	-1.959 (-4.91)**	-1.970 (-4.95)**	
Age	0.002 (2.03)**	0.002 (2.05)**	.002 (1.99)**
DP		0.007 (0.20)	0.056 (0.84)
DF		0.057 (0.45)	0.038 (0.61)
Hull_P			0.116 (0.29)
Mach_P			0.834 (1.49)
Admin_P			-2.241 (-3.59)**
Hull_F			0.071 (0.22)
Mach_F			0.864 (2.87)**
Admin_F			-1.912 (-3.06)**
Hull_T			0.177 (0.48)
Mach_T			0.936 (1.71)*
Admin_T			-1.848 (-2.61)**
N	1278	1278	1278
k	5	7	13
LLR	28.06	28.11	28.36
Obs. with y>0	256	256	256

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) N=Number of observations, k=number of rhs variables, LLR=Likelihood Ratio Chi-square.

Table 4.6.2

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993, By Service

Cross Section of *N* II.A.1 Activities (COI)

Dependent variable (*y*) = Duration to Personnel Casualty (Deaths, Missing, Injured)

rhs variables	Freight	Passenger	Tank
Constant	7.146 (66.59)**	7.300 (42.94)**	7.028 (52.95)**
Reg_gt	-0.052 (-5.62)**	-0.061 (-2.64)**	-0.049 (-4.48)**
Hull_hr	0.076 (0.23)	0.129 (0.32)	0.170 (0.46)
Mach_hr	0.844 (2.76)**	0.826 (1.44)	0.972 (1.84)*
Admin_hr	-1.899 (-3.03)**	-2.320 (-3.73)**	-1.901 (-2.73)**
Age	0.002 (1.32)	0.0001 (0.10)	.004 (2.16)**
<i>N</i>	585	332	361
<i>k</i>	5	5	5
<i>LLR</i>	11.38	3.86	10.04
Obs. with <i>y</i> >0	140	38	78

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.6.3

MOEs from an Exponential Duration Model of Personnel Casualties: MI Cases, U.S. Flag
Hours Scaled by Gross Tonnage.

Cross Section of 1,278 II.A.1 Activities (COI)

Dependent variable (y) = Duration to Personnel Casualty (Deaths, Missing, Injured)

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	6.556 (237.11)**	6.555 (237.08)**	6.555 (236.92)**	6.555 (236.19)**	6.554 (236.20)**	6.554 (235.84)**
Hull_hr	0.025 (1.58)					
Mach_hr		0.038 (2.04)**				
Admin_hr			0.033 (2.06)**			
Hull_P				0.089 (1.04)		
Mach_P					0.093 (0.89)	
Admin_P						0.068 (0.67)
Hull_F				0.036 (1.51)		
Mach_F					0.065 (1.89)*	
Admin_F						0.047 (2.07)**
Hull_T				0.018 (0.96)		
Mach_T					0.027 (1.52)	
Admin_T						0.024 (1.29)
Age	0.005 (5.81)**	0.005 (5.81)**	0.005 (5.78)**	0.005 (5.51)**	0.005 (5.63)**	0.005 (5.57)**
N	1,278	1,278	1,278	1,278	1,278	1,278
k	2	2	2	4	4	4
LLR	8.42	8.50	8.57	8.54	8.63	8.63
Obs. $y > 0$	256	256	256	256	256	256

Note:

1. See Notes for Table 4.6.1.

Table 4.7.1

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993

Cross Section of 1278 II.A.1 Activities (COI)
 Dependent variable (y) = Duration to Pollution Casualty

rhs variables	Model 1	Model 2	Model 3
Constant	7.097 (118.18)**	6.998 (107.41)**	7.009 (99.81)**
Reg_gt	-0.031 (-5.63)**	-0.027 (-4.55)*	-0.028 (-4.43)**
Hull_hr	0.103 (0.53)	0.166 (0.89)	
Mach_hr	0.538 (1.95)*	0.501 (1.83)*	
Admin_hr	-1.443 (-4.77)**	-1.527 (-5.00)**	
Age	-0.0001 (-0.11)	-0.0001 (-0.10)	0.0000 (-0.03)
DP		0.097 (3.05)**	0.199 (2.03)**
DF		0.086 (2.97)**	0.053 (1.00)
Hull_P			-0.039 (-0.91)
Mach_P			0.705 (1.42)
Admin_P			-1.919 (-4.28)**
Hull_F			0.274 (1.20)
Mach_F			0.307 (0.80)
Admin_F			-1.243 (-2.97)**
Hull_T			0.081 (0.04)
Mach_T			0.819 (1.24)
Admin_T			-1.814 (-2.45)**
<i>N</i>	1278	1278	1278
<i>k</i>	5	7	13
<i>LLR</i>	9.12	11.08	11.58
Obs. with $y > 0$	158	158	158

Note:

- (1) t -values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) N =Number of observations, k =number of rhs variables, LLR =Likelihood Ratio Chi-square.

Table 4.7.2

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993, By Service

Cross Section of *N* II.A.1 Activities (COI)
 Dependent variable (*y*) = Duration to Pollution Casualty

rhs variables	Freight	Passenger	Tank
Constant	6.894 (75.93)**	7.357 (40.40)**	7.176 (55.72)**
Reg_gt	-0.010 (-1.34)	-0.057 (-2.23)**	-0.042 (-3.86)**
Hull_hr	0.302 (1.39)	-0.040 (-0.09)	0.054 (0.13)
Mach_hr	0.211 (0.56)	0.820 (1.64)	0.827 (1.28)
Admin_hr	-1.186 (-2.84)**	-2.020 (-4.50)**	-1.876 (-2.57)**
Age	0.0009 (0.74)	-0.0007 (-0.80)	-0.001 (-0.77)
<i>N</i>	585	332	361
<i>k</i>	5	5	5
<i>LLR</i>	2.00	2.86	4.24
Obs. with <i>y</i> >0	74	15	69

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.7.3

MOEs from an Exponential Duration Model of Pollution Casualties: MI Cases, U.S. Flag
Hours Scaled by Gross Tonnage.

Cross Section of 1,278 II.A.1 Activities (COI)
 Dependent variable (y) = Duration to Pollution Casualty

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	6.719 (319.59)**	6.719 (319.42)**	6.719 (319.47)**	6.719 (318.50)**	6.719 (318.27)**	6.719 (318.35)**
Hull_hr	0.002 (0.17)					
Mach_hr		0.011 (0.76)				
Admin_hr			0.005 (0.36)			
Hull_P				0.028 (0.36)		
Mach_P					0.055 (0.62)	
Admin_P						-0.004 (-0.05)
Hull_F				0.007 (0.35)		
Mach_F					0.028 (0.95)	
Admin_F						0.008 (0.44)
Hull_T				-0.000 (-0.02)		
Mach_T					0.004 (0.26)	
Admin_T						0.003 (0.17)
Age	0.002 (2.92)**	0.002 (2.85)**	0.002 (2.90)**	0.002 (2.73)**	0.002 (2.67)**	0.002 (2.82)**
N	1,278	1,278	1,278	1,278	1,278	1,278
k	2	2	2	4	4	4
LLR	1.23	1.26	1.24	1.25	1.32	1.24
Obs. y>0	158	158	158	158	158	158

Note:

1. See Notes for Table 4.7.1.

Table 4.8.1

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993

Cross Section of 1021 II.A.2 Activities (REINSPECTION)

Dependent variable (y) = Duration to Personnel Casualty (Deaths, Missing, Injured)

rhs variables	Model 1	Model 2	Model 3
Constant	7.362 (98.34)**	7.392 (91.09)**	7.503 (80.25)**
Reg_gt	-0.074 (-10.58)**	-0.069 (-9.63)**	-0.067 (-9.34)**
Hull_hr	-0.041 (-0.10)	0.047 (0.12)	
Mach_hr	0.050 (0.09)	-0.218 (-0.37)	
Admin_hr	-0.625 (-2.27)**	-0.748 (-2.62)**	
Age	-0.0005 (-0.49)	-0.001 (-0.98)	-0.0008 (-0.81)
DP		0.034 (0.75)	-0.113 (-1.23)
DF		-0.097 (-2.52)**	-0.036 (-0.36)
Hull_P			-1.253 (-1.45)
Mach_P			-0.441 (-0.39)
Admin_P			0.553 (1.62)
Hull_F			0.784 (1.53)
Mach_F			-1.188 (-1.13)
Admin_F			-3.074 (-4.61)**
Hull_T			-0.551 (-.96)
Mach_T			1.362 (2.00)**
Admin_T			-3.442 (-4.15)**
N	1021	1021	1021
k	5	7	13
LLR	23.35	25.93	35.67
Obs. with y>0	230	230	230

Note:

1. See Notes for Table 4.7.1.

Table 4.8.2

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993, By Service

Cross Section of *N* IIA.2 Activities (REINSPECTION)

Dependent variable (*y*) = Duration to Personnel Casualty (Deaths, Missing, Injured)

rhs variables	Freight	Passenger	Tank
Constant	7.593 (67.41)**	7.503 (32.83)**	7.170 (62.41)**
Reg_gt	-0.080 (-7.67)**	-0.074 (-2.40)**	-0.040 (-3.95)**
Hull_hr	0.724 (1.39)	-1.210 (-1.45)	-0.487 (-0.84)
Mach_hr	-1.003 (-0.94)	-0.481 (-0.44)	1.000 (1.33)
Admin_hr	-3.148 (-4.67)**	0.510 (1.49)	-3.448 (-4.16)**
Age	-0.001 (-0.78)	-0.003 (-1.73)*	.004 (2.22)**
<i>N</i>	437	272	312
<i>k</i>	5	5	5
<i>LLR</i>	17.41	4.87	9.91
Obs. with <i>y</i> >0	129	39	62

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.8.3

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag

Cross Section of 1,021 II.A.2 Activities (REINSPECTION)

Dependent variable (y) = Duration to Personnel Casualty (Deaths, Missing, Injured)

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	6.587 (222.21)**	6.589 (222.92)**	6.583 (221.68)**	6.579 (220.59)**	6.581 (220.60)**	6.576 (220.60)**
Hull_hr	0.054 (2.38)**					
Mach_hr		0.060 (1.85)*				
Admin_hr			0.076 (3.51)**			
Hull_P				0.311 (3.92)**		
Mach_P					0.323 (3.93)**	
Admin_P						0.251 (4.68)**
Hull_F				0.087 (3.62)**		
Mach_F					0.119 (3.20)**	
Admin_F						0.091 (2.76)**
Hull_T				0.032 (1.36)		
Mach_T					0.025 (0.96)	
Admin_T						0.051 (2.23)**
Age	0.003 (2.90)**	0.003 (2.88)**	0.003 (2.79)**	0.002 (2.48)**	0.002 (2.52)**	0.002 (2.51)**
N	1,021	1,021	1,021	1,021	1,021	1,021
k	2	2	2	4	4	4
LLR	3.99	3.45	5.24	6.01	5.44	6.95
Obs. y>0	230	230	230	230	230	230

Note:

1. See Notes for Table 4.8.2.

Table 4.9.1

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993

Cross Section of 1021 II.A.2 Activities (REINSPECTION)
 Dependent variable (y) = Duration to Pollution Casualty

rhs variables	Model 1	Model 2	Model 3
Constant	7.145 (109.05)**	7.025 (101.95)**	7.145 (77.97)**
Reg_gt	-0.036 (-5.93)**	-0.027 (-4.18)**	-0.024 (-3.70)**
Hull_hr	0.067 (0.23)	0.176 (0.59)	
Mach_hr	-0.138 (-0.33)	-0.387 (-0.84)	
Admin_hr	-0.117 (-0.57)	-0.329 (-1.61)	
Age	-0.002 (-1.93)*	-0.002 (-1.95)*	-0.001 (-1.65)*
DP		0.160 (4.02)**	-0.057 (-0.64)
DF		0.074 (2.31)**	0.090 (0.98)
Hull_P			0.584 (1.16)
Mach_P			-1.093 (-1.59)
Admin_P			0.258 (1.21)
Hull_F			0.558 (1.34)
Mach_F			-1.262 (-1.56)
Admin_F			-2.031 (-3.65)**
Hull_T			-0.418 (-0.70)
Mach_T			0.559 (0.75)
Admin_T			-2.592 (-2.83)**
N	1021	1021	1021
k	5	7	13
LLR	5.07	7.59	13.17
Obs. with y>0	121	121	121

Note:

1. See Notes for Table 4.9.2.

Table 4.9.2

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993, By Service

Cross Section of *N* II.A.2 Activities (REINSPECTION)
 Dependent variable (*y*) = Duration to Pollution Casualty

rhs variables	Freight	Passenger	Tank
Constant	7.167 (72.72)**	7.159 (37.17)**	7.129 (57.44)**
Reg_gt	-0.019 (-2.03)**	-0.026 (-0.99)	-0.024 (-2.36)**
Hull_hr	0.579 (1.37)	0.635 (1.21)	-0.412 (-0.69)
Mach_hr	-1.304 (-1.54)	-1.146 (-1.73)*	0.542 (0.71)
Admin_hr	-2.046 (-3.65)*	0.215 (0.93)	-2.566 (-2.80)**
Age	-0.0001 (-0.08)	-0.003 (-2.53)**	-0.0006 (-0.31)
<i>N</i>	437	272	312
<i>k</i>	5	5	5
<i>LLR</i>	5.19	1.26	3.36
Obs. with <i>y</i> >0	52	11	58

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.9.3

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag

Cross Section of 1,021 II.A.2 Activities (REINSPECTION)
 Dependent variable (y) = Duration to Pollution Casualty

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	6.775 (286.70)**	6.775 (287.25)**	6.774 (285.88)**	6.770 (284.34)**	6.771 (285.02)**	6.769 (284.22)**
Hull_hr	0.008 (0.50)					
Mach_hr		0.003 (0.14)				
Admin_hr			0.003 (1.61)			
Hull_P				0.199 (3.11)**		
Mach_P					0.219 (3.41)**	
Admin_P						0.181 (4.18)**
Hull_F				0.023 (1.05)		
Mach_F					0.004 (0.12)	
Admin_F						0.016 (0.60)
Hull_T				-0.002 (-0.13)		
Mach_T					-0.011 (-0.56)	
Admin_T						0.017 (0.85)
Age	0.000 (0.18)	0.000 (0.25)	-0.000 (-0.00)	-0.000 (-0.17)	-0.000 (-0.12)	-0.000 (-0.28)
N	1,021	1,021	1,021	1,021	1,021	1,021
k	2	2	2	4	4	4
LLR	0.05	0.02	0.38	1.06	1.14	1.58
Obs. y>0	121	121	121	121	121	121

Note:

1. See Notes for Table 4.9.2.

Table 4.10.1

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993

Cross Section of 856 II.A.3 Activities (HULL EXAM)

Dependent variable (y) = Duration to Personnel Casualty (Deaths, Missing, Injured)

rhs variables	Model 1	Model 2	Model 3
Constant	7.316 (80.82)**	7.361 (78.78)**	73053 (74.75)**
Reg_gt	-0.066 (-8.67)**	-0.066 (-8.85)**	-0.065 (-8.72)**
Hull_hr	0.155 (0.67)	0.135 (0.58)	
Mach_hr	0.799 (2.96)*	0.757 (2.84)**	
Admin_hr	-2.262 (-4.04)**	-2.142 (-3.81)**	
Age	0.001 (0.85)	0.0005 (0.45)	0.0005 (0.44)
DP		-0.020 (-0.41)	-0.073 (-0.67)
DF		-0.066 (-1.62)	0.084 (1.14)
Hull_P			-0.140 (-0.28)
Mach_P			0.132 (0.19)
Admin_P			-0.177 (-0.14)
Hull_F			0.283 (0.82)
Mach_F			0.405 (0.61)
Admin_F			-3.331 (-4.32)**
Hull_T			0.191 (0.45)
Mach_T			0.525 (1.49)
Admin_T			-1.435 (-1.54)
N	856	856	856
k	5	7	13
LLR	22.81	23.55	25.89
Obs. with y>0	188	188	188

Note:

(1) See Notes for Table 4.10.2

Table 4.10.2

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993, By Service

Cross Section of *N* II.A.3 Activities (HULL EXAM)
 Dependent variable (*y*) = Duration to Personnel Casualty (Deaths, Missing, Injured)

rhs variables	Freight	Passenger	Tank
Constant	7.502 (64.60)**	7.211 (27.39)**	7.099 (45.94)**
Reg_gt	-0.07180 (-7.18)**	-0.069 (-2.12)**	-0.0452 (-4.16)**
Hull_hr	0.281 (0.82)	-0.166 (-0.33)	0.157 (0.37)
Mach_hr	0.394 (0.60)	0.154 (0.22)	0.540 (1.59)
Admin_hr	-3.369 (-4.37)**	-0.105 (-0.08)	-1.357 (-1.43)
Age	-0.002 (-1.31)	0.002 (0.82)	.004 (1.87)*
<i>N</i>	425	147	284
<i>k</i>	5	5	5
<i>LLR</i>	14.23	1.55	7.25
Obs. with <i>y</i> >0	110	19	59

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.10.3

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag

Cross Section of 856 II.A.3 Activities (HULL)

Dependent variable (y) = Duration to Personnel Casualty (Deaths, Missing, Injured)

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	6.539 (199.63)**	6.537 (198.81)**	6.540 (199.65)**	6.540 (197.92)**	6.532 (198.16)**	6.543 (198.71)**
Hull_hr	0.049 (3.12)**					
Mach_hr		0.048 (1.05)				
Admin_hr			0.050 (2.75)**			
Hull_P				0.236 (2.26)**		
Mach_P					0.141 (0.47)	
Admin_P						0.318 (1.92)*
Hull_F				0.062 (3.17)**		
Mach_F					0.132 (3.11)**	
Admin_F						0.058 (2.09)**
Hull_T				0.038 (1.82)*		
Mach_T					-0.063 (-2.98)**	
Admin_T						0.046 (2.17)**
Age	0.004 (4.17)**	0.005 (4.77)**	0.005 (4.25)**	0.004 (3.67)**	0.005 (4.85)**	0.004 (3.63)**
N	856	856	856	856	856	856
k	2	2	2	4	4	4
LLR	6.50	5.34	6.07	7.04	6.37	6.50
Obs. y>0	188	188	188	188	188	188

Note:

(1) See Notes for Table 4.10.2

Table 4.11.1

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993

Cross Section of 856 I.A.3 Activities (HULL EXAM)
 Dependent variable (y) = Duration to Pollution Casualty

rhs variables	Model 1	Model 2	Model 3
Constant	7.080 (92.54)**	7.033 (86.87)**	7.077 (77.19)**
Reg_gt	-0.033 (-4.90)**	-0.030 (-4.29)**	-0.030 (-4.30)**
Hull_hr	0.257 (1.57)	0.265 (1.66)*	
Mach_hr	0.169 (0.91)	0.183 (0.98)	
Admin_hr	-0.758 (-1.90)*	-0.808 (-2.02)**	
Age	-0.0009 (-0.95)	-0.001 (-1.08)	-0.001 (-1.05)
DP		0.168 (1.60)	0.093 (0.98)
DF		0.023 (0.62)	-0.067 (-1.01)
Hull_P			0.290 (0.87)
Mach_P			0.443 (0.75)
Admin_P			-1.789 (-1.75)*
Hull_F			0.416 (2.19)**
Mach_F			-0.054 (-0.13)
Admin_F			-0.336 (-0.66)
Hull_T			-0.327 (-0.79)
Mach_T			0.752 (1.99)**
Admin_T			-0.738 (-0.83)
N	856	856	856
k	5	7	13
LLR	4.64	5.02	6.23
Obs. with y>0	119	119	119

Note:

(1) See Notes for Table 4.11.2

Table 4.11.2

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
MI Cases, U.S. Flag, 1991-1993, By Service

Cross Section of *N* II.A.3 Activities (HULL EXAM)
 Dependent variable (*y*) = Duration to Pollution Casualty

rhs variables	Freight	Passenger	Tank
Constant	6.975 (67.72)**	7.450 (25.86)**	7.171 (46.10)**
Reg_gt	-0.023 (-2.51)**	-0.081 (-2.07)**	-0.038 (-3.11)**
Hull_hr	0.413 (2.20)**	0.306 (0.91)	-0.298 (-0.71)
Mach_hr	-0.072 (-0.18)	0.637 (1.08)	0.763 (2.03)**
Admin_hr	-0.341 (-0.67)	-1.791 (-1.73)*	-0.845 (-0.93)
Age	-0.003 (-1.65)*	0.0006 (0.43)	-0.002 (-0.87)
<i>N</i>	425	147	284
<i>k</i>	5	5	5
<i>LLR</i>	1.92	1.77	2.42
Obs. with <i>y</i> >0	57	11	51

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.11.3

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag

Cross Section of 856 II.A.3 Activities (HULL)
Dependent variable (y) = Duration to Pollution Casualty

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	6.727 (256.51)**	6.726 (255.63)**	6.727 (256.67)**	6.728 (255.92)**	6.721 (256.31)**	6.730 (256.61)**
Hull_hr	0.022 (1.43)					
Mach_hr		-0.008 (-0.21)				
Admin_hr			0.021 (1.29)			
Hull_P				0.183 (1.86)*		
Mach_P					-0.039 (-0.19)	
Admin_P						0.217 (1.48)**
Hull_F				0.032 (1.84)*		
Mach_F					0.080 (2.13)**	
Admin_F						0.020 (0.86)
Hull_T				0.014 (0.61)		
Mach_T					-0.011 (-2.70)**	
Admin_T						0.023 (1.15)
Age	0.001 (0.96)	0.001 (1.32)	0.001 (1.01)	0.001 (0.57)	0.001 (1.47)	0.001 (0.57)
N	856	856	856	856	856	856
k	2	2	2	4	4	4
LLR	0.54	0.27	0.44	0.93	1.29	0.67
Obs. y>0	119	119	119	119	119	119

Note:

(1) See Notes for Table 4.11.2

4.4.4 Level III MOEs for U.S. Flag Deep-Draft Vessels from Poisson Models

The mapping from inspection types in table CRST of the MSMS database into Level III activities is provided in Appendix D. Based on this mapping provided by USCG personnel, we create nine separate data sets for the nine Level III activities. The mapping is primarily used to compute the number of Hull, Machinery, and Administrative hours expended per deep draft vessel in the performance of each Level III activity. Although the Level III activities listed in Section 1 seem very distinct and separate from one another, this is not the case with the mapping of CRST inspection types into the 9 Level III activities. According to the mapping, although activities III.1 (Cargo/Poll. Handling/Pollution Control) and activity III.8 (Hull) are distinct in terms of resource hours expended per vessel, activities III.2-III.7 and III.9 (that is, Steering/Navigation, Documents/Paperwork, Drills/Human Factors, Auxiliary Systems, Power Plant, Fire Fighting and Prevention, and Life Saving) are *equivalent*. Use of the mapping leads to exactly the same number of resource hours for each vessel. This is a deficiency of the CRST definition of inspection types. These inspection types are probably the historic method of keeping data, and maybe operationally it is sensible for field personnel to identify their inspection work in terms of the CRST inspection types. However, if the Level III activities are the key activities from the point of view of policy making, the CRST inspection types should be segmented based upon these activity definitions. Or a separate column "Activity III" could be added to CRST to reflect this. However, the problem with including a separate new column is that field personnel would be further burdened by being required not only to report resource hours expended on each inspection type (as is being done presently) but additionally to report the resource hours expended on each Level III activity. If the mapping is any indication, since one inspection type maps into many Level III activities, this would require field personnel to input many rows of data for every inspection type. Hence our recommendation is a simple one, if it can be adequately implemented. We recommend a more sophisticated mapping which gives information about the *fraction* of hours from an inspection type that goes into each Level III activity (where 0 indicates that the inspection type does not involve that Level III activity). We understand that USCG inspectors do not work on the basis of any precise fractional division of hours among Level III activities while performing inspections, but we hope that a rough approximation available. It may be possible to amend the CRST inspection types so that such a fractional mapping becomes more sensible.

In the analysis of Level III activities, we have used a fractional mapping. Where an inspection type maps into more than one Level III activity, say n activities, we proportionately apportion resource hours to those activities, so that each Level III activity gets $1/n$ of the hours expended towards that particular instance of performing the inspection type.¹⁶ Only those estimates based on scaled hours are reported. The results are impressive and strongly

¹⁶ We express great appreciation for the mapping and refinements to it provided by LT CDR Peggy Thurber. We think the mapping does serve our purpose adequately given the problems intrinsic to creating such a mapping.

attest to the effectiveness of each Level III activity in reducing Personnel and Pollution casualty. A Poisson model of casualties, similar to those employed in assessing Level I effectiveness of Marine inspection of U.S. deep-draft vessels is employed here. The estimates presented in Tables 4.12.1-4.12.3 (Activity III.1), Tables 4.13.1-4.13.3 (Activity III.2-7,9), and Tables 4.14.1-4.14.3 (Activity III.8). In these tables the variable names are rather cryptic and need explaining. In Table 4.12.1 "D31hhr" stands for Hull hours spend on activity III.1. Similarly "D31mhr" and "D31ahr" stand for Machine and Admin hours. "H31_P" stands for Hull hours on Passenger vessels (If the vessel is not a Passenger vessel, this variable takes the value zero. The postscript "_F" and "_T" indicate Freightship and Tankships, and the beginning letter "H", "M", and "A" indicate Hull, Machine, and Admin hours, respectively.

The tables show that Activity III.1 (Cargo/Poll. Handling/Pollution Control) is certainly effective in controlling pollution occurrences as evidenced by the statistically significant estimates in the first three columns of Table 4.12.3. If we use a critical t -value of 1.00 then the last 3 columns show that Hull hours, Machinery hours, and Administrative hours are all individually effective for vessels of each service. Further, Activity III.1 is effective in reducing Personnel casualties as well, as indicated by the estimates in Tables 4.12.1 and 4.12.2. Much the same pattern is in evidence for Activity III.2-7, 9 in Tables 4.14.1-4.14.3, and the estimates are close enough to the Activity III.1 tables that it may be suspected that the resource hours data are very similar, so that there is no real distinction between the two sets of results, one merely replicates the other. This underscores the need for a mapping that allows greater discrimination between the nine Level III activities. Estimates for Activity III.8 presented in Tables 4.14.1-4.14.3 are somewhat different in magnitude, but the pattern of results is the same, indicating a great degree of success in controlling pollution and personnel casualties.

We would like to make clear statements about the effectiveness of *each* of the nine Level III activities. This is important from a policy perspective, especially while making decisions about how to redistribute a fixed pie of resource hours among each activity so as to most effectively control casualties. But the mapping does not allow such a statement, particularly about those activities that are not effective. What the results *do* say is that III.1 and III.8 are very effective in controlling casualties. While this is an important conclusion it is a retrospective statement, not one on which future policy and optimizing decisions can be made. The Risk-Based-Ranking (RBR) results provide valuable companion results in this regard since they single out Level III activities that contribute most to "risk" of casualty. To the extent that the mapping upon which the RBR are based is more precise, the econometric results for Level III activities may be combined with the RBR as inputs into decision making.

Table 4.12.1
MOEs from a Poisson Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage, MI Cases, U.S. Flag
Hours Devoted to Activity III.1
Dependent variable (y) = Number of Personnel Deaths and Missing

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-4.604 (-5.93)**	-4.613 (-5.94)**	-4.593 (-5.91)**	-4.361 (-4.32)**	-4.150 (-3.85)**	-4.312 (-4.26)**
D31hhr	-8.891 (-1.43)					
D31mhr		-13.910 (-1.53)				
D31ahr			-10.064 (-1.48)			
H31_P				-6.808 (-0.92)		
H31_F				-12.868 (-0.86)		
H31_T				-50.328 (-0.38)		
M31_P					-12.288 (-1.07)	
M31_F					-15.016 (-0.97)	
M31_T					-160.268 (-0.53)	
A31_P						-8.496 (-1.03)
A31_F						-11.691 (-0.93)
A31_T						-65.987 (-0.41)
Age	-0.008 (-0.54)	-0.009 (-0.59)	-0.008 (-0.55)	-0.008 (-0.51)	-0.008 (-0.55)	-0.008 (-0.52)
DP	1.891 (1.90)*	1.984 (2.00)**	1.934 (1.94)*	1.478 (1.16)	1.431 (1.08)	1.539 (1.21)
DF	1.713 (2.30)**	1.725 (2.32)**	1.701 (2.29)**	1.493 (1.50)	1.259 (1.18)	1.422 (1.42)
N	951	951	951	951	951	951
k	4	4	4	6	6	6
LLR	16.20	15.54	16.28	16.57	16.01	16.58
Obs. y>0	14	14	14	14	14	14

Table 4.12.2
MOEs from a Poisson Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag
Hours Devoted to Activity III.1
Dependent variable (y) = Number of Personnel Injured

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-0.105 (-0.96)	-0.098 (-0.90)	-0.099 (-0.92)	0.111 (0.89)	0.056 (0.47)	0.069 (0.58)
D31hhr	-2.071 (-4.89)**					
D31mhr		-4.655 (-5.17)**				
D31ahr			-2.110 (-4.75)**			
H31_P				1.558 (2.99)**		
H31_F				-4.250 (-4.20)**		
H31_T				-30.710 (-2.61)**		
M31_P					0.437 (0.45)	
M31_F					-10.034 (-4.12)**	
M31_T					-39.660 (-2.47)**	
A31_P						2.167 (4.39)**
A31_F						-7.458 (-4.16)**
A31_T						-24.652 (-2.57)**
Age	-0.023 (-6.41)**	-0.023 (-6.61)**	-0.023 (-6.45)**	-0.022 (-6.21)**	-0.022 (-6.20)**	-0.022 (-6.20)**
DP	0.236 (1.48)	0.040 (2.40)**	0.233 (1.46)	-0.572 (-2.79)**	-0.277 (-1.35)	-0.648 (-3.19)**
DF	0.285 (2.87)**	0.297 (2.98)**	0.273 (2.75)**	0.106 (0.88)	0.173 (1.47)	0.176 (1.54)
N	951	951	951	951	951	951
k	4	4	4	6	6	6
LLR	130.00	132.21	125.54	184.56	171.11	202.07
Obs. y>0	247	247	247	247	247	247

Table 4.12.3
MOEs from a Poisson Model of Pollution Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag
Hours Devoted to Activity III.1
Dependent variable (y) = Number of Pollution Incidents

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-0.811 (-5.30)**	-0.804 (-5.25)**	-0.797 (-5.20)**	-0.787 (-5.15)**	-0.799 (-5.21)**	-0.783 (-5.11)**
D31hhr	-1.147 (-2.66)**					
D31mhr		-3.377 (-2.85)**				
D31ahr			-1.738 (-2.95)**			
H31_P				-1.600 (-0.63)		
H31_F				-0.507 (-1.06)		
H31_T				-2.070 (-2.30)**		
M31_P					-15.106 (-2.04)**	
M31_F					-2.464 (-1.62)	
M31_T					-3.223 (-1.99)**	
A31_P						-9.781 (-1.88)*
A31_F						-0.908 (-1.30)
A31_T						-2.277 (-2.24)**
Age	-0.009 (-1.71)*	-0.009 (-1.71)*	-0.009 (-1.63)	-0.009 (-1.64)	-0.008 (-1.77)*	-0.009 (-1.63)
DP	-1.507 (-4.26)**	-1.356 (-3.76)**	-1.463 (-4.11)*	-1.482 (-3.06)**	-0.660 (-1.40)	-0.780 (-1.63)
DF	-0.557 (-3.89)**	-0.548 (-3.83)**	-0.569 (-3.97)**	-0.621 (-4.19)**	-0.562 (-3.78)**	-0.613 (-4.14)**
<i>N</i>	951	951	951	951	951	951
<i>k</i>	4	4	4	6	6	6
<i>LLR</i>	57.75	60.96	69.34	60.62	64.90	68.47
Obs. $y > 0$	151	151	151	151	151	151

Table 4.13.1
MOEs from a Poisson Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag
Hours Devoted to Activity III.2-7,9
Dependent variable (y) = Number of Personnel Deaths and Missing

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-4.608 (-5.94)**	-4.614 (-5.94)**	-4.595 (-5.92)**	-4.404 (-4.50)**	-4.163 (-3.86)**	-4.322 (-4.29)**
D32hhr	-9.024 (-1.44)					
D32mhr		-13.994 (-1.54)				
D32ahr			-10.019 (-1.48)			
H32_P				-6.920 (-0.94)		
H32_F				-12.846 (-0.88)		
H32_T				-44.063 (-0.36)		
M32_P					-12.268 (-1.08)	
M32_F					-15.320 (-0.98)	
M32_T					-157.396 (-0.52)	
A32_P						-8.496 (-1.03)
A32_F						-11.574 (-0.93)
A32_T						-64.405 (-0.40)
Age	-0.008 (-0.53)	-0.009 (-0.58)	-0.008 (-0.55)	-0.007 (-0.50)	-0.008 (-0.55)	-0.008 (-0.52)
DP	1.894 (1.90)*	1.982 (2.00)**	1.933 (1.94)*	1.526 (1.22)	1.436 (1.09)	1.549 (1.22)
DF	1.708 (2.30)**	1.724 (2.32)**	1.701 (2.29)**	1.528 (1.57)	1.270 (1.19)	1.430 (1.44)
N	951	951	951	951	951	951
k	4	4	4	6	6	6
LLR	15.89	15.45	16.25	16.21	15.90	16.54
Obs. y>0	14	14	14	14	14	14

Table 4.13.2
MOEs from a Poisson Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag
Hours Devoted to Activity III.2-7,9
Dependent variable (y) = Number of Personnel Injured

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-0.102 (-0.94)	-0.099 (-0.92)	-0.100 (-0.93)	0.121 (0.97)	0.050 (0.42)	0.066 (0.56)
D32hr	-2.253 (-4.96)**					
D32mhr		-4.631 (-5.09)**				
D32ahr			-2.121 (-4.79)**			
H32_P				2.218 (3.91)**		
H32_F				-5.514 (-4.16)**		
H32_T				-35.054 (-2.65)**		
M32_P					0.795 (0.77)	
M32_F					-10.241 (-4.10)**	
M32_T					-38.855 (-2.45)**	
A32_P						2.167 (4.39)**
A32_F						-7.426 (-4.15)**
A32_T						-24.362 (-2.54)**
Age	-0.023 (-6.41)**	-0.023 (-6.59)**	-0.023 (-6.45)**	-0.022 (-6.16)**	-0.022 (-6.18)**	-0.022 (-6.21)**
DP	0.250 (1.57)	0.391 (2.36)**	0.235 (1.47)	-0.701 (-3.30)**	-0.314 (-1.50)	-0.644 (-3.18)**
DF	0.280 (2.82)**	0.294 (2.96)**	0.274 (2.75)**	0.102 (0.84)	0.177 (1.51)	0.178 (1.56)
<i>N</i>	951	951	951	951	951	951
<i>k</i>	4	4	4	6	6	6
<i>LLR</i>	128.36	130.00	125.12	194.54	169.67	201.46
Obs. $y > 0$	247	247	247	247	247	247

Table 4.13.3
MOEs from a Poisson Model of Pollution Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag
Hours Devoted to Activity III.2-7,9
Dependent variable (y) = Number of Pollution Incidents

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-0.805 (-5.26)**	-0.805 (-5.26)**	-0.798 (-5.21)**	-0.790 (-5.16)**	-0.800 (-5.22)**	-0.783 (-5.11)**
D32hhr	-1.481 (-2.88)**					
D32mhr		-3.343 (-2.81)**				
D32ahr			-1.759 (-2.98)**			
H32_P				-5.922 (-1.49)		
H32_F				-0.716 (-1.16)		
H32_T				-2.135 (-2.35)**		
M32_P					-15.046 (-2.05)**	
M32_F					-2.371 (-1.55)	
M32_T					-3.224 (-1.99)**	
A32_P						-9.780 (-1.88)*
A32_F						-0.903 (-2.29)**
A32_T						-2.330 (-2.29)**
Age	-0.009 (-1.66)*	-0.009 (-1.70)*	-0.009 (-1.63)	-0.009 (-1.62)	-0.009 (-0.76)	-0.009 (-1.62)
DP	-1.482 (-4.18)**	-1.363 (-3.87)**	-1.460 (-4.11)**	-1.038 (-2.13)**	-0.666 (-1.42)	-0.780 (-1.63)
DF	-0.562 (-3.92)**	-0.550 (-3.84)**	-0.568 (-3.97)**	-0.614 (-4.14)**	-0.566 (-3.80)**	-0.614 (-4.14)**
N	951	951	951	951	951	951
k	4	4	4	6	6	6
LLR	59.68	60.48	63.08	63.18	64.49	68.30
Obs. y>0	151	151	151	151	151	151

Table 4.14.1
MOEs from a Poisson Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag
Hours Devoted to Activity III.8
Dependent variable (y) = Number of Personnel Deaths and Missing

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-4.593 (-5.93)**	-4.620 (-5.95)**	-4.598 (-5.93)**	-4.411 (-4.43)**	-4.036 (-3.79)**	-4.310 (-4.23)**
D38hhr	-7.575 (-1.50)					
D38mhr		-11.445 (-1.50)				
D38ahr			-7.206 (-1.49)			
H38_P				-4.763 (-0.89)		
H38_F				-18.187 (-0.98)		
H38_T				-32.802 (-0.33)		
M38_P					-9.921 (-1.02)	
M38_F					-12.337 (-0.97)	
M38_T					-184.212 (-0.63)	
A38_P						-4.823 (-0.87)
A38_F						-12.032 (-0.93)
A38_T						-51.593 (-0.41)
Age	-0.008 (-0.52)	-0.009 (-0.58)	-0.008 (-0.52)	-0.007 (-0.46)	-0.008 (-0.55)	-0.007 (-0.48)
DP	1.934 (1.94)*	1.939 (1.95)*	1.891 (1.90)*	1.459 (1.15)	1.253 (0.95)	1.357 (1.05)
DF	1.698 (2.28)**	1.722 (2.32)**	1.691 (2.27)**	1.603 (1.61)	1.134 (1.08)	1.434 (1.42)
N	951	951	951	951	951	951
k	4	4	4	6	6	6
LLR	16.17	14.89	15.74	17.05	15.59	16.36
Obs. y>0	14	14	14	14	14	14

Table 4.14.2
MOEs from a Poisson Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag
Hours Devoted to Activity III.8
Dependent variable (y) = Number of Personnel Injured

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-0.131 (-1.21)	-0.091 (-0.84)	-0.129 (-1.19)	0.191 (1.53)	0.052 (0.43)	0.086 (0.74)
D38hhr	-0.559 (-2.77)**					
D38mhr		-4.750 (-5.25)**				
D38ahr			-0.605 (-2.78)**			
H38_P				3.865 (11.16)**		
H38_F				-2.360 (-3.80)**		
H38_T				-23.765 (-2.42)**		
M38_P					-0.006 (-0.01)	
M38_F					-9.504 (-4.05)**	
M38_T					-33.101 (-2.56)**	
A38_P						1.909 (9.22)**
A38_F						-3.931 (-4.18)**
A38_T						-16.595 (-2.48)**
Age	-0.024 (-6.87)**	-0.023 (-6.62)**	-0.024 (-6.81)**	-0.027 (-7.06)**	-0.022 (-6.21)**	-0.024 (-6.44)**
DP	0.128 (0.83)	0.433 (2.60)**	0.129 (0.83)	-1.479 (-6.18)**	-0.218 (-1.08)	-0.800 (-4.14)**
DF	0.288 (2.90)**	0.299 (3.00)**	0.279 (2.80)**	0.079 (0.65)	0.181 (1.55)	0.158 (1.41)
N	951	951	951	951	951	951
k	4	4	4	6	6	6
LLR	91.34	136.03	91.25	254.90	169.95	220.30
Obs. y>0	247	247	247	247	247	247

Table 4.14.3
MOEs from a Poisson Model of Pollution Casualties (MINMOD)
Hours Scaled by Gross Tonnage. MI Cases, U.S. Flag
Hours Devoted to Activity III.8
Dependent variable (y) = Number of Pollution Incidents

rhs variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-0.810 (-5.29)**	-0.810 (-5.29)**	-0.806 (-5.27)**	-0.783 (-5.14)**	-0.791 (-5.17)**	-0.777 (-5.09)**
D38hr	-0.894 (-2.46)**					
D38mhr		-2.098 (-2.43)**				
D38ahr			-1.604 (-2.63)**			
H38_P				-5.152 (-1.60)		
H38_F				-0.204 (-0.55)		
H38_T				-1.766 (-2.37)**		
M38_P					-11.878 (-1.95)*	
M38_F					-0.827 (-0.83)	
M38_T					-3.017 (-1.96)**	
A38_P						-7.535 (-1.88)*
A38_F						-0.207 (-0.44)
A38_T						-1.834 (-2.31)**
Age	-0.009 (-1.79)*	-0.010 (-1.85)*	-0.009 (-1.72)*	-0.009 (-1.66)*	-0.010 (-1.85)*	-0.009 (-1.68)*
DP	-1.495 (-4.23)**	-1.424 (-3.99)**	-1.482 (-4.19)**	-0.968 (-1.98)**	-0.734 (-1.53)	-0.766 (-1.58)
DF	-0.556 (-3.88)**	-0.547 (-3.82)**	-0.566 (-3.95)**	-0.642 (-4.31)**	-0.600 (-4.02)**	-0.647 (-4.33)**
N	951	951	951	951	951	951
k	4	4	4	6	6	6
LLR	54.29	54.77	56.43	61.11	60.05	64.28
Obs. y>0	151	151	151	151	151	151

4.5 Foreign Flag Vessels: Econometric Results and Level I, and II MOEs

4.5.1 Data Description: Examination/Boarding of Foreign Flag Deep-Draft Vessels

Figures 4.0.4-4.0.6 display the number of Personnel and Pollution casualties during 1991-1993 for Foreign flag deep-draft vessels examined/boarded by the USCG. 90% of the D&M casualties occur on Freight ships, while Injured casualties are more evenly distributed. Most Pollution casualties are attributable to Freight ships (about 55%) and Tank ships (about 40%), as may be expected. Compared to the number of Foreign flag vessels boarded/examined, shown in Figure 4.2.1, the number of casualties may seem quite small. A total of 10909 Foreign flag vessels appear in the econometric analysis, most of whom are Freight ships (76%) and Tank ships (22%). Resource hours devoted to Port Safety (PS) hours appear in Table 4.2.2 and 4.2.3. In the econometric analysis we employ regular active-duty personnel hours (REG_HR), hours by reserve personnel (RES_HR), and Administrative hours (ADMIN_HR). It is clear that hours devoted to PS cases is a major component of USCG activities, about three- or four-fold greater than MI (U.S. flag) cases. Figures 4.2.4 and 4.2.5 show that Foreign flag deep-draft vessels are, on average, both larger in terms of gross-tonnage and younger (by more than 10 years) than U.S. flag deep-draft vessels. Duration data in Figures 4.2.6 and 4.2.7 indicate that on average, if there is a casualty, it occurs about 250 days after an Annual Exam for a Personnel or Pollution casualty.

Figure 4.0.4 PS Cases: DEAD & MISSING, 1991-93

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Figure 4.0.4
PS Cases: Number DEAD & MISSING, 1991-93

Figure 4.0.5 PS Cases: Number Injured, 1991-93

Figure 4.0.5
PS Cases: Number INJURED, 1991-1993

Figure 4.0.6 PS Cases: POLLUTION Casualties, 1991-93

Figure 4.0.6

PS Cases: POLLUTION Casualties, 1991-93

Figure 4.2.1 Deep Draft Vessels, PS Cases, Foreign Flag

Figure 4.2.1

Deep Draft Vessels, PS Cases, Foreign Flag

Total = 10,909

Figure 4.2.2 Total Port Safety Hours, PS Cases, 1989-1993

Figure 4.2.2
Total Port Safety Hrs,PS Cases,1989-93

Figure 4.2.3 Port Safety Hours by Service, Foreign Flag, 1989-1993

Figure 4.2.3

Port Safety Hours by Service, Foreign Flag, 1989-1993

Figure 4.2.4 Average Gross Tonnage, Foreign Flag

Figure 4.2.4

Average Gross Tonnage, Foreign Flag

Figure 4.2.5 Average Age by Vessel, Foreign Flag

Figure 4.2.5
Average Age by Vessel, Foreign Flag

Figure 4.2.6 Average Duration to Personnel Casualty

Figure 4.2.6
Average Duration to Personnel Casualty

Figure 4.2.7 Average Duration to Pollution Casualty

Figure 4.2.7
Average Duration to Pollution Casualty

4.5.2 Level I MOEs for Foreign Flag Deep-Draft Vessels from Poisson Models

The number of Foreign flag deep-draft vessels examined by the USCG far outnumbers the number of U.S. flag deep-draft vessels. But whereas U.S. flag vessels are subject to inspection requirements laid down by the USCG, and hence are subject to thorough safety checks, this is not always true of Foreign flag vessels. The objective of USCG inspections with respect to Foreign flag vessels is to minimize Personnel and Pollution casualties *in U.S. waters*, whereas the objective with regard to U.S. flag vessels is to minimize casualties *anywhere*.

The following analysis attempts to provide answers to two questions. Does the USCG successfully achieve this objective ? If so, is there evidence that the USCG achieves this efficiently ?

The answer to the first question can be answered unconditionally, simply by observing the number of Personnel and Pollution casualties that have occurred since 1991. This measure can be made more sophisticated by dividing it by "traffic" in U.S. waters so as to get a number akin to "accident rate" often used by the Highway Patrol. However, whether the resulting number is "low" may need to be judgmental and subjective. Between 1991 and 1993 there were 30 Deaths and Missing, 97 Injured, and 195 Pollution occurrences. Compared with a traffic of (at least) 8339 Tank ships¹⁷, the casualty rate is fairly impressive. A breakdown by service is more informative. For Freight ships the D&M rate, is $27/8339=.0032$, the Injured rate is $44/8339=.0053$, and the Pollution rate is $306/8339=.037$. For Passenger ships the D&M rate is 0, the Injured rate is $26/200=.130$, and the Pollution rate is $34/200=.170$. For Tank ships, the D&M rate is $3/2368=.0013$, the Injured rate is $27/2368=.011$, and the Pollution rate is $195/2368=.082$. Clearly, the USCG program of examining Foreign flag vessel is successful in achieving a very low D&M rate (in U.S. waters). However, improvements can and should be made, to lower the Injured and Pollution rates on Passenger vessels, and the Pollution rate on Tank ships.

The answer to the second question is not easy to obtain for two reasons. Compared to U.S. flag vessels, there is much more uncertainty about the state (that is, condition) of a Foreign flag deep-draft vessel that enters U.S. waters than is the case for a U.S. flag deep-draft vessel. Problems in information economics and insurance termed moral hazard and adverse selection become

¹⁷ This is the number of Foreign flag deep-draft vessels examined between 1989 and 1993, so the comparable number during 1991-1993 is somewhat lower. But this is the number of vessels examined, whereas traffic, or vessels traversing U.S. waters with or without an examination, must have been somewhat higher.

critically important.¹⁸ The problem of moral hazard is one where one party to a transaction (the shipowner or operator) may undertake certain actions that affect the other party's (USCG) valuation of the transaction but that the second party cannot monitor or enforce properly. The problem of adverse selection is one where one party to a transaction knows things pertaining to the transaction that are relevant to but unknown by the second party. Foreign flag vessels are subject to widely varying degrees of monitoring and regulation depending on their flag, which can just as easily change from one voyage to another. Moral hazard and adverse selection problems make the distribution of USCG resource hours in examining/monitoring a more complicated and fuzzy task than it is in the case of U.S. flag vessels. We believe a complete analysis of the Foreign flag examination program must involve a deep examination of this particular principal-agent problem. We feel this is a question that has more to do with designing optimal enforcement contracts, that is a design of proper incentives, between the USCG and foreign flag shipowners (that at the same time does not upset U.S. corporate interests with whom foreign flag shipowners do business) than just a simple issue of being able to employ USCG resources to unconditionally minimize casualties. According to the present system, the only incentive a foreign flag shipowner has to comply with USCG safety standards is a nominal monetary penalty. Hence the onus is entirely on the USCG to detect and correct problems on Foreign flag vessels. Naturally the use of USCG resources will not be as efficient as in the case where the Foreign flag shipowner "volunteers" correct information. A life insurance company, for example, may sell insurance on the condition that the insured cannot make a claim within the next two years. Those insured who do not expect to live that long will therefore not buy the policy thereby "volunteering" that information. But in the absence of that clause, the insurance company will be forced to expend resources ensuring that the insured is physically fit, which is both expensive and inefficient if it cannot discriminate very well among the millions who wish to buy insurance (which is similar to the situation facing the USCG). However a detailed study leading to the design of optimal incentives is outside the scope of the present study but is probably well worth undertaking in the future especially in light of what the subsequent results indicate about USCG efficiency in conducting its Foreign flag examinations.

Estimates from the Poisson model for Personnel casualties are contained in Table 4.15.1-4.15.3, and for Pollution casualties in Table 4.15.4. These estimates are based on unscaled hours. Although in the Table, statistical significant estimates at 5% and 10% are asterisked, we will take a *t*-value of 1.00 as the critical value, given the discussion in Section 4.4.2 (ii). A high degree of risk aversion to pollution by Foreign flag vessels in U.S. waters makes this choice even more justified. Analyses are performed on data sets disaggregated by service. For Freight ships, Table 4.15.1 shows that hours spent by active duty personnel (REG_HR) and hours spent by reserve personnel (RES_HR) are effective in reducing D&M casualties, but these hours are not effective

¹⁸ See e.g. David Kreps, 1990, A Course in Microeconomic Theory, Princeton University Press, for a fairly formal account of the essential ingredients of the economics of uncertainty and information.

in controlling injuries. Administrative hours appear with a positive sign (just as in the case with unscaled hours for U.S. flag vessels). For Passenger vessels, Table 4.15.2 shows that Regular hours are effective in controlling injuries, but Reserve and Administrative hours have the opposite sign. For Tank ships, Table 4.15.3 shows that Regular hours do seem to reduce injuries, but Administrative hours have the opposite sign. The results for D&M Tank ship casualties may have to do with very few observations having positive values for the dependent variables. This result, where no variables are significant, may be interpreted as a successful job performed by the USCG, since what casualties have occurred are purely random, and cannot be explained by variables such as REG_GT and AGE either. Hence the nonrandom casualties have been prevented due to USCG examinations. The results in Table 4.15.4 indicate that Regular hours are clearly effective in reducing Pollution casualties in vessels of all services, particularly Freight and Tank ships. However Reserve and Administrative hours appear statistically significantly with the wrong sign, and that bears explaining. In an effort to investigate further the counterintuitive signs on some resource hour variables, particularly Administrative hours, the same solutions that were tried for the MI cases involving U.S. flag vessels were tried here but are not reported, although are worth discussing. The simultaneous model using predicted resource hour variables, and the model using orthogonalized resource hour variables gave qualitatively very similar results as those discussed above. The models using scaled resource hour variables (by REG_GT) give even more counterintuitive results and, surprisingly, in many cases reverses the correct signs on Regular hours. The results for Foreign flag casualty cases are not nearly robust enough to specification changes as were the corresponding results for U.S. flag vessels. This is not surprising in view of the discussion of the greater uncertainty surrounding the state of Foreign flag vessels. If the unscaled results are to be believed, then the USCG is certainly successful in lowering Personnel and Pollution casualties.

4.5.3 Level II MOEs for Foreign Flag Deep-Draft Vessels from Duration Models

The duration data set for Foreign flag vessels contains observations on 12912 Annual Freight Examinations, 3328 Annual Tankship Examinations, and 233 Annual Passenger Examinations. Table 4.16.1 presents estimates for Personnel casualties based on unscaled data. The results echo those of the Poisson model: Regular hours and Reserve hours devoted to Annual Examinations are effective in prolonging time to Personnel casualty for Freight and Tank ships. Administrative hours appear again with the opposite sign. The corresponding estimates with scaled resource hour variables paint quite a different picture. For Freight ships, four specifications are estimated in Table 4.16.2. The first column include all three resource hour variables and shows that Regular hours are effective in increasing time to Personnel casualty. However the last three columns with resource hour variables included one at a time reverses this conclusion. The main reason for this is that there is a high degree of correlation among the three resource hour variables, and when correlated variables are dropped (or added), signs on coefficient estimates can easily change. What the estimates in the first and second columns say is the following:

"Conditionally on Reserve and Administrative hours, Reserve hours are effective, but on its own, Regular hours do not contribute to prolonging duration to casualty". Reserve hours, on the other hand, are conditionally and unconditionally somewhat effective, while Administrative hours are not effective. For Tank ships, estimates from Table 4.16.3 show that none of the resource hour variables are effective in increasing time to Personnel casualty. For Passenger vessels, estimates in Table 4.16.4 show no statistically significant coefficients, and the *LLR* values show that the fit of the model is poor. We interpret these results in favor of USCG activities - that USCG examinations have successfully reduced the systematic component of the occurrence of Personnel casualties, so that the remaining casualties (8 instances) can be best described as random occurrences.

The duration analysis of Pollution casualties based on unscaled estimates in Table 4.17.1 leads us to the conclusion that there is some weak evidence that Regular hours devoted to Annual Examination of Tank ships is effective in prolonging time to casualty, and Reserve hours are effective for Freight ships and Tank ships. Again Administrative hours appear with the opposite signs. Results based on scaled resource hour variables for Freight ships appear in Table 4.17.2. Again, conditional on Reserve hours and Administrative hours, Regular hours are effective in increasing duration to Pollution casualty, but unconditionally (by itself) Regular hours are not effective. For Tank ships (Table 4.17.3) none of the resource hour variables are seen to be effective. For Passenger ships (Table 4.17.4), we would like to conclude as earlier, that is, Annual Examination succeed in removing nonrandom occurrences of pollution, so that what remains are random occurrences.

In sum, if the unscaled results are to be believed, the Annual Examinations are effective in prolonging the duration to Personnel and Pollution casualties. But this conclusion should be tempered by the results based on scaled hours. Certainly, the results are not robust to changes in specifications or to scaling of resource hour variables. Our recommendation is to be cautiously optimistic about these results but since they are based on limited information (see below) we withhold judgement till a more complete analysis is possible by combining MSMS data with, say, Lloyd's data pertaining to foreign flag vessels.

Our recommendations for further analysis of the effectiveness of USCG activities on Foreign flag vessels has to do with the quality and completeness of the data. If we had data on *all* casualties, not just those within U.S. waters, that have occurred, we will get a greater variability in the data that will probably allow statistically more improved inferences. Perhaps the MSMS database could be merged with the Lloyd's database to provide complete information. This is not a trivial task, and requires substantial resources from both the USCG and Lloyd's, but the end results should justify the means. There is considerable incentive for Lloyd's to use MSMS data because of its comprehensive coverage of inspections/boarding/monitoring and casualties of both U.S. and Foreign flag vessels, which will no doubt be useful for Lloyd's insurance purposes. As it stands, the data provides information on only "half" the experiment. There is neither data on the monitoring effort on Foreign flag vessels that occurs outside U.S. waters, nor is there data on the

occurrence of casualties outside U.S. waters. We are inferring the effectiveness of USCG activities based on a truncated information set, and clearly the inferences will be much weaker than ones based on the complete information set.

Table 4.15.1

**MOEs from a Poisson Model of Personnel Casualties (MINMOD)
PS Cases, Foreign Flag**

Cross Section of 8336 Freight Vessels
Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-3.033 (-1.47)	-3.883 (-2.60)**
Reg_gt	-0.273 (-1.38)	-0.243 (-1.69)*
Reg_hr	-1.309 (-1.75)*	-0.005 (-0.08)
Res_hr	-1.459 (-1.55)	0.113 (0.67)
Admin_hr	2.603 (3.00)**	0.659 (3.10)**
Age	-0.021 (-0.65)	0.0406 (1.99)**
<i>N</i>	8336	8336
<i>k</i>	5	5
<i>LLR</i>	17.109	13.978
<i>Mad. R²</i>	0.044	0.024
Obs. with y>0	18	32

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Madalla's pseudo R-square.

Table 4.15.2

MOEs from a Poisson Model of Personnel Casualties (MINMOD)
PS Cases, Foreign Flag

Cross Section of 200 Passenger Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	No values calculated for deaths and missing due to non-convergence	-39.351 (-8.62)**
Reg_gt		3.437 (8.34)**
Reg_hr		-8.425 (-4.30)**
Res_hr		9.269 (4.95)**
Admin_hr		8.631 (4.30)**
Age		0.069 (3.48)**
<i>N</i>	200	200
<i>k</i>	5	5
<i>LLR</i>		179.644
<i>Mad. R²</i>		0.732
Obs. with y>0	0	5

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Madalla's pseudo R-square.

Table 4.15.3

MOEs from a Poisson Model of Personnel Casualties (MINMOD)
PS Cases, Foreign Flag

Cross Section of 2368 Tank Vessels
 Dependent variable (y) = Number of personnel affected

rhs variables	lhs variable (y)	
	Deaths and Missing	Injuries
Constant	-14.238 (-1.49)	1.043 (0.44)
Reg_gt	0.570 (0.65)	-0.593 (-2.68)**
Reg_hr	1.559 (1.26)	-0.710 (-1.56)
Res_hr	1.925 (0.88)	0.061 (0.08)
Admin_hr	-2.440 (-1.25)	1.748 (2.88)**
Age	0.067 (0.91)	-0.011 (-0.34)
<i>N</i>	2368	2368
<i>k</i>	5	5
<i>LLR</i>	3.954	23.984
<i>Mad. R²</i>	0.086	0.077
Obs. with y>0	3	18

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Madalla's pseudo R-square.

Table 4.15.4

MOEs from a Poisson Model of Pollution Casualties (MINMOD)
PS Cases, Foreign Flag

Cross Section of *N* Deep Draft Vessels
 Dependent variable (*y*) = Number of Pollution Occurrences

rhs variables	Freight	Passenger	Tank
Constant	-1.609 (-2.84)**	-9.514 (-2.95)**	-0.327 (-0.35)
Reg_gt	-0.281 (-5.20)**	0.758 (2.31)**	-0.306 (-3.50)**
Reg_hr	-0.557 (-2.88)**	-0.780 (1.09)	-0.406 (-2.66)**
Res_hr	0.122 (1.16)	1.260 (1.54)	0.419 (1.57)
Admin_hr	1.502 (6.67)**	0.934 (1.14)	1.294 (5.84)**
Age	0.034 (4.17) **	0.014 (1.19)	0.021 (1.99)**
<i>N</i>	8339	200	2368
<i>k</i>	5	5	5
<i>LLR</i>	179.00	17.429	146.628
<i>Mad. R²</i>	0.067	0.086	0.105
Obs. with <i>y</i> >0	285	25	172

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square, *Mad. R²*=Madalla's pseudo R-square.

Table 4.16.1

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
PS Cases, Foreign Flag, 1991-1993

Cross Section of *N* I.I.B Activities (Annual Foreign Vessel Examination)
 Dependent variable (*y*) = Duration to Personnel Casualty (Deaths, Missing, Injury)

rhs variables	Freight	Passenger	Tank
Constant	7.041 (205.57)**	7.235 (29.93)**	6.822 (84.90)**
Reg_gt	-0.009 (-2.63)**	-0.029 (-1.18)	0.009 (1.25)
Reg_hr	0.047 (1.27)	-0.264 (-1.59)	0.227 (2.67)**
Res_hr	0.971 (2.49)**	1.464 (0.31)	0.120 (1.34)
Admin_hr	-0.932 (-24.47)**	-0.798 (-4.04)**	-1.037 (-12.42)**
Age	0.002 (3.73)**	0.001 (0.66)	.003 (3.74)**
<i>N</i>	12912	233	3328
<i>k</i>	5	5	5
<i>LLR</i>	193.57	6.39	65.40
Obs. with <i>y</i> >0	195	8	111

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.16.2

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. PS Cases, Foreign Flag

Level II.B.1: Cross Section of 12,912 Annual FREIGHT Exams
 Dependent variable (y) = Duration to Personnel Casualty (Deaths, Missing, Injury)

rhs variables	Model 1	Model 2	Model 3	Model 4
Constant	6.821 (965.08)**	6.820 (960.79)**	6.822 (959.22)**	6.820 (963.82)**
Reg_hr	0.354 (2.76)**	-0.226 (-3.89)**		
Res_hr	0.111 (0.73)		0.103 (1.80)	
Admin_hr	-0.780 (-5.62)**			-0.420 (-7.69)**
Age	0.003 (6.59)**	0.002 (6.33)**	0.003 (5.58)**	0.003 (6.80)**
<i>N</i>	12,912	12,912	12,912	12,912
<i>k</i>	4	2	2	2
<i>LLR</i>	15.50	7.13	3.68	13.19
Obs. with y>0	195	195	195	195

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.16.3

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. PS Cases, Foreign Flag

Level II.B.2: Cross Section of 3328 Annual TANKSHIP Exams
 Dependent variable (y) = Duration to Personnel Casualty (Deaths, Missing, Injury)

rhs variables	Model 1	Model 2	Model 3	Model 4
Constant	6.795 (591.93)**	6.795 (591.91)**	6.797 (587.16)**	6.795 (589.44)**
Reg_hr	-0.086 (-5.82)**	-0.138 (-3.98)**		
Res_hr	0.187 (0.72)		-0.223 (-1.72)*	
Admin_hr	-0.342 (-1.51)			-0.378 (-2.36)**
Age	0.004 (5.01)**	0.004 (4.79)**	0.003 (4.42)**	0.004 (4.88)**
<i>N</i>	3,328	3,328	3,328	3,328
<i>k</i>	4	2	2	2
<i>LLR</i>	4.50	3.42	2.45	4.10
Obs. with y>0	111	111	111	111

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.16.4

MOEs from an Exponential Duration Model of Personnel Casualties (MINMOD)
Hours Scaled by Gross Tonnage. PS Cases, Foreign Flag

Level II.B.3: Cross Section of 233 Annual PASSENGER Exams
 Dependent variable (*y*) = Duration to Personnel Casualty (Deaths, Missing, Injury)

rhs variables	Model 1	Model 2	Model 3	Model 4
Constant	6.808 (157.01)**	6.804 (164.03)**	6.805 (162.82)**	6.804 (164.29)**
Reg_hr	-0.969 (-0.32)	-0.149 (-0.49)		
Res_hr	-5.04 (-0.42)		-4.927 (-0.41)	
Admin_hr	0.821 (0.27)			-0.142 (-0.48)
Age	0.002 (0.91)	0.002 (0.89)	0.002 (0.90)	0.002 (0.89)
<i>N</i>	233	233	233	233
<i>k</i>	4	2	2	2
<i>LLR</i>	0.14	0.11	0.11	0.11
Obs. with <i>y</i> >0	8	8	8	8

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.17.1

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
PS Cases, Foreign Flag, 1991-1993

Cross Section of *N* II.B Activities (Annual Foreign Vessel Examination)
 Dependent variable (*y*) = Duration to Pollution Casualty

rhs variables	Freight	Passenger	Tank
Constant	6.883 (168.25)**	7.487 (26.22)**	6.645 (71.02)**
Reg_gt	0.007 (1.78)*	-0.056 (-1.94)*	0.016 (1.78)*
Reg_hr	-0.010 (-0.25)	-0.157 (-0.96)	0.127 (1.26)
Res_hr	0.049 (1.10)	-0.093 (-0.19)	0.188 (1.76)*
Admin_hr	-0.954 (-22.90)**	-0.879 (-4.34)**	-1.133 (-11.05)**
Age	0.001 (3.08)**	0.001 (0.67)	.001 (1.27)
<i>N</i>	12912	233	3328
<i>k</i>	5	5	5
<i>LLR</i>	221.22	6.41	85.70
Obs. with <i>y</i> >0	462	11	318

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.17.2

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
Hours Scaled by Gross Tonnage. PS Cases, Foreign Flag

Level II.B.1: Cross Section of 12912 Annual FREIGHT Exams
 Dependent variable (y) = Duration to Pollution Casualty

rhs variables	Model 1	Model 2	Model 3	Model 4
Constant	6.810 (914.84)**	6.810 (911.88)**	6.811 (910.20)**	6.810 (913.96)**
Reg_hr	0.372 (2.76)**	-0.294 (-4.15)**		
Res_hr	0.048 (0.29)		0.040 (0.48)	
Admin_hr	-0.883 (-6.04)**			-0.513 (-7.50)**
Age	0.003 (5.39)**	0.003 (5.07)**	0.002 (4.19)**	0.003 (5.56)**
<i>N</i>	12,912	12,912	12,912	12,912
<i>k</i>	4	2	2	2
<i>LLR</i>	19.44	8.62	2.20	17.23
Obs. with y>0	462	462	462	462

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.17.3

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
Hours Scaled by Gross Tonnage. PS Cases, Foreign Flag

Level II.B.2: Cross Section of 3328 Annual TANKSHIP Exams
 Dependent variable (y) = Duration to Pollution Casualty

rhs variables	Model 1	Model 2	Model 3	Model 4
Constant	6.760 (487.43)**	6.760 (488.71)**	6.762 (486.65)**	6.760 (488.16)**
Reg_hr	-0.064 (-3.44)**	-0.120 (-3.32)**		
Res_hr	0.202 (0.67)		-0.199 (-1.07)	
Admin_hr	-0.352 (-1.46)			-0.362 (-2.07)**
Age	0.002 (2.34)**	0.002 (2.15)**	0.002 (1.91)*	0.002 (2.30)**
<i>N</i>	3,328	3,328	3,328	3,328
<i>k</i>	4	2	2	2
<i>LLR</i>	2.72	1.52	0.76	2.42
Obs. with y>0	318	318	318	318

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

Table 4.17.4

MOEs from an Exponential Duration Model of Pollution Casualties (MINMOD)
Hours Scaled by Gross Tonnage. PS Cases, Foreign Flag

Level II.B.3: Cross Section of 233 Annual PASSENGER Exams
 Dependent variable (y) = Duration to Pollution Casualty

rhs variables	Model 1	Model 2	Model 3	Model 4
Constant	6.795 (158.72)**	6.794 (168.40)**	6.80 (167.01)**	6.794 (168.69)**
Reg_hr	0.496 (0.16)	-0.101 (-0.34)		
Res_hr	-6.165 (-0.45)		-6.147 (-0.45)	
Admin_hr	-0.602 (-0.20)			-0.106 (-0.37)
Age	0.002 (0.83)	0.002 (0.78)	0.002 (0.81)	0.002 (0.79)
<i>N</i>	233	233	233	233
<i>k</i>	4	2	2	2
<i>LLR</i>	0.11	0.08	0.10	0.08
Obs. with y>0	11	11	11	11

Note:

- (1) *t*-values in parentheses.
- (2) ** indicates statistical significance at the 5% level, and * at the 10% level.
- (3) *N*=Number of observations, *k*=number of rhs variables, *LLR*=Likelihood Ratio Chi-square.

5.0 Decision Support Using the Measures of Effectiveness

The overall objective of this study is to provide Measures of Effectiveness (MOEs) of the USCG Marine Inspection and Boarding Program that are based upon objective scientific methods. This component of the study has two sub-objectives: (1) incorporate the functional relationships that produced the MOEs into a easy-to-use, flexible decision aid; and (2) provide a description of the applicability of the MOEs to the allocation of resources to maximize those effectiveness measures.

MOEs are management information. They are actual or appropriate surrogate measures of achievement of goals specified by program management, and are most useful when integrated into improvements in business practices. Justification of programs to Congress is one value MOEs can provide. Improvement in internal management processes such as efficient allocation of inspection resources are another. Section 5.1 will provide an overview of the prototype decision aid implementing the MOEs in a spreadsheet format, while Section 5.2 will discuss methods for incorporating MOEs into the resource allocation process.

5.1 A Prototype Decision Support System

A decision support system (DSS) is an interactive, flexible, and adaptable computer-based information system, designed to support decision making where human judgement and experience are required. It utilizes data, provides an easy user interface and is controlled by, and interacts with, the decision maker allowing for incorporation of his/her insights into the problem solving and decision making process. Tasks such as assessing the effectiveness of USCG activities require both expert judgement and data analysis. The DSS must therefore include models and a modeling capability.

The modeling tool selected for this application was an electronic spreadsheet [Turban, Efrain, 1995, Decision Support and Expert Systems (4th edition) Englewood, N.J.: Prentice Hall] . The modeling capability allows users to create their own models and conduct "what-if" analyses. In addition, reports can be consolidated, and data can be organized in alphabetical or numerical order. Other capabilities include setting up windows for viewing several parts of the spreadsheets simultaneously, and executing mathematical manipulations. These enable the spreadsheet to become an important tool for analysis, planning, and modeling. In addition to the ability of writing models with a spreadsheet, the software includes large numbers of built-in statistical, mathematical, and financial functions. A major capability of spreadsheet programs is that formulas can be embedded using numbers in the spreadsheet; these numbers can be changed and the implications of these changes can immediately be observed and analyzed.

The windows platform was chosen to conform to the availability of USCG hardware. The spreadsheet software selected for the prototype was Microsoft Excel. Excel files can be

converted to Lotus applications, and Excel runs on both Windows and Macintosh platforms.

Rapid prototyping was the methodology used for development of the prototype DSS, and is presented in Figure 5.1, Rapid Prototyping Development Process. This approach permits the creation of the major components of a DSS on a rudimentary basis. The structure of the database and models, and the format of the human-machine interface can be formulated, formalized and implemented quickly, permitting ongoing assessment and revision. The resulting prototype is a tangible product of a project at an early stage; it can be used to retain or increase support of the project. It provides a first system that can be "field tested" - yielding experience in use, and if successful, credibility that the final results of the project will meet its goals. In addition, a prototype can be used to demonstrate the capabilities of decision aids, and point out where human knowledge and judgement are needed.

As part of the rapid prototyping process, various displays were created, implemented in Excel and presented to the USCG for review. The focus of the effort was on models for determining effectiveness as is described in a tutorial companion volume entitled, "Decision Support for Utilizing Measures of Effectiveness." In this DSS tutorial three models from the econometric MOE analysis are presented. The models used in the tutorial are: Model 5 from Table 4.5.2, Model 5 from Table 4.12.3, and Model 4 from Table 4.6.3. An example of the input is displayed in Figure 5.2.

5.2 Analytical Approaches to Resource Allocation

Resource allocation for the Office of Marine Safety (M) can be accomplished by using MOEs as the "benefits" in the development of cost/benefit relationships. Costs can be developed for activities that provide the desired impact on MOEs such as increasing the number of inspections of a certain type. This "activity costing" can be used by program management using the same spreadsheet approach currently used for billet allocation. Basing allocation of resources to MSOs on the risk exposure at the port(s) associated with that MSO, would incorporate MOEs into business practice.

In this section two additional approaches are discussed: (1) Goal Programming, and (2) Convex Resource Allocation.

5.2.1 Goal Programming

Goal programming (GP) formulations set target ranges for the performance in specific program areas. Benefits accrued for achieving the goal are specified as well as penalties for under-achievement and diminished returns for over-achievement. Optimization techniques (e.g., linear programming) are used to decide what combination of activities will best meet the goals, given logistical and budgetary constraints. Appendix E presents a GP formulation of the resource allocation problem.

Figure 5.1 Rabid Prototyping Development Process

Figure 5.2 Model 5 From Section 4.0 - Table 4.5.2

The benefit of goal programming is the ability to explicitly link stated USCG goals with investment in USCG activities. In addition, this approach can model complex relationships between goals and investments. This ability will be of value when considering decisions that involve infrastructure and organizational design (such as reengineering MSOs). GP provides a framework that permits sophisticated analyses requiring flexibility in the model formulation. It also can provide a means for assessing tradeoffs between safety and environmental issues, by incorporating multiobjectives that may be incommensurate in quantitative terms but must be addressed by program management in an analytical manner. The result may not be the "optimal" solution but a set of "good" alternatives from which a manager can select the best choice.

5.2.2 Application of MOE Analysis to The Design of a USCG Resource Allocation Convex Resource Allocation

MOEs are management information. They become most useful when they are integrated into improvements in business processes. Justification of programs to

Congress is one value MOEs can provide. Improvement in internal management processes such as efficient allocation of inspection resources are another. We will discuss the applicability of the current MOE analysis to the problem of allocation of resources to maximize those effectiveness measures.

The Problem

Regular inspections of vessels entering and exiting US ports have been shown to provide a reduction in the probability of casualties and pollution incidents. Increasing the frequency of these inspections should reduce the maritime risk, as should increasing the items to be inspected. These additional activities which should be balanced against the increased cost for the USCG and maritime industry of these inspections.

There are different types of inspection resources - USCG inspectors with various qualifications and associated costs, and perhaps contract resources from classification societies. Our discussion here will focus on allocating from a single aggregate set of inspection resources, but the basic reasoning is directly extendable to multiple sets. These resources are assigned to a MSO that services a number of ports. The ability to share resources across MSOs is limited by the cost of moving people around and the stress that places on family life, etc..

It is the responsibility of the vessel operator to contact the USCG when the vessel is due for an inspection or boarding. Alternatively, the USCG through its MSIS system can identify the next port call for a vessel due for inspection. The inspectors decide on which vessels they will board on a daily basis. Lack of information and uncertainties of vessel traffic movements and uncertainties in the time required for certain inspections make it difficult to do long-term scheduling. There is no "user fee" placed upon the vessels to be inspected, and thus no financial means to encourage sharing information with the USCG that would permit better planning.

Much of the time spent in inspection activities consists of getting to the ship, documenting the inspection and inputting the information into MIS systems. Time estimates for inspecting individual marine subsystems have been previously elicited. A standard form is provided for boarding activities - inspection activities are, by their very nature, less pre-defined. The time spent on vessels and their subsystems should be specific to their design, age, nature of cargo and other vessel characteristics.

Through analysis of MOEs, coefficients for models that predict casualty rates have been developed. These models base their predictions on the time spent inspecting various parts of the ship and its operation. These coefficients provide estimates on the marginal change in marine casualty rate from greater inspection time spent on a

category of inspection items.

Standard Approaches to Resource Allocation

A convex resource allocation scheme was discussed in some detail in the earlier report. Basically, if the following information can be developed:

- * a meaningful forecast of vessel traffic by vessel type (age, cargo, size, etc.) can be developed for each MSO,
- * calibrated models that predict the reduction in marine causality by vessel type as a function of frequency of inspection and time invested in the inspection,
- * models that translate marine casualties for ports served by an MSO into consequences cited in the five-year plan for the office of M.

then standard optimization techniques will derive a cost-efficient allocation of USCG inspection resources across MSOs. There is no computational barrier to deriving such an allocation.

Let us layout how we could apply the convex resource allocation methodology with our current analysis. Using the Poisson and duration models developed in the econometric analysis, we can predict the reduction in casualties if inspection hours are increased. These models predict diminishing marginal returns in casualty reduction with increasing levels of inspection. Let us assume they can provide us with predicted casualty reduction for inspection of a particular vessel type (age, tonnage, etc.). The current econometric models can compare casualty rates between freighters, tankers, and passenger ships.

Now, let us make the analogy with investment management. The USCG is actually making a decision on how to invest resources. The alternative investments are MSOs, whose yield on the investment is determined by the amount already invested, and the mix of vessel types that arrive at the MSO. The marginal benefit for the next inspector at an MSO is the marginal benefit of assigning him/her to inspect the vessels that provide the greatest marginal reduction in casualties. If the USCG incrementally assign resources to the MSO that has the greatest potential reduction in casualties, the USCG will be providing the optimal allocation of inspectors across the MSOs. Because of diminishing marginal returns, a seventh inspector for MSO Baltimore, for example, will not be as valuable as the sixth you just allocated, so it will probably go to some other MSO. When you have exhausted your supply of inspectors to be assigned, the optimal allocation of resources has been made. A slightly more formal mathematical statement of the algorithm is provided in Appendix F.

It is easy to include constraints on minimum and maximum numbers of inspectors to

be allocated to any given MSO. You will get the optimal allocation by simply starting with the minimum initial allocation before allocating additional inspectors, and by allocating no more inspectors to MSOs that have reached their maximum.

To develop inspector allocations to meet M-office five-year goals on casualty reduction, we would need forecasted MSO vessel traffic by vessel type for the five-year period. By incrementally allocating inspectors up to levels of casualty reduction set by the five-year-plan (e.g. 50% reduction in marine casualties in five years - during which time the vessel traffic is expected to increase 20%), the USCG can identify the ultimate resource needs to meet their stated goals.

Because the analysis focused on numbers of casualties, the econometric models do not reflect the ultimate societal values placed on national incidents in certain environmentally or politically sensitive regions. A subjective weight could be placed on the incremental value of reducing incidents in various harbors supported by a given MSO that result in more or fewer resources allocated to the MSO. Alternatively, allocations could be adjusted manually after the fact to account for the vulnerabilities of particular MSO marine environments. Allowing manual adjustments is important for a new business practice, since new processes generally have a few flaws identified during first application.

Can the USCG pursue such an approach with the present analysis?

There are several barriers to applying such techniques to the USCG as our data analysis stands now:

Issue 1. To develop robust coefficient estimates that provide evidence for the effectiveness of inspection programs, the econometric models have been aggregate models. With the aggregate models, we are unable to predict how an increase in inspection activity at an MSO with a given mix of vessel characteristics (and associated risk exposure) will reduce the risk at that MSO.

Issue 2. We have not been able to assess the adequacy of the exposure data that would be available for such a resource allocation model. Obtaining this data has been problematic for both Sandia National Laboratories and the USCG.

Issue 3. It is unclear how well the USCG could forecast vessel traffic rates. Intuitively, if the forecast uncertainty is large, the benefit from any optimal scheme for resource allocation is small.

Issue 4. The option to defer inspections of vessels that have many arrivals at US ports until it arrives at an MSO that has spare inspection capacity is not captured in the previously discussed optimization formulation. To include this feature requires knowledge of how often the USCG would have the opportunity to inspect a vessel, thus requiring a forecast of scheduled port calls by vessel. Note there is currently no mechanism to motivate the vessel operators to provide future vessel schedules. In particular, there is no market incentive to share this (highly proprietary) data with the USCG.

Issue 5. Casualties differ for different vessel types. Tankers have a greater potential for environmental damage than passenger vessels, but passenger vessel casualties may result in greater loss of life. We have not discussed how these qualitatively different impacts could be integrated in a single analysis.

Issue 6. Given the uncertainties that exist in the estimates for marginal benefits, it may not be wise to base the resource investment decision on maximizing the expected benefits. The benefits estimated by the econometric models have some forecast variance associated with them. If the forecast variance is large, the probability of getting little return on your investment is large; i.e. the investment is risky. It may be more prudent to choose an allocation whose yield is less, but whose risk is also less.

For USCG applications of the resource allocation model, we can overcome these barriers and apply the basic allocation scheme described above. That assessment assumes the model is used to provide an initial allocation of inspectors that evolves over time in a market-like manner, as MSOs find they need more or less inspectors to manage to USCG goals.

Issue 1. We can estimate an MSO-specific marginal benefit for the next inspector resource from vessel-type-specific aggregate econometric models. We currently have econometric models which can provide marginal benefit estimates from investing resources in inspecting freight ships, passenger ships and tankers. If a forecast can be provided for the number of freight ships, passenger ships and tankers that arrive at ports for a given MSO, then an MSO-specific marginal benefit model can be developed. It would be the weighted sum of the marginal benefits from inspecting the three types of vessels, where the weights are the number of the three vessel types that can be serviced by a particular MSO.

Issue 2. Perhaps an independent USCG-developed source, or formal purchasing arrangements with the Corps of Engineers or an outside data vendor would be

the best approach to address gathering the risk exposure data we need.

Issue 3. For the purposes of developing initial allocations, we should be able to develop effective forecasting schemes for the three vessel types of interest. If a proven product is not available from the private sector, some analysis should be pursued to validate the feasibility and performance of such a forecast.

Issue 4. The issue of multiple arrivals would require both some additional data analysis (to characterize patterns of arrivals by individual vessels, and to identify how often reinspection occurred because of questionable vessel condition flagged in MSIS) and some simple simulations to develop factors that capture how reinspection and opportunities to defer inspections should affect inspector allocations. These simulations would also allow us to evaluate how the dynamic nature of traffic arrivals may complicate the assignment of inspectors. Our optimization formulation is static. We would expect enough data exists to do the basic analysis.

Issue 5. There are a couple approaches to addressing the problem of non-comparable casualty impacts. One is to *a priori* assign a relative weight for human life vs. environmental damage. The second is to present the decision makers with a tradeoff curve of resource allocations that reflect various weightings between human life and environmental damage, and allow the decision maker to determine the appropriate weighting, given the information provided by the tradeoff curve. We would recommend the latter approach.

Issue 6. We can manage forecast casualty variance by maximizing a weighted sum of the expected marginal returns and the variances associated with those marginal returns. By varying the weights, you are valuing the expected return as more or less important than the likelihood of achieving that return (the variance). Again, we recommend presenting the decision maker with a tradeoff curve that allows the decision maker to choose the proper weighting.

Should the USCG pursue such approaches?

If the USCG is moving towards an "empowered" design for management of the marine inspection business process, the idea of a HQ-level global allocation model doesn't apply. You count on the invisible hand of a market created among competing MSOs to allocate resources effectively, where the return on investment is measured by MOEs for the business process. This assumes MSOs can move people (or motivate people to move) to and from other MSOs, or that contractors can be engaged to handle demand at some market rate. The global allocation models provide a check that the competition between MSOs is not getting in the way of the efficient business

operation, and provide some initial allocation to get the game started.

Since the allocation in this case would be a starting point, rather than some control variable, the allocation need not be very precise. Enhancing the spreadsheet-based USCG staffing model, the USCG may get close enough to get the process moving with little additional effort. The current spreadsheet model suffers from a lack of dependence on risk exposure facing the MSO and an inability to reflect the diminishing returns provided by increasing staffing.

The methodology described above addresses these issues. But before the USCG moves ahead to implementation:

- * the ability to forecast MSO vessel traffic rates by vessel type should be validated; and
- * the role of intelligent scheduling of vessels for inspection should be understood and its effect reflected as some fudge factor in the analysis.

Extension of the methodology to handle non-comparable benefits and investment risk has been outlined above, but some additional formality and detail for the methodologies should be developed.

As a final note, if the resource allocation is viewed as support to the Districts, the analysis as laid out would come unbidden and not designed to meet their specific management needs. What may be more supportive of an empowered culture is interviewing Districts and working with them to improve their individual business process. HQ has available data and analysis resources and they come to the Districts to truly "support" them in their hard job of managing their process. By the way, HQ also owns development of the rules of the game and the ultimate quality measures, e.g. MOEs, so the role is not totally one of line support. It would be relatively easy to identify some process improvements that a District might want to investigate with analysis support of HQ. This is consistent with the evolving role of HQ organizations in private industry.

6.0 References

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APPENDICES

Appendix A US Flag and Foreign Flag MSO Risk-Based Ranking Results

Section A.1 contains the results for U.S. Flag district level RBRs, Section A.2 contains the results for foreign flag district level RBRs, Section A.3 contains the results for the U.S. flag MSO RBRs, and Section A.4 contains the results for the foreign flag MSO RBRs. The risk-based ranking results in this appendix are expressed as absolute risk, as illustrated in Table 2.2. These absolute importance measures have not be normalized to yield relative risk rankings (as was done in Section 3.2 for the USCG-wide level data aggregation). Such relative rankings could be directly developed from the absolute measures. However, the normalized rankings merely set the importance results within a convenient scale between 0.0 and 1.0. The order of rank between Level III Intervention strategies is the same for both absolute and normalized measures, and the same insights regarding the importance of the various Level III Intervention strategies to risk would be derived from either measure.

A.1 U.S. Flag District Level Risk-Based Ranking Results

Bin data used in the risk-based ranking for district level data aggregation are shown in Table A.1.1. The risk-based ranking results are shown in Tables A.1.2 through A.1.9 as follows:

Table A.1.2 - U.S. Flag, District, Relative Frequency, Deaths,
Table A.1.3 - U.S. Flag, District, Relative Frequency, Injuries,
Table A.1.4 - U.S. Flag, District, Relative Frequency, Property Loss,
Table A.1.5 - U.S. Flag, District, Relative Frequency, Pollution,
Table A.1.6 - U.S. Flag, District, Casualty Frequency, Deaths,
Table A.1.7 - U.S. Flag, District, Casualty Frequency, Injuries,
Table A.1.8 - U.S. Flag, District, Casualty Frequency, Property Loss,
Table A.1.9 - U.S. Flag, District, Casualty Frequency, Pollution.

Table A.1.1 Risk-Based Ranking Bin Data Summary - USCG Districts, U.S. Flag

Table A.1.1 Risk-Based Ranking Bin Data Summary - USCG Districts, U.S. Flag										
Bin		Inspections	Casualties	Relative Freq.	Casualty Freq.	Casualty Frequency Standard Deviation	Consequences			
District	Service						Deaths	Injuries	Property Loss	Pollution
1	FREIGHTER	280	102	0.05	0.36	0.0288	2	38	\$6,055,882	1653
	PASSENGER	1255	50	0.03	0.04	0.0055	1	12	\$193,300	32
	TANKER	277	87	0.04	0.31	0.0279	0	31	\$514,950	286
2	Freighter	0	0	0.00	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
	PASSENGER	333	13	0.01	0.04	0.0106	0	2	\$93,300	0
	TANKER	0	0	0.00	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
5	FREIGHTER	204	93	0.05	0.46	0.0349	0	19	\$1,343,263	3174
	PASSENGER	466	62	0.03	0.13	0.0157	0	7	\$243,300	0
	TANKER	134	48	0.02	0.36	0.0414	0	7	\$151,850	146
7	FREIGHTER	164	75	0.04	0.46	0.0389	2	17	\$1,562,300	180

Table A.1.1 Risk-Based Ranking Bin Data Summary - USCG Districts, U.S. Flag

	Bin	Inspections	Casualties	Relative	Casualty	Casualty	Consequences			
				Freq.	Freq.	Standard				
	PASSENGER	515	24	0.01	0.05	0.0093	0	5	\$189,200	112
	TANKER	84	58	0.03	0.69	0.0504	0	19	\$133,450	1520
8	FREIGHTER	368	251	0.13	0.68	0.0243	4	98	\$4,336,574	14513
	PASSENGER	415	13	0.01	0.03	0.0086	0	1	\$8,270	0
	TANKER	228	110	0.06	0.48	0.0331	0	28	\$4,065,265	1563
9	FREIGHTER	278	167	0.09	0.60	0.0294	1	28	\$5,248,841	2004
	PASSENGER	511	18	0.01	0.04	0.0082	0	1	\$377,000	5
	TANKER	24	1	0.00	0.04	0.0408	0	0	\$0	0
11	FREIGHTER	242	147	0.08	0.61	0.0314	1	62	\$3,697,651	429
	PASSENGER	530	40	0.02	0.08	0.0115	0	2	\$24,806	68
	TANKER	147	89	0.05	0.61	0.0403	1	19	\$155,046	2859
13	FREIGHTER	153	94	0.05	0.61	0.0394	1	34	\$5,209,350	264
	PASSENGER	281	69	0.04	0.25	0.0257	0	15	\$695,375	7
	TANKER	168	130	0.07	0.77	0.0323	3	37	\$278,621	169

Table A.1.1 Risk-Based Ranking Bin Data Summary - USCG Districts, U.S. Flag

Bin		Inspections	Casualties	Relative	Casualty	Casualty	Consequences			
				Freq.	Freq.	Standard				
14	FREIGHTER	155	50	0.03	0.32	0.0375	0	27	\$54,700	25454
	PASSENGER	258	33	0.02	0.13	0.0208	1	5	\$1,034,020	1010
	TANKER	127	96	0.05	0.76	0.0381	0	26	\$1,255,300	2056
17	FREIGHTER	80	6	0.00	0.08	0.0294	0	1	\$200,000	5
	PASSENGER	121	15	0.01	0.12	0.0300	0	0	\$4,800	25
	TANKER	15	1	0.00	0.07	0.0644	0	0	\$0	0

Table A.1.2 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Deaths

Table A.1.2 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Deaths											
Bin		Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	0.0124	0.0134	0.0000	0.0433	0.0000	0.0051	0.0021	0.0021	0.0000	0.0041
1	PASSENGER	0.0010	0.0144	0.0000	0.0062	0.0000	0.0000	0.0010	0.0015	0.0000	0.0010
1	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	Freighter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	FREIGHTER	0.0072	0.0216	0.0000	0.0196	0.0000	0.0051	0.0010	0.0021	0.0000	0.0021
7	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	FREIGHTER	0.0515	0.0927	0.0000	0.2142	0.0000	0.0082	0.0062	0.0103	0.0000	0.0206
8	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	FREIGHTER	0.0113	0.0263	0.0000	0.0160	0.0000	0.0057	0.0015	0.0057	0.0000	0.0010
9	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.1.2 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Deaths

Bin		Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	FREIGHTER	0.0093	0.0113	0.0000	0.0304	0.0000	0.0026	0.0010	0.0108	0.0000	0.0005
11	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	TANKER	0.0139	0.0072	0.0000	0.0103	0.0000	0.0005	0.0005	0.0046	0.0000	0.0015
13	FREIGHTER	0.0088	0.0067	0.0000	0.0180	0.0000	0.0005	0.0015	0.0015	0.0000	0.0005
13	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TANKER	0.0247	0.0433	0.0000	0.0649	0.0000	0.0031	0.0000	0.0093	0.0000	0.0093
14	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	PASSENGER	0.0010	0.0077	0.0000	0.0031	0.0000	0.0010	0.0005	0.0000	0.0000	0.0005
14	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.1.3 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Injuries

Table A.1.3 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Injuries											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving.	Other
1	FREIGHTER	0.2348	0.2544	0.0000	0.8218	0.0000	0.0978	0.0391	0.0391	0.0000	0.0783
1	PASSENGER	0.0124	0.1730	0.0000	0.0742	0.0000	0.0000	0.0124	0.0185	0.0000	0.0124
1	TANKER	0.1756	0.2394	0.0000	0.4789	0.0000	0.0319	0.0160	0.0639	0.0000	0.0000
2	Freighter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PASSENGER	0.0000	0.0031	0.0000	0.0021	0.0000	0.0000	0.0021	0.0000	0.0000	0.0000
2	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	FREIGHTER	0.1565	0.2152	0.0000	0.1859	0.0000	0.0783	0.0294	0.0196	0.0000	0.0294
5	PASSENGER	0.0000	0.1009	0.0000	0.0180	0.0000	0.0433	0.0072	0.0180	0.0000	0.0036
5	TANKER	0.0324	0.0288	0.0000	0.0252	0.0000	0.0360	0.0036	0.0000	0.0000	0.0036
7	FREIGHTER	0.0613	0.1838	0.0000	0.1663	0.0000	0.0438	0.0088	0.0175	0.0000	0.0175
7	PASSENGER	0.0129	0.0438	0.0000	0.0051	0.0000	0.0026	0.0026	0.0026	0.0000	0.0000
7	TANKER	0.1565	0.0978	0.0000	0.1859	0.0000	0.0294	0.0098	0.0196	0.0000	0.0000
8	FREIGHTER	1.2616	2.2709	0.0000	5.2482	0.0000	0.2019	0.1514	0.2523	0.0000	0.5046
8	PASSENGER	0.0000	0.0036	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	TANKER	0.2739	0.5191	0.0000	0.4181	0.0000	0.0288	0.0000	0.0721	0.0000	0.0433
9	FREIGHTER	0.3172	0.7353	0.0000	0.4470	0.0000	0.1586	0.0433	0.1586	0.0000	0.0288
9	PASSENGER	0.0005	0.0067	0.0000	0.0005	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000

Table A.1.3 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Injuries

Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	FREIGHTER	0.5747	0.7024	0.0000	1.8836	0.0000	0.1596	0.0639	0.6704	0.0000	0.0319
11	PASSENGER	0.0082	0.0144	0.0000	0.0031	0.0000	0.0010	0.0000	0.0051	0.0000	0.0021
11	TANKER	0.2642	0.1370	0.0000	0.1957	0.0000	0.0098	0.0098	0.0881	0.0000	0.0294
13	FREIGHTER	0.2976	0.2276	0.0000	0.6128	0.0000	0.0175	0.0525	0.0525	0.0000	0.0175
13	PASSENGER	0.0232	0.2394	0.0000	0.1159	0.0000	0.0463	0.0232	0.0154	0.0000	0.0000
13	TANKER	0.3048	0.5335	0.0000	0.8002	0.0000	0.0381	0.0000	0.1143	0.0000	0.1143
14	FREIGHTER	0.0278	0.0973	0.0000	0.3754	0.0000	0.0000	0.0000	0.0417	0.0000	0.0000
14	PASSENGER	0.0051	0.0386	0.0000	0.0154	0.0000	0.0051	0.0026	0.0000	0.0000	0.0026
14	TANKER	0.1473	0.1740	0.0000	0.3481	0.0000	0.0803	0.0402	0.1607	0.0000	0.0134
17	FREIGHTER	0.0015	0.0005	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.1.4 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Property Loss

Table A.1.4 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Property Loss											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	\$37,40	\$40,539	\$0	\$130,972	\$0	\$15,592	\$6,237	\$6,237	\$0	\$12,473
1	PASSENGER	\$199	\$2,787	\$0	\$1,194	\$0	\$0	\$199	\$299	\$0	\$199
1	TANKER	\$2,917	\$3,977	\$0	\$7,955	\$0	\$530	\$265	\$1,061	\$0	\$0
2	Freighter	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	PASSENGER	\$0	\$144	\$0	\$96	\$0	\$0	\$96	\$0	\$0	\$0
2	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	FREIGHTER	\$11,067	\$15,217	\$0	\$13,142	\$0	\$5,534	\$2,075	\$1,383	\$0	\$2,075
5	PASSENGER	\$0	\$3,508	\$0	\$626	\$0	\$1,503	\$251	\$626	\$0	\$125
5	TANKER	\$704	\$626	\$0	\$547	\$0	\$782	\$78	\$0	\$0	\$78
7	FREIGHTER	\$5,631	\$16,894	\$0	\$15,285	\$0	\$4,022	\$804	\$1,609	\$0	\$1,609
7	PASSENGER	\$487	\$1,656	\$0	\$195	\$0	\$97	\$97	\$97	\$0	\$0
7	TANKER	\$1,099	\$687	\$0	\$1,306	\$0	\$206	\$69	\$137	\$0	\$0
8	FREIGHTER	\$55,826	\$100,487	\$0	\$232,237	\$0	\$8,932	\$6,699	\$11,165	\$0	\$22,330
8	PASSENGER	\$0	\$30	\$0	\$4	\$0	\$0	\$0	\$0	\$0	\$0
8	TANKER	\$39,773	\$75,360	\$0	\$60,707	\$0	\$4,187	\$0	\$10,467	\$0	\$6,280
9	FREIGHTER	\$59,462	\$137,843	\$0	\$83,787	\$0	\$29,731	\$8,108	\$29,731	\$0	\$5,406
9	PASSENGER	\$194	\$2,524	\$0	\$194	\$0	\$0	\$0	\$194	\$0	\$0

Table A.1.4 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Property Loss								
Bin								
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention
Hull	Lifesaving	Other						
9	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	FREIGHTER	\$34,273	\$41,889	\$0	\$112,339	\$9,520	\$3,808	\$39,985
11	PASSENGER	\$102	\$179	\$0	\$38	\$13	\$0	\$64
11	TANKER	\$2,156	\$1,118	\$0	\$1,597	\$80	\$719	\$0
13	FREIGHTER	\$45,602	\$34,872	\$0	\$93,886	\$2,682	\$8,047	\$0
13	PASSENGER	\$1,074	\$11,100	\$0	\$5,371	\$2,148	\$1,074	\$716
13	TANKER	\$2,296	\$4,017	\$0	\$6,026	\$287	\$0	\$861
14	FREIGHTER	\$56	\$197	\$0	\$761	\$0	\$0	\$85
14	PASSENGER	\$1,065	\$7,987	\$0	\$3,195	\$1,065	\$532	\$0
14	TANKER	\$7,110	\$8,403	\$0	\$16,806	\$3,878	\$1,939	\$7,757
17	FREIGHTER	\$309	\$103	\$0	\$103	\$0	\$0	\$0
17	PASSENGER	\$2	\$15	\$0	\$0	\$0	\$7	\$0
17	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.1.5 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Pollution

Table A.1.5 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Pollution											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	10	11	0	36	0	4	2	2	0	3
1	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	TANKER	2	2	0	4	0	0	0	1	0	0
2	Freighter	0	0	0	0	0	0	0	0	0	0
2	PASSENGER	0	0	0	0	0	0	0	0	0	0
2	TANKER	0	0	0	0	0	0	0	0	0	0
5	FREIGHTER	26	36	0	31	0	13	5	3	0	5
5	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	TANKER	1	1	0	1	0	1	0	0	0	0
7	FREIGHTER	1	2	0	2	0	0	0	0	0	0
7	PASSENGER	0	1	0	0	0	0	0	0	0	0
7	TANKER	13	8	0	15	0	2	1	2	0	0
8	FREIGHTER	187	336	0	777	0	30	22	37	0	75
8	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	TANKER	15	29	0	23	0	2	0	4	0	2
9	FREIGHTER	23	53	0	32	0	11	3	11	0	2
9	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.1.5 Risk-Based Rankings - U.S. Flag, District, Relative Frequency, Pollution

Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0	0	0	0	0	0	0	0	0	0
11	FREIGHTER	4	5	0	13	0	1	0	5	0	0
11	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	TANKER	40	21	0	29	0	1	1	13	0	4
13	FREIGHTER	2	2	0	5	0	0	0	0	0	0
13	PASSENGER	0	0	0	0	0	0	0	0	0	0
13	TANKER	1	2	0	4	0	0	0	1	0	1
14	FREIGHTER	26	92	0	354	0	0	0	39	0	0
14	PASSENGER	1	8	0	3	0	1	1	0	0	1
14	TANKER	12	14	0	28	0	6	3	13	0	1
17	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	TANKER	0	0	0	0	0	0	0	0	0	0

Table A.1.6 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Deaths

Table A.1.6 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Deaths											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	0.0857	0.0929	0.0000	0.3000	0.0000	0.0357	0.0143	0.0143	0.0000	0.0286
1	PASSENGER	0.0016	0.0223	0.0000	0.0096	0.0000	0.0000	0.0016	0.0024	0.0000	0.0016
1	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	Freighter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	FREIGHTER	0.0854	0.2561	0.0000	0.2317	0.0000	0.0610	0.0122	0.0244	0.0000	0.0244
7	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	FREIGHTER	0.2717	0.4891	0.0000	1.1304	0.0000	0.0435	0.0326	0.0543	0.0000	0.1087
8	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	FREIGHTER	0.0791	0.1835	0.0000	0.1115	0.0000	0.0396	0.0108	0.0396	0.0000	0.0072
9	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.1.6 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Deaths												
Bin		Level III Intervention Strategy Importance										
District	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	
9	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	FREIGHTER	0.0744	0.0909	0.0000	0.2438	0.0000	0.0207	0.0083	0.0868	0.0000	0.0041	
11	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	TANKER	0.1837	0.0952	0.0000	0.1361	0.0000	0.0068	0.0068	0.0612	0.0000	0.0204	
13	FREIGHTER	0.1111	0.0850	0.0000	0.2288	0.0000	0.0065	0.0196	0.0196	0.0000	0.0065	
13	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	TANKER	0.2857	0.5000	0.0000	0.7500	0.0000	0.0357	0.0000	0.1071	0.0000	0.1071	
14	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
14	PASSENGER	0.0078	0.0581	0.0000	0.0233	0.0000	0.0078	0.0039	0.0000	0.0000	0.0039	
14	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table A.1.7 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Injuries

Table A.1.7 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Injuries											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	1.6286	1.7643	0.0000	5.7000	0.0000	0.6786	0.2714	0.2714	0.0000	0.5429
1	PASSENGER	0.0191	0.2677	0.0000	0.1147	0.0000	0.0000	0.0191	0.0287	0.0000	0.0191
1	TANKER	1.2310	1.6787	0.0000	3.3574	0.0000	0.2238	0.1119	0.4477	0.0000	0.0000
2	Freighter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PASSENGER	0.0000	0.0180	0.0000	0.0120	0.0000	0.0000	0.0120	0.0000	0.0000	0.0000
2	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	FREIGHTER	1.4902	2.0490	0.0000	1.7696	0.0000	0.7451	0.2794	0.1863	0.0000	0.2794
5	PASSENGER	0.0000	0.4206	0.0000	0.0751	0.0000	0.1803	0.0300	0.0751	0.0000	0.0150
5	TANKER	0.4701	0.4179	0.0000	0.3657	0.0000	0.5224	0.0522	0.0000	0.0000	0.0522
7	FREIGHTER	0.7256	2.1768	0.0000	1.9695	0.0000	0.5183	0.1037	0.2073	0.0000	0.2073
7	PASSENGER	0.0485	0.1650	0.0000	0.0194	0.0000	0.0097	0.0097	0.0097	0.0000	0.0000
7	TANKER	3.6190	2.2619	0.0000	4.2976	0.0000	0.6786	0.2262	0.4524	0.0000	0.0000
8	FREIGHTER	6.6576	11.9837	0.0000	27.6957	0.0000	1.0652	0.7989	1.3315	0.0000	2.6630
8	PASSENGER	0.0000	0.0169	0.0000	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	TANKER	2.3333	4.4211	0.0000	3.5614	0.0000	0.2456	0.0000	0.6140	0.0000	0.3684
9	FREIGHTER	2.2158	5.1367	0.0000	3.1223	0.0000	1.1079	0.3022	1.1079	0.0000	0.2014
9	PASSENGER	0.0020	0.0254	0.0000	0.0020	0.0000	0.0000	0.0000	0.0020	0.0000	0.0000

Table A.1.7 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Injuries

Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	FREIGHTER	4.6116	5.6364	0.0000	15.1157	0.0000	1.2810	0.5124	5.3802	0.0000	0.2562
11	PASSENGER	0.0302	0.0528	0.0000	0.0113	0.0000	0.0038	0.0000	0.0189	0.0000	0.0075
11	TANKER	3.4898	1.8095	0.0000	2.5850	0.0000	0.1293	0.1293	1.1633	0.0000	0.3878
13	FREIGHTER	3.7778	2.8889	0.0000	7.7778	0.0000	0.2222	0.6667	0.6667	0.0000	0.2222
13	PASSENGER	0.1601	1.6548	0.0000	0.8007	0.0000	0.3203	0.1601	0.1068	0.0000	0.0000
13	TANKER	3.5238	6.1667	0.0000	9.2500	0.0000	0.4405	0.0000	1.3214	0.0000	1.3214
14	FREIGHTER	0.3484	1.2194	0.0000	4.7032	0.0000	0.0000	0.0000	0.5226	0.0000	0.0000
14	PASSENGER	0.0388	0.2907	0.0000	0.1163	0.0000	0.0388	0.0194	0.0000	0.0000	0.0194
14	TANKER	2.2520	2.6614	0.0000	5.3228	0.0000	1.2283	0.6142	2.4567	0.0000	0.2047
17	FREIGHTER	0.0375	0.0125	0.0000	0.0125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.1.8 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Property Loss

Table A.1.8 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Property Loss											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	\$150,306	\$179,398	\$0	\$19,394	\$0	\$9,697	\$14,546	\$19,394	\$0	\$646
1	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	TANKER	\$38,024	\$19,555	\$0	\$2,173	\$0	\$3,259	\$0	\$0	\$0	\$0
2	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	FREIGHTER	\$20,705	\$20,705	\$0	\$3,106	\$0	\$1,553	\$0	\$1,553	\$0	\$104
5	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	TANKER	\$11,806	\$8,142	\$0	\$2,036	\$0	\$0	\$0	\$0	\$0	\$81
7	FREIGHTER	\$52,483	\$21,735	\$0	\$1,060	\$0	\$1,590	\$1,060	\$3,181	\$0	\$114
7	PASSENGER	\$22,447	\$6,414	\$0	\$9,620	\$0	\$3,207	\$6,414	\$0	\$0	\$0
7	TANKER	\$12,600	\$6,873	\$0	\$573	\$0	\$0	\$0	\$573	\$0	\$0
8	FREIGHTER	\$65,327	\$79,844	\$0	\$10,485	\$0	\$9,678	\$0	\$3,226	\$0	\$248
8	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	TANKER	\$170,630	\$174,896	\$0	\$34,126	\$0	\$8,532	\$25,595	\$17,063	\$0	\$656
9	FREIGHTER	\$99,978	\$249,945	\$0	\$39,991	\$0	\$0	\$19,996	\$29,993	\$0	\$0
9	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.1.8 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Property Loss

Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	FREIGHTER	\$45,550	\$39,043	\$0	\$11,387	\$0	\$4,880	\$1,627	\$3,254	\$0	\$325
11	PASSENGER	\$1,908	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	TANKER	\$4,771	\$3,976	\$0	\$0	\$0	\$795	\$0	\$0	\$0	\$0
13	FREIGHTER	\$61,790	\$42,778	\$0	\$11,883	\$0	\$7,130	\$4,753	\$2,377	\$0	\$1,358
13	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	FREIGHTER	\$803	\$229	\$0	\$0	\$0	\$115	\$0	\$0	\$0	\$0
14	PASSENGER	\$188,004	\$141,003	\$0	\$987,019	\$0	\$0	\$0	\$0	\$0	\$0
14	TANKER	\$23,685	\$5,921	\$0	\$0	\$0	\$0	\$17,764	\$0	\$0	\$846
17	FREIGHTER	\$4,270	\$3,559	\$0	\$0	\$0	\$0	\$0	\$2,135	\$0	\$0
17	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.1.9 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Pollution

Table A.1.9 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Pollution											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	71	77	0	248	0	30	12	12	0	24
1	PASSENGER	0	1	0	0	0	0	0	0	0	0
1	TANKER	11	15	0	31	0	2	1	4	0	0
2	Freighter	0	0	0	0	0	0	0	0	0	0
2	PASSENGER	0	0	0	0	0	0	0	0	0	0
2	TANKER	0	0	0	0	0	0	0	0	0	0
5	FREIGHTER	249	342	0	296	0	124	47	31	0	47
5	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	TANKER	10	9	0	8	0	11	1	0	0	1
7	FREIGHTER	8	23	0	21	0	5	1	2	0	2
7	PASSENGER	1	4	0	0	0	0	0	0	0	0
7	TANKER	290	181	0	344	0	54	18	36	0	0
8	FREIGHTER	986	1775	0	4102	0	158	118	197	0	394
8	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	TANKER	130	247	0	199	0	14	0	34	0	21
9	FREIGHTER	159	368	0	223	0	79	22	79	0	14
9	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.1.9 Risk-Based Rankings - U.S. Flag, District, Casualty Frequency, Pollution											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0	0	0	0	0	0	0	0	0	0
11	FREIGHTER	32	39	0	105	0	9	4	37	0	2
11	PASSENGER	1	2	0	0	0	0	0	1	0	0
11	TANKER	525	272	0	389	0	19	19	175	0	58
13	FREIGHTER	29	22	0	60	0	2	5	5	0	2
13	PASSENGER	0	1	0	0	0	0	0	0	0	0
13	TANKER	16	28	0	42	0	2	0	6	0	6
14	FREIGHTER	328	1150	0	4434	0	0	0	493	0	0
14	PASSENGER	8	59	0	23	0	8	4	0	0	4
14	TANKER	178	210	0	421	0	97	49	194	0	16
17	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	PASSENGER	0	1	0	0	0	1	0	0	0	0
17	TANKER	0	0	0	0	0	0	0	0	0	0

A.2 Foreign Flag District Level Risk-Based Ranking Results

Bin data used in the risk-based ranking for district level data aggregation are shown in Table A.2.1. The risk-based ranking results are shown in Tables A.2.2 through A.2.9 as follows:

Table A.2.2 - Foreign Flag, District, Relative Frequency, Deaths,

Table A.2.3 - Foreign Flag, District, Relative Frequency, Injuries,

Table A.2.4 - Foreign Flag, District, Relative Frequency, Property Loss,

Table A.2.5 - Foreign Flag, District, Relative Frequency, Pollution,

Table A.2.6 - Foreign Flag, District, Casualty Frequency, Deaths,

Table A.2.7 - Foreign Flag, District, Casualty Frequency, Injuries,

Table A.2.8 - Foreign Flag, District, Casualty Frequency, Property Loss,

Table A.2.9 - Foreign Flag, District, Casualty Frequency, Pollution.

Table A.2.1 Risk-Based Ranking Bin Data Summary - USCG Districts, Foreign Flag

Table A.2.1 Risk-Based Ranking Bin Data Summary - USCG Districts, Foreign Flag										
Bin		inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Frequency Standard Deviation	Consequences			
District	Service						Deaths	injuries	Property Loss	pollution
1	FREIGHTER	1249	93	0.07	0.07	0.0074	0	4	\$1,772,330	827
1	PASSENGER	0	0	0.00	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
1	TANKER	474	74	0.06	0.16	0.0167	1	1	\$231,500	100842
2	FREIGHTER	0	0	0.00	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	PASSENGER	0	0	0.00	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	TANKER	0	0	0.00	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
5	FREIGHTER	2595	109	0.08	0.04	0.0039	2	4	\$2,233,554	7435
5	PASSENGER	2	0	0.00	0.00	0.0000	0	0	\$0	0
5	TANKER	373	67	0.05	0.18	0.0199	1	2	\$265,111	14951
7	FREIGHTER	2947	185	0.14	0.06	0.0045	2	1	\$4,652,225	154337
7	PASSENGER	59	29	0.02	0.49	0.0651	0	4	\$20,000	295

Table A.2.1 Risk-Based Ranking Bin Data Summary - USCG Districts, Foreign Flag										
Bin		inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Frequency Standard Deviation	Consequences			
District	Service						Deaths	injuries	Property Loss	pollution
7	TANKER	233	47	0.04	0.20	0.0263	0	1	\$60,300	4054
8	FREIGHTER	5377	243	0.19	0.05	0.0028	2	7	\$5,579,089	260268
8	PASSENGER	0	0	0.00	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	TANKER	953	134	0.10	0.14	0.0113	1	9	\$1,324,934	41217
9	FREIGHTER	525	53	0.04	0.10	0.0131	1	1	\$1,740,425	149
9	PASSENGER	0	0	0.00	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	TANKER	31	3	0.00	0.10	0.0531	0	0	\$250,000	0
11	FREIGHTER	2273	83	0.06	0.04	0.0039	0	4	\$7,469,969	8698
11	PASSENGER	13	5	0.00	0.38	0.1349	0	0	\$0	2
11	TANKER	195	17	0.01	0.09	0.0202	0	0	\$300,000	339
13	FREIGHTER	2192	82	0.06	0.04	0.0041	2	2	\$354,600	7916
13	PASSENGER	1	0	0.00	0.00	0.0000	0	0	\$0	0
13	TANKER	61	7	0.01	0.11	0.0408	0	1	\$10,100	57
14	FREIGHTER	477	11	0.01	0.02	0.0069	0	0	\$0	467

Table A.2.1 Risk-Based Ranking Bin Data Summary - USCG Districts, Foreign Flag										
Bin		inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Frequency Standard Deviation	Consequences			
District	Service						Deaths	injuries	Property Loss	pollution
Bad Data 14	PASSENGER	22	28	0.02	1.27	Bad Data	1	24	\$13,000,000	3
14	TANKER	212	13	0.01	0.06	0.0165	0	0	\$238,000	11
17	FREIGHTER	281	11	0.01	0.04	0.0116	0	0	\$157,700	111
17	PASSENGER	2	0	0.00	0.00	0.0000	0	0	\$0	0
17	TANKER	25	1	0.00	0.04	0.0392	0	1	\$0	0

Table A.2.2 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Deaths

Table A.2.2 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Deaths											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	TANKER	0.0270	0.0139	0.0000	0.0015	0.0000	0.0023	0.0000	0.0000	0.0000	0.0000
2	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	FREIGHTER	0.0618	0.0618	0.0000	0.0093	0.0000	0.0046	0.0000	0.0046	0.0000	0.0031
5	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	TANKER	0.0224	0.0154	0.0000	0.0039	0.0000	0.0000	0.0000	0.0000	0.0000	0.0015
7	FREIGHTER	0.1529	0.0633	0.0000	0.0031	0.0000	0.0046	0.0031	0.0093	0.0000	0.0046
7	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	FREIGHTER	0.1251	0.1529	0.0000	0.0201	0.0000	0.0185	0.0000	0.0062	0.0000	0.0124
8	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	TANKER	0.0309	0.0317	0.0000	0.0062	0.0000	0.0015	0.0046	0.0031	0.0000	0.0031
9	FREIGHTER	0.0077	0.0193	0.0000	0.0031	0.0000	0.0000	0.0015	0.0023	0.0000	0.0000
9	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.2.2 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Deaths												
Bin		Level III Intervention Strategy Importance										
District	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	
9	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	FREIGHTER	0.0402	0.0278	0.0000	0.0077	0.0000	0.0046	0.0031	0.0015	0.0000	0.0062	
13	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
14	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Bad Data 14	PASSENGER	0.0000	0.0023	0.0000	0.0162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
14	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table A.2.3 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Injuries

Table A.2.3 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Injuries											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	0.0958	0.1143	0.0000	0.0124	0.0000	0.0062	0.0093	0.0124	0.0000	0.0062
1	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	TANKER	0.0270	0.0139	0.0000	0.0015	0.0000	0.0023	0.0000	0.0000	0.0000	0.0000
2	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	FREIGHTER	0.1236	0.1236	0.0000	0.0185	0.0000	0.0093	0.0000	0.0093	0.0000	0.0062
5	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	TANKER	0.0448	0.0309	0.0000	0.0077	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031
7	FREIGHTER	0.0764	0.0317	0.0000	0.0015	0.0000	0.0023	0.0015	0.0046	0.0000	0.0023
7	PASSENGER	0.0216	0.0062	0.0000	0.0093	0.0000	0.0031	0.0062	0.0000	0.0000	0.0000
7	TANKER	0.0170	0.0093	0.0000	0.0008	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000
8	FREIGHTER	0.4378	0.5351	0.0000	0.0703	0.0000	0.0649	0.0000	0.0216	0.0000	0.0432
8	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	TANKER	0.2780	0.2849	0.0000	0.0556	0.0000	0.0139	0.0417	0.0278	0.0000	0.0278
9	FREIGHTER	0.0077	0.0193	0.0000	0.0031	0.0000	0.0000	0.0015	0.0023	0.0000	0.0000
9	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.2.3 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Injuries												
Bin		Level III Intervention Strategy Importance										
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	
9	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	FREIGHTER	0.0865	0.0741	0.0000	0.0216	0.0000	0.0093	0.0031	0.0062	0.0000	0.0062	
11	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	FREIGHTER	0.0402	0.0278	0.0000	0.0077	0.0000	0.0046	0.0031	0.0015	0.0000	0.0062	
13	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	TANKER	0.0023	0.0008	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
14	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Bad Data 14	PASSENGER	0.0000	0.0556	0.0000	0.3892	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
14	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	TANKER	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table A.2.4 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Property Loss

Table A.2.4 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Property Loss											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	42426	50638	0	5474	0	2737	4106	5474	0	2737
1	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	TANKER	6257	3218	0	358	0	536	0	0	0	0
2	FREIGHTER	0	0	0	0	0	0	0	0	0	0
2	PASSENGER	0	0	0	0	0	0	0	0	0	0
2	TANKER	0	0	0	0	0	0	0	0	0	0
5	FREIGHTER	68990	68990	0	10349	0	5174	0	5174	0	3450
5	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	TANKER	5937	4094	0	1024	0	0	0	0	0	409
7	FREIGHTER	355653	147291	0	7185	0	10777	7185	21555	0	10777
7	PASSENGER	108	31	0	46	0	15	31	0	0	0
7	TANKER	1024	559	0	47	0	0	0	47	0	0
8	FREIGHTER	348962	426510	0	56006	0	51698	0	17233	0	34465
8	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	TANKER	40925	41948	0	8185	0	2046	6139	4092	0	4092
9	FREIGHTER	13440	33599	0	5376	0	0	2688	4032	0	0
9	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.2.4 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Property Loss											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0	193	0	0	0	0	0	0	0	0
11	FREIGHTER	161513	138440	0	40378	0	17305	5768	11537	0	11537
11	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	TANKER	1390	1158	0	0	0	232	0	0	0	0
13	FREIGHTER	7119	4929	0	1369	0	821	548	274	0	1095
13	PASSENGER	0	0	0	0	0	0	0	0	0	0
13	TANKER	23	8	0	8	0	0	0	0	0	0
14	FREIGHTER	0	0	0	0	0	0	0	0	0	0
Bad Data 14	PASSENGER	0	30116	0	210811	0	0	0	0	0	0
14	TANKER	735	184	0	0	0	0	551	0	0	184
17	FREIGHTER	731	609	0	0	0	0	0	365	0	0
17	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	TANKER	0	0	0	0	0	0	0	0	0	0

Table A.2.5 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Pollution

Table A.2.5 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Pollution											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	20	24	0	3	0	1	2	3	0	1
1	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	TANKER	2725	1402	0	156	0	234	0	0	0	0
2	FREIGHTER	0	0	0	0	0	0	0	0	0	0
2	PASSENGER	0	0	0	0	0	0	0	0	0	0
2	TANKER	0	0	0	0	0	0	0	0	0	0
5	FREIGHTER	230	230	0	34	0	17	0	17	0	11
5	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	TANKER	335	231	0	58	0	0	0	0	0	23
7	FREIGHTER	11799	4886	0	238	0	358	238	715	0	358
7	PASSENGER	2	0	0	1	0	0	0	0	0	0
7	TANKER	69	38	0	3	0	0	0	3	0	0
8	FREIGHTER	16279	19897	0	2613	0	2412	0	804	0	1608
8	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	TANKER	1273	1305	0	255	0	64	191	127	0	127
9	FREIGHTER	1	3	0	0	0	0	0	0	0	0
9	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.2.5 Risk-Based Rankings - Foreign Flag, District, Relative Frequency, Pollution											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0	0	0	0	0	0	0	0	0	0
11	FREIGHTER	188	161	0	47	0	20	7	13	0	13
11	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	TANKER	2	1	0	0	0	0	0	0	0	0
13	FREIGHTER	159	110	0	31	0	18	12	6	0	24
13	PASSENGER	0	0	0	0	0	0	0	0	0	0
13	TANKER	0	0	0	0	0	0	0	0	0	0
14	FREIGHTER	3	1	0	0	0	0	0	0	0	0
Bad Data 14	PASSENGER	0	0	0	0	0	0	0	0	0	0
14	TANKER	0	0	0	0	0	0	0	0	0	0
17	FREIGHTER	1	0	0	0	0	0	0	0	0	0
17	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	TANKER	0	0	0	0	0	0	0	0	0	0

Table A.2.6 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Deaths

Table A.2.6 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Deaths												
Bin		Level III Intervention Strategy Importance										
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	
1	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1	TANKER	0.0738	0.0380	0.0000	0.0042	0.0000	0.0063	0.0000	0.0000	0.0000	0.0000	
2	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
5	FREIGHTER	0.0308	0.0308	0.0000	0.0046	0.0000	0.0023	0.0000	0.0023	0.0000	0.0015	
5	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
5	TANKER	0.0777	0.0536	0.0000	0.0134	0.0000	0.0000	0.0000	0.0000	0.0000	0.0054	
7	FREIGHTER	0.0672	0.0278	0.0000	0.0014	0.0000	0.0020	0.0014	0.0041	0.0000	0.0020	
7	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
7	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	FREIGHTER	0.0301	0.0368	0.0000	0.0048	0.0000	0.0045	0.0000	0.0015	0.0000	0.0030	
8	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	TANKER	0.0420	0.0430	0.0000	0.0084	0.0000	0.0021	0.0063	0.0042	0.0000	0.0042	
9	FREIGHTER	0.0190	0.0476	0.0000	0.0076	0.0000	0.0000	0.0038	0.0057	0.0000	0.0000	
9	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table A.2.6 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Deaths												
Bin		Level III Intervention Strategy Importance										
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	
9	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	FREIGHTER	0.0237	0.0164	0.0000	0.0046	0.0000	0.0027	0.0018	0.0009	0.0000	0.0036	
13	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
14	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Bad Data 14	PASSENGER	0.0000	0.1364	0.0000	0.9545	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
14	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table A.2.7 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Injuries

Table A.2.7 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Injuries											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	0.0993	0.1185	0.0000	0.0128	0.0000	0.0064	0.0096	0.0128	0.0000	0.0064
1	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	TANKER	0.0738	0.0380	0.0000	0.0042	0.0000	0.0063	0.0000	0.0000	0.0000	0.0000
2	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	FREIGHTER	0.0617	0.0617	0.0000	0.0092	0.0000	0.0046	0.0000	0.0046	0.0000	0.0031
5	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	TANKER	0.1555	0.1072	0.0000	0.0268	0.0000	0.0000	0.0000	0.0000	0.0000	0.0107
7	FREIGHTER	0.0336	0.0139	0.0000	0.0007	0.0000	0.0010	0.0007	0.0020	0.0000	0.0010
7	PASSENGER	0.4746	0.1356	0.0000	0.2034	0.0000	0.0678	0.1356	0.0000	0.0000	0.0000
7	TANKER	0.0944	0.0515	0.0000	0.0043	0.0000	0.0000	0.0000	0.0043	0.0000	0.0000
8	FREIGHTER	0.1054	0.1289	0.0000	0.0169	0.0000	0.0156	0.0000	0.0052	0.0000	0.0104
8	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	TANKER	0.3778	0.3872	0.0000	0.0756	0.0000	0.0189	0.0567	0.0378	0.0000	0.0378
9	FREIGHTER	0.0190	0.0476	0.0000	0.0076	0.0000	0.0000	0.0038	0.0057	0.0000	0.0000
9	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.2.7 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Injuries											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	FREIGHTER	0.0493	0.0422	0.0000	0.0123	0.0000	0.0053	0.0018	0.0035	0.0000	0.0035
11	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	FREIGHTER	0.0237	0.0164	0.0000	0.0046	0.0000	0.0027	0.0018	0.0009	0.0000	0.0036
13	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TANKER	0.0492	0.0164	0.0000	0.0164	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bad Data 14	PASSENGER	0.0000	3.2727	0.0000	22.9091	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	TANKER	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.2.8 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Property Loss

Table A.2.8 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Property Loss											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	43989	52503	0	5676	0	2838	4257	5676	0	2838
1	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	TANKER	17094	8791	0	977	0	1465	0	0	0	0
2	FREIGHTER	0	0	0	0	0	0	0	0	0	0
2	PASSENGER	0	0	0	0	0	0	0	0	0	0
2	TANKER	0	0	0	0	0	0	0	0	0	0
5	FREIGHTER	34429	34429	0	5164	0	2582	0	2582	0	1721
5	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	TANKER	20612	14215	0	3554	0	0	0	0	0	1422
7	FREIGHTER	156284	64724	0	3157	0	4736	3157	9472	0	4736
7	PASSENGER	2373	678	0	1017	0	339	678	0	0	0
7	TANKER	5694	3106	0	259	0	0	0	259	0	0
8	FREIGHTER	84044	102721	0	13489	0	12451	0	4150	0	8301
8	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	TANKER	55611	57001	0	11122	0	2781	8342	5561	0	5561
9	FREIGHTER	33151	82877	0	13260	0	0	6630	9945	0	0
9	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.2.8 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Property Loss											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0	8065	0	0	0	0	0	0	0	0
11	FREIGHTER	92019	78873	0	23005	0	9859	3286	6573	0	6573
11	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	TANKER	9231	7692	0	0	0	1538	0	0	0	0
13	FREIGHTER	4206	2912	0	809	0	485	324	162	0	647
13	PASSENGER	0	0	0	0	0	0	0	0	0	0
13	TANKER	497	166	0	166	0	0	0	0	0	0
14	FREIGHTER	0	0	0	0	0	0	0	0	0	0
Bad Data 14	PASSENGER	0	1772727	0	12409091	0	0	0	0	0	0
14	TANKER	4491	1123	0	0	0	0	3368	0	0	1123
17	FREIGHTER	3367	2806	0	0	0	0	0	1684	0	0
17	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	TANKER	0	0	0	0	0	0	0	0	0	0

Table A.2.9 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Pollution

Table A.2.9 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Pollution											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	FREIGHTER	21	24	0	3	0	1	2	3	0	1
1	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	TANKER	7446	3829	0	425	0	638	0	0	0	0
2	FREIGHTER	0	0	0	0	0	0	0	0	0	0
2	PASSENGER	0	0	0	0	0	0	0	0	0	0
2	TANKER	0	0	0	0	0	0	0	0	0	0
5	FREIGHTER	115	115	0	17	0	9	0	9	0	6
5	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	TANKER	1162	802	0	200	0	0	0	0	0	80
7	FREIGHTER	5185	2147	0	105	0	157	105	314	0	157
7	PASSENGER	35	10	0	15	0	5	10	0	0	0
7	TANKER	383	209	0	17	0	0	0	17	0	0
8	FREIGHTER	3921	4792	0	629	0	581	0	194	0	387
8	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	TANKER	1730	1773	0	346	0	86	259	173	0	173
9	FREIGHTER	3	7	0	1	0	0	1	1	0	0
9	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.2.9 Risk-Based Rankings - Foreign Flag, District, Casualty Frequency, Pollution											
Bin		Level III Intervention Strategy Importance									
District	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	TANKER	0	0	0	0	0	0	0	0	0	0
11	FREIGHTER	107	92	0	27	0	11	4	8	0	8
11	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	TANKER	10	9	0	0	0	2	0	0	0	0
13	FREIGHTER	94	65	0	18	0	11	7	4	0	14
13	PASSENGER	0	0	0	0	0	0	0	0	0	0
13	TANKER	3	1	0	1	0	0	0	0	0	0
14	FREIGHTER	7	2	0	0	0	1	0	0	0	0
Bad Data 14	PASSENGER	0	0	0	3	0	0	0	0	0	0
14	TANKER	0	0	0	0	0	0	0	0	0	0
17	FREIGHTER	2	2	0	0	0	0	0	1	0	0
17	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	TANKER	0	0	0	0	0	0	0	0	0	0

A.3 U.S. Flag Marine Safety Office Level Risk-Based Ranking Results

Bin data used in the risk-based ranking for district level data aggregation are shown in Table A.3.1. The risk-based ranking results are shown in Tables A.3.2 through A.3.9 as follows:

Table A.3.2 - U.S. Flag, MSO, Relative Frequency, Deaths,
Table A.3.3 - U.S. Flag, MSO, Relative Frequency, Injuries,
Table A.3.4 - U.S. Flag, MSO, Relative Frequency, Property Loss,
Table A.3.5 - U.S. Flag, MSO, Relative Frequency, Pollution,
Table A.3.6 - U.S. Flag, MSO, Casualty Frequency, Deaths,
Table A.3.7 - U.S. Flag, MSO, Casualty Frequency, Injuries,
Table A.3.8 - U.S. Flag, MSO, Casualty Frequency, Property Loss,
Table A.3.9 - U.S. Flag, MSO, Casualty Frequency, Pollution.

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag											
Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
1	BOS	FREIGHTER	10	1	0.0005	0.10000	0.0949	0	0	\$0	5
1	BOS	PASSENGER	207	11	0.0057	0.05314	0.0156	0	4	\$25,400	2
1	BOS	TANKER	20	4	0.0021	0.20000	0.0894	0	0	\$0	1
1	NYC	FREIGHTER	245	100	0.0515	0.40816	0.0314	2	38	\$6,055,882	1648
1	NYC	PASSENGER	759	30	0.0154	0.03953	0.0071	1	6	\$152,700	0
1	NYC	TANKER	230	81	0.0417	0.35217	0.0315	0	31	\$508,900	285
1	POM	FREIGHTER	15		0.0000	0.00000	0.0000	0	0	\$0	0
1	POM	PASSENGER	80	2	0.0010	0.02500	0.0175	0	0	\$200	0
1	POM	TANKER	20	2	0.0010	0.10000	0.0671	0	0	\$6,050	0
1	PRO	FREIGHTER	10	1	0.0005	0.10000	0.0949	0	0	\$0	0
1	PRO	PASSENGER	209	7	0.0036	0.03349	0.0124	0	2	\$15,000	30
1	PRO	TANKER	7		0.0000	0.00000	0.0000	0	0	\$0	0
2	DAV	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
2	DAV	PASSENGER	1		0.0000	0.00000	0.0000	0	0	\$0	0
2	DAV	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	HUN	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	HUN	PASSENGER	20	1	0.0005	0.05000	0.0487	0	0	\$0	0
2	HUN	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	LOU	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	LOU	PASSENGER	62	2	0.0010	0.03226	0.0224	0	0	\$92,000	0
2	LOU	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	MEM	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	MEM	PASSENGER	27	2	0.0010	0.07407	0.0504	0	0	\$300	0
2	MEM	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
2	NAS	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	NAS	PASSENGER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	NAS	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	PAD	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	PAD	PASSENGER	46	1	0.0005	0.02174	0.0215	0	0	\$0	0
2	PAD	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	PIT	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	PIT	PASSENGER	24		0.0000	0.00000	0.0000	0	0	\$0	0
2	PIT	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	SLM	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	SLM	PASSENGER	145	7	0.0036	0.04828	0.0178	0	2	\$1,000	0

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
2	SLM	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	STP	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	STP	PASSENGER	8		0.0000	0.00000	0.0000	0	0	\$0	0
2	STP	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
5	BAL	FREIGHTER	38	10	0.0051	0.26316	0.0714	0	0	\$16,763	13
5	BAL	PASSENGER	66	2	0.0010	0.03030	0.0211	0	0	\$0	0
5	BAL	TANKER	27	1	0.0005	0.03704	0.0363	0	1	\$0	0
5	HMR	FREIGHTER	144	70	0.0360	0.48611	0.0417	0	16	\$1,056,500	3160
5	HMR	PASSENGER	131	15	0.0077	0.11450	0.0278	0	2	\$141,800	0
5	HMR	TANKER	88	44	0.0227	0.50000	0.0533	0	6	\$151,850	146
5	PHI	FREIGHTER	9	3	0.0015	0.33333	0.1571	0	2	\$0	0
5	PHI	PASSENGER	157	6	0.0031	0.03822	0.0153	0	4	\$41,200	0
5	PHI	TANKER	18	3	0.0015	0.16667	0.0878	0	0	\$0	0

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
5	WNC	FREIGHTER	13	10	0.0051	0.76923	0.1169	0	1	\$270,000	1
5	WNC	PASSENGER	112	39	0.0201	0.34821	0.0450	0	1	\$60,300	0
5	WNC	TANKER	1		0.0000	0.00000	0.0000	0	0	\$0	0
7	CHA	FREIGHTER	20	6	0.0031	0.30000	0.1025	0	2	\$25,300	0
7	CHA	PASSENGER	37		0.0000	0.00000	0.0000	0	0	\$0	0
7	CHA	TANKER	2		0.0000	0.00000	0.0000	0	0	\$0	0
7	JAC	FREIGHTER	68	49	0.0252	0.72059	0.0544	2	13	\$405,000	140
7	JAC	PASSENGER	76	8	0.0041	0.10526	0.0352	0	5	\$59,000	50
7	JAC	TANKER	16	11	0.0057	0.68750	0.1159	0	2	\$37,250	87
7	MIA	FREIGHTER	29	11	0.0057	0.37931	0.0901	0	1	\$1,128,000	40
7	MIA	PASSENGER	145	5	0.0026	0.03448	0.0152	0	0	\$7,900	11
7	MIA	TANKER	2	1	0.0005	0.50000	0.3536	0	0	\$0	0
7	SAV	FREIGHTER	5		0.0000	0.00000	0.0000	0	0	\$0	0
7	SAV	PASSENGER	42	1	0.0005	0.02381	0.0235	0	0	\$25,000	0
7	SAV	TANKER	2	3	0.0015	1.50000	ERR	0	1	\$0	0

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
7	SJP	FREIGHTER	28	8	0.0041	0.28571	0.0854	0	0	\$4,000	0
7	SJP	PASSENGER	108	6	0.0031	0.05556	0.0220	0	0	\$87,300	50
7	SJP	TANKER	25	13	0.0067	0.52000	0.0999	0	6	\$500	426
7	TAM	FREIGHTER	14	1	0.0005	0.07143	0.0688	0	1	\$0	0
7	TAM	PASSENGER	104	4	0.0021	0.03846	0.0189	0	0	\$10,000	1
7	TAM	TANKER	37	30	0.0154	0.81081	0.0644	0	10	\$95,700	1007
8	COR	FREIGHTER	8	8	0.0041	1.00000	0.0000	0	8	\$0	0
8	COR	PASSENGER	25	1	0.0005	0.04000	0.0392	0	0	\$0	0
8	COR	TANKER	25	12	0.0062	0.48000	0.0999	0	3	\$185,160	680
8	GAL	FREIGHTER	46	54	0.0278	1.17391	ERR	1	22	\$341,232	257
8	GAL	PASSENGER	36	2	0.0010	0.05556	0.0382	0	0	\$20	0
8	GAL	TANKER	32	8	0.0041	0.25000	0.0765	0	1	\$0	28
8	HOU	FREIGHTER	45	39	0.0201	0.86667	0.0507	0	14	\$0	13844
8	HOU	PASSENGER	16		0.0000	0.00000	0.0000	0	0	\$0	0
8	HOU	TANKER	30	12	0.0062	0.40000	0.0894	0	1	\$3,613,250	638

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
8	MOB	FREIGHTER	42	26	0.0134	0.61905	0.0749	0	6	\$481,100	139
8	MOB	PASSENGER	82	1	0.0005	0.01220	0.0121	0	0	\$0	0
8	MOB	TANKER	42	38	0.0196	0.90476	0.0453	0	9	\$101,700	158
8	MOR	FREIGHTER	16	1	0.0005	0.06250	0.0605	0	0	\$1,500	0
8	MOR	PASSENGER	5		0.0000	0.00000	0.0000	0	0	\$0	0
8	MOR	TANKER	5		0.0000	0.00000	0.0000	0	0	\$0	0
8	NEW	FREIGHTER	133	96	0.0494	0.72180	0.0389	2	42	\$3,092,200	155
8	NEW	PASSENGER	233	9	0.0046	0.03863	0.0126	0	1	\$8,250	0
8	NEW	TANKER	30	16	0.0082	0.53333	0.0911	0	8	\$145,000	21
8	PAT	FREIGHTER	73	27	0.0139	0.36986	0.0565	1	6	\$420,542	118
8	PAT	PASSENGER	15		0.0000	0.00000	0.0000	0	0	\$0	0
8	PAT	TANKER	64	24	0.0124	0.37500	0.0605	0	6	\$20,155	38
9	BUF	FREIGHTER	38	30	0.0154	0.78947	0.0661	0	5	\$196,476	1250
9	BUF	PASSENGER	66	2	0.0010	0.03030	0.0211	0	0	\$5,000	0
9	BUF	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag												
District	MSO	Bin	inspections	casualties	Relative Freq.	Casualty Freq.	Standard Deviation	Consequences				
								Deaths	injuries	property	pollution	
9	CHI	FREIGHTER	6		0.0000	0.00000	0.0000	0	0	\$0	0	
9	CHI	PASSENGER	96	2	0.0010	0.02083	0.0146	0	0	\$335,000	5	
9	CHI	TANKER	5		0.0000	0.00000	0.0000	0	0	\$0	0	
9	CLE	FREIGHTER	21	35	0.0180	1.66667	ERR	1	4	\$1,622,665	310	
9	CLE	PASSENGER	20	2	0.0010	0.10000	0.0671	0	0	\$0	0	
9	CLE	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0	
9	DET	FREIGHTER	16	7	0.0036	0.43750	0.1240	0	0	\$41,500	2	
9	DET	PASSENGER	39	6	0.0031	0.15385	0.0578	0	0	\$0	0	
9	DET	TANKER	1		0.0000	0.00000	0.0000	0	0	\$0	0	
9	DUL	FREIGHTER	56	34	0.0175	0.60714	0.0653	0	5	\$265,500	7	
9	DUL	PASSENGER	42		0.0000	0.00000	0.0000	0	0	\$0	0	
9	DUL	TANKER	5		0.0000	0.00000	0.0000	0	0	\$0	0	
9	MIL	FREIGHTER	31	9	0.0046	0.29032	0.0815	0	2	\$1,076,000	0	
9	MIL	PASSENGER	23	1	0.0005	0.04348	0.0425	0	0	\$0	0	

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
9	MIL	TANKER	1		0.0000	0.00000	0.0000	0	0	\$0	0
9	SIM	FREIGHTER	19	10	0.0051	0.52632	0.1145	0	1	\$95,000	28
9	SIM	PASSENGER	131	2	0.0010	0.01527	0.0107	0	1	\$15,000	0
9	SIM	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	SSM	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	SSM	PASSENGER	6		0.0000	0.00000	0.0000	0	0	\$0	0
9	SSM	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	STB	FREIGHTER	43	25	0.0129	0.58140	0.0752	0	7	\$134,000	7
9	STB	PASSENGER	22	1	0.0005	0.04545	0.0444	0	0	\$0	0
9	STB	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	TOL	FREIGHTER	48	17	0.0088	0.35417	0.0690	0	4	\$1,817,700	400
9	TOL	PASSENGER	66	2	0.0010	0.03030	0.0211	0	0	\$22,000	0
9	TOL	TANKER	12	1	0.0005	0.08333	0.0798	0	0	\$0	0

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
11	LOS	FREIGHTER	145	96	0.0494	0.66207	0.0393	1	39	\$583,551	99
11	LOS	PASSENGER	208	11	0.0057	0.05288	0.0155	0	1	\$500	12
11	LOS	TANKER	86	63	0.0324	0.73256	0.0477	0	16	\$61,100	223
11	PAC	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
11	PAC	PASSENGER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
11	PAC	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
11	SDC	FREIGHTER	13		0.0000	0.00000	0.0000	0	0	\$0	0
11	SDC	PASSENGER	92	6	0.0031	0.06522	0.0257	0	1	\$2,806	10
11	SDC	TANKER	10	2	0.0010	0.20000	0.1265	0	1	\$0	0
11	SFC	FREIGHTER	84	51	0.0263	0.60714	0.0533	0	23	\$3,114,100	330
11	SFC	PASSENGER	230	23	0.0118	0.10000	0.0198	0	0	\$21,500	46
11	SFC	TANKER	51	24	0.0124	0.47059	0.0699	1	2	\$93,946	2636
13	POR	FREIGHTER	43	17	0.0088	0.39535	0.0746	1	2	\$661,000	46

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
13	POR	PASSENGER	17	7	0.0036	0.41176	0.1194	0	0	\$26,500	5
13	POR	TANKER	102	92	0.0474	0.90196	0.0294	2	21	\$235,121	59
13	SEA	FREIGHTER	110	77	0.0396	0.70000	0.0437	0	32	\$4,548,350	218
13	SEA	PASSENGER	264	62	0.0319	0.23485	0.0261	0	15	\$668,875	2
13	SEA	TANKER	66	38	0.0196	0.57576	0.0608	1	16	\$43,500	110
13	TAC	FREIGHTER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
13	TAC	PASSENGER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
13	TAC	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
14	GUA	FREIGHTER	19	2	0.0010	0.10526	0.0704	0	1	\$0	0
14	GUA	PASSENGER	13		0.0000	0.00000	0.0000	0	0	\$0	0
14	GUA	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
14	HON	FREIGHTER	136	48	0.0247	0.35294	0.0410	0	26	\$54,700	25454

Table A.3.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, U.S. Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
14	HON	PASSENGER	245	33	0.0170	0.13469	0.0218	1	5	\$1,034,020	1010
14	HON	TANKER	124	96	0.0494	0.77419	0.0375	0	26	\$1,255,300	2056
17	ANC	FREIGHTER	49	6	0.0031	0.12245	0.0468	0	1	\$200,000	5
17	ANC	PASSENGER	20	1	0.0005	0.05000	0.0487	0	0	\$600	0
17	ANC	TANKER	13	1	0.0005	0.07692	0.0739	0	0	\$0	0
17	JUN	FREIGHTER	27		0.0000	0.00000	0.0000	0	0	\$0	0
17	JUN	PASSENGER	78	12	0.0062	0.15385	0.0409	0	0	\$4,200	25
17	JUN	TANKER			0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	VAL	FREIGHTER	4		0.0000	0.00000	0.0000	0	0	\$0	0
17	VAL	PASSENGER	21	2	0.0010	0.09524	0.0641	0	0	\$0	0
17	VAL	TANKER	2		0.0000	0.00000	0.0000	0	0	\$0	0

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
1	BOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	FREIGHTER	0.0124	0.0134	0.0000	0.0433	0.0000	0.0051	0.0021	0.0021	0.0000
1	NYC	PASSENGER	0.0000	0.0108	0.0000	0.0031	0.0000	0.0000	0.0010	0.0015	0.0000
1	NYC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	HUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	HUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
2	HUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
2	STP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	STP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	STP	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	FREIGHTER	0.0051	0.0113	0.0000	0.0154	0.0000	0.0010	0.0010	0.0021	0.0000

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
7	JAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	FREIGHTER	0.0026	0.0036	0.0000	0.0118	0.0000	0.0015	0.0000	0.0010	0.0000
8	GAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
8	GAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	FREIGHTER	0.0093	0.0196	0.0000	0.0463	0.0000	0.0000	0.0000	0.0010	0.0000
8	NEW	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	FREIGHTER	0.0010	0.0036	0.0000	0.0036	0.0000	0.0000	0.0015	0.0000	0.0000
8	PAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	
9	CHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	CHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	CHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	CLE	FREIGHTER	0.0021	0.0051	0.0000	0.0036	0.0000	0.0000	0.0010	0.0000	0.0000	
9	CLE	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	CLE	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	DET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	DET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	DET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	DUL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	DUL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	DUL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	MIL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	MIL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	MIL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	SIM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	SIM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	SIM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	SSM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
9	SSM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	FREIGHTER	0.0051	0.0088	0.0000	0.0191	0.0000	0.0026	0.0000	0.0093	0.0000
11	LOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	PAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	PAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	PAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
11	SFC	TANKER	0.0046	0.0005	0.0000	0.0015	0.0000	0.0000	0.0000	0.0021	0.0000
13	POR	FREIGHTER	0.0036	0.0010	0.0000	0.0015	0.0000	0.0005	0.0005	0.0005	0.0000
13	POR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	TANKER	0.0134	0.0237	0.0000	0.0247	0.0000	0.0010	0.0000	0.0062	0.0000
13	SEA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	TANKER	0.0015	0.0026	0.0000	0.0093	0.0000	0.0005	0.0000	0.0000	0.0000
13	TAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	PASSENGER	0.0010	0.0077	0.0000	0.0031	0.0000	0.0010	0.0005	0.0000	0.0000
14	HON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.2 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
17	JUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.3 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Injuries

Table A.3.3 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Injuries											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
1	BOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	PASSENGER	0.0021	0.0082	0.0000	0.0103	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	FREIGHTER	0.2348	0.2544	0.0000	0.8218	0.0000	0.0978	0.0391	0.0391	0.0000
1	NYC	PASSENGER	0.0000	0.0649	0.0000	0.0185	0.0000	0.0000	0.0062	0.0093	0.0000
1	NYC	TANKER	0.1596	0.1916	0.0000	0.4789	0.0000	0.0319	0.0160	0.0479	0.0000
1	POM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	PASSENGER	0.0010	0.0021	0.0000	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	HUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	HUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.3 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Injuries											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
2	HUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	PASSENGER	0.0000	0.0010	0.0000	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.3 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
2	STP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	STP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	STP	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	TANKER	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	FREIGHTER	0.0742	0.0824	0.0000	0.1318	0.0000	0.0577	0.0247	0.0165	0.0000
5	HMR	PASSENGER	0.0000	0.0072	0.0000	0.0021	0.0000	0.0041	0.0000	0.0021	0.0000
5	HMR	TANKER	0.0278	0.0216	0.0000	0.0185	0.0000	0.0309	0.0031	0.0000	0.0000
5	PHI	FREIGHTER	0.0000	0.0000	0.0000	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	PASSENGER	0.0000	0.0062	0.0000	0.0021	0.0000	0.0021	0.0000	0.0000	0.0000
5	PHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	FREIGHTER	0.0015	0.0026	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	PASSENGER	0.0000	0.0093	0.0000	0.0010	0.0000	0.0036	0.0010	0.0015	0.0000
5	WNC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	FREIGHTER	0.0010	0.0021	0.0000	0.0021	0.0000	0.0010	0.0000	0.0000	0.0000
7	CHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	FREIGHTER	0.0335	0.0736	0.0000	0.1004	0.0000	0.0067	0.0067	0.0134	0.0000

Table A.3.3 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
7	JAC	PASSENGER	0.0051	0.0103	0.0000	0.0051	0.0000	0.0000	0.0000	0.0026	0.0000
7	JAC	TANKER	0.0031	0.0031	0.0000	0.0021	0.0000	0.0021	0.0000	0.0000	0.0000
7	MIA	FREIGHTER	0.0005	0.0026	0.0000	0.0005	0.0000	0.0010	0.0000	0.0000	0.0000
7	MIA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	TANKER	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	TANKER	0.0154	0.0031	0.0000	0.0185	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	FREIGHTER	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	TANKER	0.0412	0.0309	0.0000	0.0515	0.0000	0.0051	0.0051	0.0103	0.0000
8	COR	FREIGHTER	0.0000	0.0000	0.0000	0.0330	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	TANKER	0.0031	0.0077	0.0000	0.0046	0.0000	0.0000	0.0000	0.0031	0.0000
8	GAL	FREIGHTER	0.0566	0.0793	0.0000	0.2606	0.0000	0.0340	0.0000	0.0227	0.0000
8	GAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.3 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
8	GAL	TANKER	0.0010	0.0010	0.0000	0.0005	0.0000	0.0005	0.0000	0.0005	0.0000
8	HOU	FREIGHTER	0.0288	0.0360	0.0000	0.1081	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	TANKER	0.0010	0.0021	0.0000	0.0010	0.0000	0.0000	0.0000	0.0005	0.0000
8	MOB	FREIGHTER	0.0154	0.0216	0.0000	0.0185	0.0000	0.0031	0.0000	0.0062	0.0000
8	MOB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	TANKER	0.0278	0.0742	0.0000	0.0417	0.0000	0.0046	0.0000	0.0000	0.0000
8	MOR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	FREIGHTER	0.1946	0.4109	0.0000	0.9732	0.0000	0.0000	0.0000	0.0216	0.0000
8	NEW	PASSENGER	0.0000	0.0026	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	TANKER	0.0082	0.0124	0.0000	0.0330	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	FREIGHTER	0.0062	0.0216	0.0000	0.0216	0.0000	0.0000	0.0093	0.0000	0.0000
8	PAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	TANKER	0.0154	0.0185	0.0000	0.0185	0.0000	0.0000	0.0000	0.0031	0.0000
9	BUF	FREIGHTER	0.0026	0.0335	0.0000	0.0103	0.0000	0.0103	0.0000	0.0154	0.0000
9	BUF	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

[illegible]

Table A.3.3 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
9	SSM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	FREIGHTER	0.0108	0.0288	0.0000	0.0252	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	FREIGHTER	0.0041	0.0082	0.0000	0.0082	0.0000	0.0021	0.0000	0.0000	0.0000
9	TOL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	FREIGHTER	0.2008	0.3414	0.0000	0.7430	0.0000	0.1004	0.0000	0.3615	0.0000
11	LOS	PASSENGER	0.0005	0.0036	0.0000	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	TANKER	0.1483	0.0989	0.0000	0.1318	0.0000	0.0082	0.0082	0.0330	0.0000
11	PAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	PAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	PAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	PASSENGER	0.0005	0.0005	0.0000	0.0005	0.0000	0.0000	0.0000	0.0005	0.0000
11	SDC	TANKER	0.0000	0.0005	0.0000	0.0005	0.0000	0.0000	0.0000	0.0005	0.0000
11	SFC	FREIGHTER	0.0947	0.0592	0.0000	0.2606	0.0000	0.0000	0.0237	0.0355	0.0000
11	SFC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.3 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
11	SFC	TANKER	0.0093	0.0010	0.0000	0.0031	0.0000	0.0000	0.0000	0.0041	0.0000
13	POR	FREIGHTER	0.0072	0.0021	0.0000	0.0031	0.0000	0.0010	0.0010	0.0010	0.0000
13	POR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	TANKER	0.1406	0.2487	0.0000	0.2595	0.0000	0.0108	0.0000	0.0649	0.0000
13	SEA	FREIGHTER	0.1648	0.1813	0.0000	0.5273	0.0000	0.0000	0.0330	0.0330	0.0000
13	SEA	PASSENGER	0.0154	0.2240	0.0000	0.1159	0.0000	0.0463	0.0232	0.0077	0.0000
13	SEA	TANKER	0.0247	0.0412	0.0000	0.1483	0.0000	0.0082	0.0000	0.0000	0.0000
13	TAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	FREIGHTER	0.0000	0.0005	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	FREIGHTER	0.0268	0.0803	0.0000	0.3481	0.0000	0.0000	0.0000	0.0402	0.0000
14	HON	PASSENGER	0.0051	0.0386	0.0000	0.0154	0.0000	0.0051	0.0026	0.0000	0.0000
14	HON	TANKER	0.1473	0.1740	0.0000	0.3481	0.0000	0.0803	0.0402	0.1607	0.0000
17	ANC	FREIGHTER	0.0015	0.0005	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.3 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
17	JUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.4 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Property Loss

Table A.3.4 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Property Loss									
Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention
Bin									
1	BOS	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	BOS	PASSENGER	\$13	\$52	\$0	\$65	\$0	\$0	\$0
1	BOS	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	NYC	FREIGHTER	\$37,420	\$40,539	\$0	\$130,972	\$15,592	\$6,237	\$6,237
1	NYC	PASSENGER	\$0	\$1,651	\$0	\$472	\$0	\$157	\$236
1	NYC	TANKER	\$2,620	\$3,145	\$0	\$7,861	\$524	\$262	\$786
1	POM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	POM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	POM	TANKER	\$0	\$3	\$0	\$0	\$0	\$0	\$3
1	PRO	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	PRO	PASSENGER	\$8	\$15	\$0	\$8	\$0	\$0	\$0
1	PRO	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	DAV	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	DAV	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	DAV	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	HUN	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	HUN	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.3.4 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Property Loss

[illegible]

Table A.3.4 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Property Loss											
Level III Intervention Strategy Importance										Bin	
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
2	STP	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	STP	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	STP	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	BAL	FREIGHTER	\$35	\$60	\$0	\$0	\$9	\$0	\$0	\$0	\$0
5	BAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	BAL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	HMR	FREIGHTER	\$4,896	\$5,440	\$0	\$8,704	\$3,808	\$1,632	\$1,088	\$0	\$0
5	HMR	PASSENGER	\$0	\$511	\$0	\$146	\$292	\$0	\$146	\$0	\$0
5	HMR	TANKER	\$704	\$547	\$0	\$469	\$782	\$78	\$0	\$0	\$0
5	PHI	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	PHI	PASSENGER	\$0	\$64	\$0	\$21	\$21	\$0	\$0	\$0	\$0
5	PHI	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	WNC	FREIGHTER	\$417	\$695	\$0	\$139	\$0	\$0	\$0	\$0	\$0
5	WNC	PASSENGER	\$0	\$559	\$0	\$62	\$217	\$62	\$93	\$0	\$0
5	WNC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	CHA	FREIGHTER	\$13	\$26	\$0	\$26	\$13	\$0	\$0	\$0	\$0
7	CHA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	CHA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	JAC	FREIGHTER	\$1,043	\$2,294	\$0	\$3,128	\$209	\$209	\$209	\$417	\$0

Table A.3.4 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Property Loss											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
7	JAC	PASSENGER	\$61	\$122	\$0	\$61	\$0	\$0	\$0	\$30	\$0
7	JAC	TANKER	\$58	\$58	\$0	\$38	\$0	\$38	\$0	\$0	\$0
7	MIA	FREIGHTER	\$581	\$2,904	\$0	\$581	\$0	\$1,162	\$0	\$0	\$0
7	MIA	PASSENGER	\$4	\$16	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	MIA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SAV	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SAV	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$13	\$13	\$0	\$0
7	SAV	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SJP	FREIGHTER	\$0	\$6	\$0	\$0	\$0	\$2	\$0	\$0	\$0
7	SJP	PASSENGER	\$45	\$315	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SJP	TANKER	\$1	\$0	\$0	\$2	\$0	\$0	\$0	\$0	\$0
7	TAM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	TAM	PASSENGER	\$5	\$10	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	TAM	TANKER	\$394	\$296	\$0	\$493	\$0	\$49	\$49	\$99	\$0
8	COR	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	COR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	COR	TANKER	\$191	\$477	\$0	\$286	\$0	\$0	\$0	\$191	\$0
8	GAL	FREIGHTER	\$879	\$1,230	\$0	\$4,041	\$0	\$527	\$0	\$351	\$0
8	GAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

[illegible]

Table A.3.4 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Property Loss

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
9	CHI	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CHI	PASSENGER	\$173	\$173	\$0	\$0	\$0	\$0	\$0	\$173	\$0
9	CHI	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	FREIGHTER	\$3,342	\$8,356	\$0	\$5,849	\$0	\$0	\$1,671	\$0	\$0
9	CLE	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	FREIGHTER	\$43	\$43	\$0	\$0	\$0	\$0	\$0	\$21	\$0
9	DET	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DUL	FREIGHTER	\$957	\$1,230	\$0	\$820	\$0	\$547	\$0	\$547	\$0
9	DUL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DUL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MIL	FREIGHTER	\$0	\$1,108	\$0	\$1,108	\$0	\$554	\$554	\$0	\$0
9	MIL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MIL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SIM	FREIGHTER	\$147	\$147	\$0	\$49	\$0	\$49	\$0	\$0	\$0
9	SIM	PASSENGER	\$0	\$8	\$0	\$8	\$0	\$0	\$0	\$0	\$0
9	SIM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.3.4 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Property Loss											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
9	SSM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	FREIGHTER	\$207	\$552	\$0	\$483	\$0	\$0	\$0	\$0	\$0
9	STB	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	TOL	FREIGHTER	\$1,872	\$3,744	\$0	\$3,744	\$0	\$936	\$0	\$0	\$0
9	TOL	PASSENGER	\$0	\$23	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	TOL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	LOS	FREIGHTER	\$3,005	\$5,108	\$0	\$11,118	\$0	\$1,502	\$0	\$5,409	\$0
11	LOS	PASSENGER	\$0	\$2	\$0	\$1	\$0	\$0	\$0	\$0	\$0
11	LOS	TANKER	\$566	\$378	\$0	\$503	\$0	\$31	\$31	\$126	\$0
11	PAC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	PAC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	PAC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	PASSENGER	\$1	\$1	\$0	\$1	\$0	\$0	\$0	\$1	\$0
11	SDC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SFC	FREIGHTER	\$12,828	\$8,018	\$0	\$35,278	\$0	\$0	\$3,207	\$4,811	\$0
11	SFC	PASSENGER	\$66	\$66	\$0	\$0	\$0	\$11	\$0	\$44	\$0

Table A.3.4 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Property Loss											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
11	SFC	TANKER	\$435	\$48	\$0	\$145	\$0	\$0	\$0	\$194	\$0
13	POR	FREIGHTER	\$2,383	\$681	\$0	\$1,021	\$0	\$340	\$340	\$340	\$0
13	POR	PASSENGER	\$14	\$27	\$0	\$0	\$0	\$0	\$0	\$14	\$0
13	POR	TANKER	\$1,574	\$2,785	\$0	\$2,906	\$0	\$121	\$0	\$726	\$0
13	SEA	FREIGHTER	\$23,421	\$25,763	\$0	\$74,947	\$0	\$0	\$4,684	\$4,684	\$0
13	SEA	PASSENGER	\$689	\$9,988	\$0	\$5,166	\$0	\$2,067	\$1,033	\$344	\$0
13	SEA	TANKER	\$67	\$112	\$0	\$403	\$0	\$22	\$0	\$0	\$0
13	TAC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	TAC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	TAC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	HON	FREIGHTER	\$56	\$169	\$0	\$732	\$0	\$0	\$0	\$85	\$0
14	HON	PASSENGER	\$1,065	\$7,987	\$0	\$3,195	\$0	\$1,065	\$532	\$0	\$0
14	HON	TANKER	\$7,110	\$8,403	\$0	\$16,806	\$0	\$3,878	\$1,939	\$7,757	\$0
17	ANC	FREIGHTER	\$309	\$103	\$0	\$103	\$0	\$0	\$0	\$0	\$0
17	ANC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	ANC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.3.4 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Property Loss

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
17	JUN	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	JUN	PASSENGER	\$2	\$11	\$0	\$0	\$0	\$6	\$0	\$0	\$0
17	JUN	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	VAL	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	VAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	VAL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution												
Bin				Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Life-saving	
1	BOS	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	BOS	PASSENGER	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
1	BOS	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	NYC	FREIGHTER	10.18	11.03	0.00	35.64	0.00	4.24	1.70	1.70	0.00	
1	NYC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	NYC	TANKER	1.47	1.76	0.00	4.40	0.00	0.29	0.15	0.44	0.00	
1	POM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	POM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	POM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	PRO	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	PRO	PASSENGER	0.02	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	
1	PRO	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	DAV	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	DAV	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	DAV	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	HUN	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	HUN	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	
2	HUN	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	LOU	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	LOU	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	LOU	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	MEM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	MEM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	MEM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	NAS	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	NAS	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	NAS	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	PAD	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	PAD	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	PAD	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	PIT	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	PIT	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	PIT	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	SLM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	SLM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	SLM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifeaving
2	STP	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	STP	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	STP	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	BAL	FREIGHTER	0.03	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00
5	BAL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	BAL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	HMR	FREIGHTER	14.64	16.27	0.00	26.04	0.00	11.39	4.88	3.25	0.00
5	HMR	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	HMR	TANKER	0.68	0.53	0.00	0.45	0.00	0.75	0.08	0.00	0.00
5	PHI	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	PHI	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	PHI	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	WNC	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	WNC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	WNC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	CHA	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	CHA	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	CHA	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	JAC	FREIGHTER	0.36	0.79	0.00	1.08	0.00	0.07	0.07	0.14	0.00

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	
7	JAC	PASSENGER	0.05	0.10	0.00	0.05	0.00	0.00	0.00	0.03	0.00	
7	JAC	TANKER	0.13	0.13	0.00	0.09	0.00	0.09	0.00	0.00	0.00	
7	MIA	FREIGHTER	0.02	0.10	0.00	0.02	0.00	0.04	0.00	0.00	0.00	
7	MIA	PASSENGER	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	MIA	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SAV	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SAV	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SAV	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SJP	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SJP	PASSENGER	0.03	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SJP	TANKER	1.10	0.22	0.00	1.32	0.00	0.00	0.00	0.00	0.00	
7	TAM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	TAM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	TAM	TANKER	4.15	3.11	0.00	5.19	0.00	0.52	0.52	1.04	0.00	
8	COR	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8	COR	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8	COR	TANKER	0.70	1.75	0.00	1.05	0.00	0.00	0.00	0.70	0.00	
8	GAL	FREIGHTER	0.66	0.93	0.00	3.04	0.00	0.40	0.00	0.26	0.00	
8	GAL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
8	GAL	TANKER	0.03	0.03	0.00	0.01	0.00	0.01	0.00	0.01	0.00
8	HOU	FREIGHTER	28.51	35.64	0.00	106.93	0.00	0.00	0.00	0.00	0.00
8	HOU	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	HOU	TANKER	0.66	1.31	0.00	0.66	0.00	0.00	0.00	0.33	0.00
8	MOB	FREIGHTER	0.36	0.50	0.00	0.43	0.00	0.07	0.00	0.14	0.00
8	MOB	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	MOB	TANKER	0.49	1.30	0.00	0.73	0.00	0.08	0.00	0.00	0.00
8	MOR	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	MOR	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	MOR	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	NEW	FREIGHTER	0.72	1.52	0.00	3.59	0.00	0.00	0.00	0.08	0.00
8	NEW	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	NEW	TANKER	0.02	0.03	0.00	0.09	0.00	0.00	0.00	0.00	0.00
8	PAT	FREIGHTER	0.12	0.43	0.00	0.43	0.00	0.00	0.18	0.00	0.00
8	PAT	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	PAT	TANKER	0.10	0.12	0.00	0.12	0.00	0.00	0.00	0.02	0.00
9	BUF	FREIGHTER	0.64	8.37	0.00	2.57	0.00	2.57	0.00	3.86	0.00
9	BUF	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	BUF	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sya.	Power Plant	Fire Prevention	Hull	Lifesaving
9	CHI	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	CHI	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	CHI	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	CLE	FREIGHTER	0.64	1.60	0.00	1.12	0.00	0.00	0.32	0.00	0.00
9	CLE	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	CLE	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	DET	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	DET	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	DET	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	DUL	FREIGHTER	0.03	0.03	0.00	0.02	0.00	0.01	0.00	0.01	0.00
9	DUL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	DUL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	MIL	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	MIL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	MIL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	SIM	FREIGHTER	0.04	0.04	0.00	0.01	0.00	0.01	0.00	0.00	0.00
9	SIM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	SIM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	SSM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
9	SSM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	SSM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	STB	FREIGHTER	0.01	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00
9	STB	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	STB	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	TOL	FREIGHTER	0.41	0.82	0.00	0.82	0.00	0.21	0.00	0.00	0.00
9	TOL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	TOL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	LOS	FREIGHTER	0.51	0.87	0.00	1.89	0.00	0.25	0.00	0.92	0.00
11	LOS	PASSENGER	0.01	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00
11	LOS	TANKER	2.07	1.38	0.00	1.84	0.00	0.11	0.11	0.46	0.00
11	PAC	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	PAC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	PAC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	SDC	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	SDC	PASSENGER	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00
11	SDC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	SFC	FREIGHTER	1.36	0.85	0.00	3.74	0.00	0.00	0.34	0.51	0.00
11	SFC	PASSENGER	0.14	0.14	0.00	0.00	0.00	0.02	0.00	0.09	0.00

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifeaving	
11	SFC	TANKER	12.22	1.36	0.00	4.07	0.00	0.00	0.00	5.43	0.00	
13	POR	FREIGHTER	0.17	0.05	0.00	0.07	0.00	0.02	0.02	0.02	0.00	
13	POR	PASSENGER	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
13	POR	TANKER	0.39	0.70	0.00	0.73	0.00	0.03	0.00	0.18	0.00	
13	SEA	FREIGHTER	1.12	1.23	0.00	3.59	0.00	0.00	0.22	0.22	0.00	
13	SEA	PASSENGER	0.00	0.03	0.00	0.02	0.00	0.01	0.00	0.00	0.00	
13	SEA	TANKER	0.17	0.28	0.00	1.02	0.00	0.06	0.00	0.00	0.00	
13	TAC	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
13	TAC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
13	TAC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
14	GUA	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
14	GUA	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
14	GUA	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
14	HON	FREIGHTER	26.21	78.64	0.00	340.78	0.00	0.00	0.00	39.32	0.00	
14	HON	PASSENGER	1.04	7.80	0.00	3.12	0.00	1.04	0.52	0.00	0.00	
14	HON	TANKER	11.65	13.76	0.00	27.53	0.00	6.35	3.18	12.70	0.00	
17	ANC	FREIGHTER	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	ANC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	ANC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table A.3.5 Risk-Based Rankings - U.S. Flag, MSO, Relative Frequency, Pollution											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
17	JUN	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	JUN	PASSENGER	0.01	0.06	0.00	0.00	0.00	0.04	0.00	0.00	0.00
17	JUN	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	VAL	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	VAL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	VAL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
1	BOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	FREIGHTER	0.0980	0.1061	0.0000	0.3429	0.0000	0.0408	0.0163	0.0163	0.0000
1	NYC	PASSENGER	0.0000	0.0277	0.0000	0.0079	0.0000	0.0000	0.0026	0.0040	0.0000
1	NYC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	HUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	HUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
2	HUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaing
2	STP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	STP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	STP	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	FREIGHTER	0.1471	0.3235	0.0000	0.4412	0.0000	0.0294	0.0294	0.0588	0.0000

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
7	JAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	FREIGHTER	0.1087	0.1522	0.0000	0.5000	0.0000	0.0652	0.0000	0.0435	0.0000
8	GAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
8	GAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	FREIGHTER	0.1353	0.2857	0.0000	0.6767	0.0000	0.0000	0.0000	0.0150	0.0000
8	NEW	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	FREIGHTER	0.0274	0.0959	0.0000	0.0959	0.0000	0.0000	0.0411	0.0000	0.0000
8	PAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifeaving
9	CHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	FREIGHTER	0.1905	0.4762	0.0000	0.3333	0.0000	0.0000	0.0952	0.0000	0.0000
9	CLE	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	
9	SSM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	SSM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	STB	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	STB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	STB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	TOL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	TOL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
9	TOL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	LOS	FREIGHTER	0.0690	0.1172	0.0000	0.2552	0.0000	0.0345	0.0000	0.1241	0.0000	
11	LOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	LOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	PAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	PAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	PAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SDC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SDC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SDC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SFC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SFC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
11	SFC	TANKER	0.1765	0.0196	0.0000	0.0588	0.0000	0.0000	0.0000	0.0784	0.0000
13	POR	FREIGHTER	0.1628	0.0465	0.0000	0.0698	0.0000	0.0233	0.0233	0.0233	0.0000
13	POR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	TANKER	0.2549	0.4510	0.0000	0.4706	0.0000	0.0196	0.0000	0.1176	0.0000
13	SEA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	TANKER	0.0455	0.0758	0.0000	0.2727	0.0000	0.0152	0.0000	0.0000	0.0000
13	TAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	PASSENGER	0.0082	0.0612	0.0000	0.0245	0.0000	0.0082	0.0041	0.0000	0.0000
14	HON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.6 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Deaths

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
17	JUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
1	BOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	PASSENGER	0.0193	0.0773	0.0000	0.0966	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	FREIGHTER	1.8612	2.0163	0.0000	6.5143	0.0000	0.7755	0.3102	0.3102	0.0000
1	NYC	PASSENGER	0.0000	0.1660	0.0000	0.0474	0.0000	0.0000	0.0158	0.0237	0.0000
1	NYC	TANKER	1.3478	1.6174	0.0000	4.0435	0.0000	0.2696	0.1348	0.4043	0.0000
1	POM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	PASSENGER	0.0096	0.0191	0.0000	0.0096	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	DAV	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	HUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	HUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
2	HUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	LOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MEM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	NAS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PAD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	PIT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	PASSENGER	0.0000	0.0138	0.0000	0.0276	0.0000	0.0000	0.0000	0.0000	0.0000
2	SLM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
2	STP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	STP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	STP	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	TANKER	0.0000	0.0000	0.0000	0.0370	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	FREIGHTER	1.0000	1.1111	0.0000	1.7778	0.0000	0.7778	0.3333	0.2222	0.0000
5	HMR	PASSENGER	0.0000	0.1069	0.0000	0.0305	0.0000	0.0611	0.0000	0.0305	0.0000
5	HMR	TANKER	0.6136	0.4773	0.0000	0.4091	0.0000	0.6818	0.0682	0.0000	0.0000
5	PHI	FREIGHTER	0.0000	0.0000	0.0000	0.4444	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	PASSENGER	0.0000	0.0764	0.0000	0.0255	0.0000	0.0255	0.0000	0.0000	0.0000
5	PHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	FREIGHTER	0.2308	0.3846	0.0000	0.0769	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	PASSENGER	0.0000	0.1607	0.0000	0.0179	0.0000	0.0625	0.0179	0.0268	0.0000
5	WNC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	FREIGHTER	0.1000	0.2000	0.0000	0.2000	0.0000	0.1000	0.0000	0.0000	0.0000
7	CHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	FREIGHTER	0.9559	2.1029	0.0000	2.8676	0.0000	0.1912	0.1912	0.3824	0.0000

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
7	JAC	PASSENGER	0.1316	0.2632	0.0000	0.1316	0.0000	0.0000	0.0000	0.0658	0.0000
7	JAC	TANKER	0.3750	0.3750	0.0000	0.2500	0.0000	0.2500	0.0000	0.0000	0.0000
7	MIA	FREIGHTER	0.0345	0.1724	0.0000	0.0345	0.0000	0.0690	0.0000	0.0000	0.0000
7	MIA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	TANKER	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	TANKER	1.2000	0.2400	0.0000	1.4400	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	FREIGHTER	0.0000	0.0000	0.0000	0.0714	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	TANKER	2.1622	1.6216	0.0000	2.7027	0.0000	0.2703	0.2703	0.5405	0.0000
8	COR	FREIGHTER	0.0000	0.0000	0.0000	8.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	TANKER	0.2400	0.6000	0.0000	0.3600	0.0000	0.0000	0.0000	0.2400	0.0000
8	GAL	FREIGHTER	2.3913	3.3478	0.0000	11.0000	0.0000	1.4348	0.0000	0.9565	0.0000
8	GAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
8	GAL	TANKER	0.0625	0.0625	0.0000	0.0313	0.0000	0.0313	0.0000	0.0313	0.0000
8	HOU	FREIGHTER	1.2444	1.5556	0.0000	4.6667	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	TANKER	0.0667	0.1333	0.0000	0.0667	0.0000	0.0000	0.0000	0.0333	0.0000
8	MOB	FREIGHTER	0.7143	1.0000	0.0000	0.8571	0.0000	0.1429	0.0000	0.2857	0.0000
8	MOB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	TANKER	1.2857	3.4286	0.0000	1.9286	0.0000	0.2143	0.0000	0.0000	0.0000
8	MOR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	FREIGHTER	2.8421	6.0000	0.0000	14.2105	0.0000	0.0000	0.0000	0.3158	0.0000
8	NEW	PASSENGER	0.0000	0.0215	0.0000	0.0043	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	TANKER	0.5333	0.8000	0.0000	2.1333	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	FREIGHTER	0.1644	0.5753	0.0000	0.5753	0.0000	0.0000	0.2466	0.0000	0.0000
8	PAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	TANKER	0.4688	0.5625	0.0000	0.5625	0.0000	0.0000	0.0000	0.0938	0.0000
9	BUF	FREIGHTER	0.1316	1.7105	0.0000	0.5263	0.0000	0.5263	0.0000	0.7895	0.0000
9	BUF	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaing
9	CHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	FREIGHTER	0.7619	1.9048	0.0000	1.3333	0.0000	0.0000	0.3810	0.0000	0.0000
9	CLE	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	FREIGHTER	0.6250	0.8036	0.0000	0.5357	0.0000	0.3571	0.0000	0.3571	0.0000
9	DUL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	FREIGHTER	0.0000	0.1290	0.0000	0.1290	0.0000	0.0645	0.0645	0.0000	0.0000
9	MIL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	FREIGHTER	0.1579	0.1579	0.0000	0.0526	0.0000	0.0526	0.0000	0.0000	0.0000
9	SIM	PASSENGER	0.0000	0.0076	0.0000	0.0076	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
9	SSM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	FREIGHTER	0.4884	1.3023	0.0000	1.1395	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	FREIGHTER	0.1667	0.3333	0.0000	0.3333	0.0000	0.0833	0.0000	0.0000	0.0000
9	TOL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	FREIGHTER	2.6897	4.5724	0.0000	9.9517	0.0000	1.3448	0.0000	4.8414	0.0000
11	LOS	PASSENGER	0.0048	0.0337	0.0000	0.0096	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	TANKER	3.3488	2.2326	0.0000	2.9767	0.0000	0.1860	0.1860	0.7442	0.0000
11	PAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	PAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	PAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	PASSENGER	0.0109	0.0109	0.0000	0.0109	0.0000	0.0000	0.0000	0.0109	0.0000
11	SDC	TANKER	0.0000	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000
11	SFC	FREIGHTER	2.1905	1.3690	0.0000	6.0238	0.0000	0.0000	0.5476	0.8214	0.0000
11	SFC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
11	SFC	TANKER	0.3529	0.0392	0.0000	0.1176	0.0000	0.0000	0.0000	0.1569	0.0000
13	POR	FREIGHTER	0.3256	0.0930	0.0000	0.1395	0.0000	0.0465	0.0465	0.0465	0.0000
13	POR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	TANKER	2.6765	4.7353	0.0000	4.9412	0.0000	0.2059	0.0000	1.2353	0.0000
13	SEA	FREIGHTER	2.9091	3.2000	0.0000	9.3091	0.0000	0.0000	0.5818	0.5818	0.0000
13	SEA	PASSENGER	0.1136	1.6477	0.0000	0.8523	0.0000	0.3409	0.1705	0.0568	0.0000
13	SEA	TANKER	0.7273	1.2121	0.0000	4.3636	0.0000	0.2424	0.0000	0.0000	0.0000
13	TAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	TAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	FREIGHTER	0.0000	0.0526	0.0000	0.0526	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	FREIGHTER	0.3824	1.1471	0.0000	4.9706	0.0000	0.0000	0.0000	0.5735	0.0000
14	HON	PASSENGER	0.0408	0.3061	0.0000	0.1224	0.0000	0.0408	0.0204	0.0000	0.0000
14	HON	TANKER	2.3065	2.7258	0.0000	5.4516	0.0000	1.2581	0.6290	2.5161	0.0000
17	ANC	FREIGHTER	0.0612	0.0204	0.0000	0.0204	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.7 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Injuries											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
17	JUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.3.8 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Property Damage

Table A.3.8 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Property Damage											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
1	BOS	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	BOS	PASSENGER	\$123	\$491	\$0	\$614	\$0	\$0	\$0	\$0	\$0
1	BOS	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	NYC	FREIGHTER	\$296,615	\$321,333	\$0	\$1,038,151	\$0	\$123,589	\$49,436	\$49,436	\$0
1	NYC	PASSENGER	\$0	\$4,225	\$0	\$1,207	\$0	\$0	\$402	\$604	\$0
1	NYC	TANKER	\$22,126	\$26,551	\$0	\$66,378	\$0	\$4,425	\$2,213	\$6,638	\$0
1	POM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	POM	PASSENGER	\$0	\$3	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	POM	TANKER	\$0	\$303	\$0	\$0	\$0	\$0	\$0	\$303	\$0
1	PRO	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	PRO	PASSENGER	\$72	\$144	\$0	\$72	\$0	\$0	\$0	\$0	\$0
1	PRO	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	DAV	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	DAV	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	DAV	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	HUN	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	HUN	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

2	HUN	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	LOU	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	LOU	PASSENGER	\$0	\$1,484	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	LOU	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	MEM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	MEM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$11	\$0	\$0
2	MEM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	NAS	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	NAS	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	NAS	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	PAD	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	PAD	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	PAD	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	PIT	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	PIT	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	PIT	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	SLM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	SLM	PASSENGER	\$0	\$7	\$0	\$14	\$0	\$0	\$0	\$0	\$0	\$0
2	SLM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	STP	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	STP	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	STP	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	BAL	FREIGHTER	\$1,765	\$3,088	\$0	\$0	\$0	\$0	\$441	\$0	\$0	\$0

5	BAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	BAL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	HMR	FREIGHTER	\$66,031	\$73,368	\$0	\$117,389	\$0	\$51,358	\$22,010	\$14,674	\$0
5	HMR	PASSENGER	\$0	\$7,577	\$0	\$2,165	\$0	\$4,330	\$0	\$2,165	\$0
5	HMR	TANKER	\$15,530	\$12,079	\$0	\$10,353	\$0	\$17,256	\$1,726	\$0	\$0
5	PHI	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	PHI	PASSENGER	\$0	\$787	\$0	\$262	\$0	\$262	\$0	\$0	\$0
5	PHI	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	WNC	FREIGHTER	\$62,308	\$103,846	\$0	\$20,769	\$0	\$0	\$0	\$0	\$0
5	WNC	PASSENGER	\$0	\$9,691	\$0	\$1,077	\$0	\$3,769	\$1,077	\$1,615	\$0
5	WNC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	CHA	FREIGHTER	\$1,265	\$2,530	\$0	\$2,530	\$0	\$1,265	\$0	\$0	\$0
7	CHA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	CHA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	JAC	FREIGHTER	\$29,779	\$65,515	\$0	\$89,338	\$0	\$5,956	\$5,956	\$11,912	\$0
7	JAC	PASSENGER	\$1,553	\$3,105	\$0	\$1,553	\$0	\$0	\$0	\$776	\$0
7	JAC	TANKER	\$6,984	\$6,984	\$0	\$4,656	\$0	\$4,656	\$0	\$0	\$0
7	MIA	FREIGHTER	\$38,897	\$194,483	\$0	\$38,897	\$0	\$77,793	\$0	\$0	\$0
7	MIA	PASSENGER	\$54	\$218	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	MIA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SAV	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SAV	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$595	\$595	\$0	\$0
7	SAV	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

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8	NEW	PASSENGER	\$0	\$177	\$0	\$35	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	NEW	FREIGHTER	\$209,247	\$441,743	\$0	\$1,046,233	\$0	\$0	\$0	\$0	\$0	\$23,250	\$0
8	MOR	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOR	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOB	TANKER	\$14,529	\$38,743	\$0	\$21,793	\$0	\$0	\$2,421	\$0	\$0	\$0	\$0
8	MOB	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOB	FREIGHTER	\$57,274	\$80,183	\$0	\$68,729	\$0	\$0	\$11,455	\$0	\$0	\$22,910	\$0
8	HOU	TANKER	\$240,883	\$481,767	\$0	\$240,883	\$0	\$0	\$0	\$0	\$0	\$120,442	\$0
8	HOU	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	HOU	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	GAL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	GAL	PASSENGER	\$0	\$1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	GAL	FREIGHTER	\$37,090	\$51,927	\$0	\$170,616	\$0	\$0	\$22,254	\$0	\$0	\$14,836	\$0
8	COR	TANKER	\$14,813	\$37,032	\$0	\$22,219	\$0	\$0	\$0	\$0	\$0	\$14,813	\$0
8	COR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	COR	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	TAM	TANKER	\$20,692	\$15,519	\$0	\$25,865	\$0	\$0	\$2,586	\$2,586	\$5,173	\$0	\$0
7	TAM	PASSENGER	\$96	\$192	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	TAM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SIP	TANKER	\$100	\$20	\$0	\$120	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SIP	PASSENGER	\$808	\$5,658	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SIP	FREIGHTER	\$0	\$429	\$0	\$0	\$0	\$0	\$143	\$0	\$0	\$0	\$0

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8	NEW	TANKER	\$9,667	\$14,500	\$0	\$38,667	\$0	\$0	\$0	\$0
8	PAT	FREIGHTER	\$11,522	\$40,326	\$0	\$40,326	\$0	\$0	\$17,283	\$0
8	PAT	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PAT	TANKER	\$1,575	\$1,890	\$0	\$1,890	\$0	\$0	\$0	\$315
9	BUF	FREIGHTER	\$5,170	\$67,215	\$0	\$20,682	\$0	\$20,682	\$0	\$31,023
9	BUF	PASSENGER	\$0	\$76	\$0	\$0	\$0	\$0	\$0	\$0
9	BUF	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CHI	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CHI	PASSENGER	\$3,490	\$3,490	\$0	\$0	\$0	\$0	\$0	\$3,490
9	CHI	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	FREIGHTER	\$309,079	\$772,698	\$0	\$540,888	\$0	\$0	\$154,540	\$0
9	CLE	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	FREIGHTER	\$5,188	\$5,188	\$0	\$0	\$0	\$0	\$0	\$2,594
9	DET	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DUL	FREIGHTER	\$33,188	\$42,670	\$0	\$28,446	\$0	\$18,964	\$0	\$18,964
9	DUL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DUL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MIL	FREIGHTER	\$0	\$69,419	\$0	\$69,419	\$0	\$34,710	\$34,710	\$0
9	MIL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MIL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SIM	FREIGHTER	\$15,000	\$15,000	\$0	\$5,000	\$0	\$5,000	\$0	\$0

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9	SIM	PASSENGER	\$0	\$115	\$0	\$115	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SIM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	FREIGHTER	\$9,349	\$24,930	\$0	\$21,814	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	TOL	FREIGHTER	\$75,738	\$151,475	\$0	\$151,475	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	TOL	PASSENGER	\$0	\$667	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	TOL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	LOS	FREIGHTER	\$40,245	\$68,416	\$0	\$148,906	\$0	\$0	\$20,122	\$0	\$72,441	\$0	\$0
11	LOS	PASSENGER	\$2	\$17	\$0	\$5	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	LOS	TANKER	\$12,788	\$8,526	\$0	\$11,367	\$0	\$0	\$710	\$710	\$2,842	\$0	\$0
11	PAC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	PAC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	PAC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	PASSENGER	\$31	\$31	\$0	\$31	\$0	\$0	\$0	\$0	\$31	\$0	\$0
11	SDC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SFC	FREIGHTER	\$296,581	\$185,363	\$0	\$815,598	\$0	\$0	\$74,145	\$111,218	\$0	\$0	\$0
11	SFC	PASSENGER	\$561	\$561	\$0	\$0	\$0	\$0	\$93	\$374	\$0	\$0	\$0
11	SFC	TANKER	\$16,579	\$1,842	\$0	\$5,526	\$0	\$0	\$0	\$7,368	\$0	\$0	\$0

13	POR	FREIGHTER	\$107,605	\$30,744	\$0	\$46,116	\$0	\$15,372	\$15,372	\$15,372	\$0
13	POR	PASSENGER	\$1,559	\$3,118	\$0	\$0	\$0	\$0	\$0	\$1,559	\$0
13	POR	TANKER	\$29,966	\$53,017	\$0	\$55,323	\$0	\$2,305	\$0	\$13,831	\$0
13	SEA	FREIGHTER	\$413,486	\$454,835	\$0	\$1,323,156	\$0	\$0	\$82,697	\$82,697	\$0
13	SEA	PASSENGER	\$5,067	\$73,475	\$0	\$38,004	\$0	\$15,202	\$7,601	\$2,534	\$0
13	SEA	TANKER	\$1,977	\$3,295	\$0	\$11,864	\$0	\$659	\$0	\$0	\$0
13	TAC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	TAC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	TAC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	HON	FREIGHTER	\$804	\$2,413	\$0	\$10,457	\$0	\$0	\$0	\$1,207	\$0
14	HON	PASSENGER	\$8,441	\$63,307	\$0	\$25,323	\$0	\$8,441	\$4,220	\$0	\$0
14	HON	TANKER	\$111,357	\$131,604	\$0	\$263,208	\$0	\$60,740	\$30,370	\$121,481	\$0
17	ANC	FREIGHTER	\$12,245	\$4,082	\$0	\$4,082	\$0	\$0	\$0	\$0	\$0
17	ANC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$30	\$0	\$0
17	ANC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	JUN	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	JUN	PASSENGER	\$54	\$269	\$0	\$0	\$0	\$162	\$0	\$0	\$0
17	JUN	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	VAL	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	VAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

17	VAL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
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Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution

Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
1	BOS	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	BOS	PASSENGER	0.01	0.04	0.00	0.05	0.00	0.00	0.00	0.00	0.00
1	BOS	TANKER	0.05	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	NYC	FREIGHTER	80.72	87.44	0.00	282.51	0.00	33.63	13.45	13.45	0.00
1	NYC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	NYC	TANKER	12.39	14.87	0.00	37.17	0.00	2.48	1.24	3.72	0.00
1	POM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	POM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	POM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	PRO	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	PRO	PASSENGER	0.14	0.29	0.00	0.14	0.00	0.00	0.00	0.00	0.00
1	PRO	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	DAV	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	DAV	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	DAV	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	HUN	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	HUN	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
2	HUN	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	LOU	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	LOU	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	LOU	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	MEM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	MEM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	MEM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	NAS	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	NAS	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	NAS	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	PAD	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	PAD	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	PAD	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	PIT	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	PIT	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	PIT	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	SLM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	SLM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	SLM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifeseaving
2	STP	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	STP	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	STP	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	BAL	FREIGHTER	1.37	2.39	0.00	0.00	0.00	0.34	0.00	0.00	0.00
5	BAL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	BAL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	HMR	FREIGHTER	197.50	219.44	0.00	351.11	0.00	153.61	65.83	43.89	0.00
5	HMR	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	HMR	TANKER	14.93	11.61	0.00	9.95	0.00	16.59	1.66	0.00	0.00
5	PHI	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	PHI	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	PHI	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	WNC	FREIGHTER	0.23	0.38	0.00	0.08	0.00	0.00	0.00	0.00	0.00
5	WNC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	WNC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	CHA	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	CHA	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	CHA	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	JAC	FREIGHTER	10.29	22.65	0.00	30.88	0.00	2.06	2.06	4.12	0.00

Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	
7	JAC	PASSENGER	1.32	2.63	0.00	1.32	0.00	0.00	0.00	0.66	0.00	
7	JAC	TANKER	16.31	16.31	0.00	10.88	0.00	10.88	0.00	0.00	0.00	
7	MIA	FREIGHTER	1.38	6.90	0.00	1.38	0.00	2.76	0.00	0.00	0.00	
7	MIA	PASSENGER	0.08	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	MIA	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SAV	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SAV	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SAV	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SJP	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SJP	PASSENGER	0.46	3.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	SJP	TANKER	85.20	17.04	0.00	102.24	0.00	0.00	0.00	0.00	0.00	
7	TAM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	TAM	PASSENGER	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7	TAM	TANKER	217.73	163.30	0.00	272.16	0.00	27.22	27.22	54.43	0.00	
8	COR	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8	COR	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8	COR	TANKER	54.40	136.00	0.00	81.60	0.00	0.00	0.00	54.40	0.00	
8	GAL	FREIGHTER	27.93	39.11	0.00	128.50	0.00	16.76	0.00	11.17	0.00	
8	GAL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution											
Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
8	GAL	TANKER	1.75	1.75	0.00	0.88	0.00	0.88	0.00	0.88	0.00
8	HOU	FREIGHTER	1230.58	1538.22	0.00	4614.67	0.00	0.00	0.00	0.00	0.00
8	HOU	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	HOU	TANKER	42.53	85.07	0.00	42.53	0.00	0.00	0.00	21.27	0.00
8	MOB	FREIGHTER	16.55	23.17	0.00	19.86	0.00	3.31	0.00	6.62	0.00
8	MOB	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	MOB	TANKER	22.57	60.19	0.00	33.86	0.00	3.76	0.00	0.00	0.00
8	MOR	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	MOR	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	MOR	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	NEW	FREIGHTER	10.49	22.14	0.00	52.44	0.00	0.00	0.00	1.17	0.00
8	NEW	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	NEW	TANKER	1.40	2.10	0.00	5.60	0.00	0.00	0.00	0.00	0.00
8	PAT	FREIGHTER	3.23	11.32	0.00	11.32	0.00	0.00	4.85	0.00	0.00
8	PAT	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	PAT	TANKER	2.97	3.56	0.00	3.56	0.00	0.00	0.00	0.59	0.00
9	BUF	FREIGHTER	32.89	427.63	0.00	131.58	0.00	131.58	0.00	197.37	0.00
9	BUF	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	BUF	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
9	CHI	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	CHI	PASSENGER	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.05	0.00
9	CHI	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	CLE	FREIGHTER	59.05	147.62	0.00	103.33	0.00	0.00	29.52	0.00	0.00
9	CLE	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	CLE	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	DET	FREIGHTER	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.13	0.00
9	DET	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	DET	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	DUL	FREIGHTER	0.88	1.13	0.00	0.75	0.00	0.50	0.00	0.50	0.00
9	DUL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	DUL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	MIL	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	MIL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	MIL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	SIM	FREIGHTER	4.42	4.42	0.00	1.47	0.00	1.47	0.00	0.00	0.00
9	SIM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	SIM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	SSM	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	
9	SSM	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
9	SSM	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
9	STB	FREIGHTER	0.49	1.30	0.00	1.14	0.00	0.00	0.00	0.00	0.00	
9	STB	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
9	STB	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
9	TOL	FREIGHTER	16.67	33.33	0.00	33.33	0.00	8.33	0.00	0.00	0.00	
9	TOL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
9	TOL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	LOS	FREIGHTER	6.83	11.61	0.00	25.26	0.00	3.41	0.00	12.29	0.00	
11	LOS	PASSENGER	0.06	0.40	0.00	0.12	0.00	0.00	0.00	0.00	0.00	
11	LOS	TANKER	46.67	31.12	0.00	41.49	0.00	2.59	2.59	10.37	0.00	
11	PAC	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
11	PAC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
11	PAC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
11	SDC	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
11	SDC	PASSENGER	0.11	0.11	0.00	0.11	0.00	0.00	0.00	0.11	0.00	
11	SDC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
11	SFC	FREIGHTER	31.43	19.64	0.00	86.43	0.00	0.00	7.86	11.79	0.00	
11	SFC	PASSENGER	1.20	1.20	0.00	0.00	0.00	0.20	0.00	0.80	0.00	

Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution

Bin			Level III Intervention Strategy Importance								
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
11	SFC	TANKER	465.18	51.69	0.00	155.06	0.00	0.00	0.00	206.75	0.00
13	POR	FREIGHTER	7.49	2.14	0.00	3.21	0.00	1.07	1.07	1.07	0.00
13	POR	PASSENGER	0.29	0.59	0.00	0.00	0.00	0.00	0.00	0.29	0.00
13	POR	TANKER	7.52	13.30	0.00	13.88	0.00	0.58	0.00	3.47	0.00
13	SEA	FREIGHTER	19.82	21.80	0.00	63.42	0.00	0.00	3.96	3.96	0.00
13	SEA	PASSENGER	0.02	0.22	0.00	0.11	0.00	0.05	0.02	0.01	0.00
13	SEA	TANKER	5.00	8.33	0.00	30.00	0.00	1.67	0.00	0.00	0.00
13	TAC	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	TAC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	TAC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	GUA	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	GUA	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	GUA	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	HON	FREIGHTER	374.32	1122.97	0.00	4866.21	0.00	0.00	0.00	561.49	0.00
14	HON	PASSENGER	8.24	61.84	0.00	24.73	0.00	8.24	4.12	0.00	0.00
14	HON	TANKER	182.39	215.55	0.00	431.10	0.00	99.48	49.74	198.97	0.00
17	ANC	FREIGHTER	0.31	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00
17	ANC	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	ANC	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.3.9 Risk-Based Rankings - U.S. Flag, MSO, Casualty Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	
17	JUN	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	JUN	PASSENGER	0.32	1.60	0.00	0.00	0.00	0.96	0.00	0.00	0.00	
17	JUN	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	VAL	FREIGHTER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	VAL	PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	VAL	TANKER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

A.4 Foreign Flag Marine Safety Office Level Risk-Based Ranking Results

Bin data used in the risk-based ranking for district level data aggregation are shown in Table A.4.1. The risk-based ranking results are shown in Tables A.4.2 through A.4.9 as follows:

Table A.4.2 - Foreign Flag, MSO, Relative Frequency, Deaths,

Table A.4.3 - Foreign Flag, MSO, Relative Frequency, Injuries,

Table A.4.4 - Foreign Flag, MSO, Relative Frequency, Property Loss,

Table A.4.5 - Foreign Flag, MSO, Relative Frequency, Pollution,

Table A.4.6 - Foreign Flag, MSO, Casualty Frequency, Deaths,

Table A.4.7 - Foreign Flag, MSO, Casualty Frequency, Injuries,

Table A.4.8 - Foreign Flag, MSO, Casualty Frequency, Property Loss,

Table A.4.9 - Foreign Flag, MSO, Casualty Frequency, Pollution.

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag											
Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
1	BOS	FREIGHTER	125	15	0.0116	0.12000	0.0291	0	0	\$951,000	0
1	BOS	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
1	BOS	TANKER	69	12	0.0093	0.17391	0.0456	1	0	\$3,500	331
1	LIS	FREIGHTER	160	8	0.0062	0.05000	0.0172	0	1	\$100	8
1	LIS	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
1	LIS	TANKER	34	6	0.0046	0.17647	0.0654	0	0	\$60,000	63
1	NYC	FREIGHTER	751	53	0.0409	0.07057	0.0093	0	2	\$620,730	736
1	NYC	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
1	NYC	TANKER	272	44	0.0340	0.16176	0.0223	0	1	\$100,000	1117
1	POM	FREIGHTER	85	5	0.0039	0.05882	0.0255	0	0	\$170,000	0
1	POM	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
1	POM	TANKER	53	7	0.0054	0.13208	0.0465	0	0	\$68,000	99047
1	PRO	FREIGHTER	128	12	0.0093	0.09375	0.0258	0	1	\$30,500	83

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
1	PRO	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
1	PRO	TANKER	46	5	0.0039	0.10870	0.0459	0	0	\$0	284
2	ALL MSOs	FREIGHTER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	ALL MSOs	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
2	ALL MSOs	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
5	BAL	FREIGHTER	527	28	0.0216	0.05313	0.0098	0	2	\$590,954	5041
5	BAL	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
5	BAL	TANKER	48	12	0.0093	0.25000	0.0625	0	0	\$25	227
5	HMR	FREIGHTER	751	32	0.0247	0.04261	0.0074	1	1	\$40,100	929
5	HMR	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
5	HMR	TANKER	134	17	0.0131	0.12687	0.0288	0	0	\$0	14005
5	PHI	FREIGHTER	1127	37	0.0286	0.03283	0.0053	1	0	\$1,542,500	912

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag												
District	MSO	Bin		inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Standard Deviation	Consequences			
		Service	PASSENGER						Deaths	injuries	property	pollution
5	PHI			0	0	0.0000	NOINSPE CTIONS	NOINSPE CTIONS	0	0	\$0	0
5	PHI	TANKER		170	26	0.0201	0.15294	0.0276	0	2	\$115,085	713
5	WNC	FREIGHTER		190	12	0.0093	0.06316	0.0176	0	1	\$60,000	553
5	WNC	PASSENGER		2	0	0.0000	0.00000	0.0000	0	0	\$0	0
5	WNC	TANKER		21	12	0.0093	0.57143	0.1080	1	0	\$150,001	6
7	CHA	FREIGHTER		244	15	0.0116	0.06148	0.0154	0	0	\$0	1594
7	CHA	PASSENGER		1	0	0.0000	0.00000	0.0000	0	0	\$0	0
7	CHA	TANKER		3	0	0.0000	0.00000	0.0000	0	0	\$0	0
7	JAC	FREIGHTER		316	14	0.0108	0.04430	0.0116	0	0	\$202,025	168
7	JAC	PASSENGER		1	0	0.0000	0.00000	0.0000	0	0	\$0	0
7	JAC	TANKER		15	7	0.0054	0.46667	0.1288	0	1	\$0	689
7	MIA	FREIGHTER		735	72	0.0556	0.09796	0.0110	2	0	\$1,071,500	150650
7	MIA	PASSENGER		15	15	0.0116	1.00000	0.0000	0	4	\$10,000	290
7	MIA	TANKER		6	2	0.0015	0.33333	0.1925	0	0	\$0	11
7	PTC	FREIGHTER		17	1	0.0008	0.05882	0.0571	0	0	\$0	0

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
7	PTC	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
7	PTC	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
7	SAV	FREIGHTER	527	37	0.0286	0.07021	0.0111	0	0	\$21,600	1147
7	SAV	PASSENGER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
7	SAV	TANKER	13	3	0.0023	0.23077	0.1169	0	0	\$50,000	100
7	SJP	FREIGHTER	615	22	0.0170	0.03577	0.0075	0	0	\$3,330,100	181
7	SJP	PASSENGER	40	13	0.0100	0.32500	0.0741	0	0	\$10,000	5
7	SJP	TANKER	184	30	0.0232	0.16304	0.0272	0	0	\$10,000	3011
7	STC	FREIGHTER	48	5	0.0039	0.10417	0.0441	0	0	\$0	3
7	STC	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
7	STC	TANKER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
7	STT	FREIGHTER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
7	STT	PASSENGER	1	1	0.0008	1.00000	0.0000	0	0	\$0	0

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
7	STT	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
7	TAM	FREIGHTER	444	19	0.0147	0.04279	0.0096	0	1	\$27,000	594
7	TAM	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
7	TAM	TANKER	11	5	0.0039	0.45455	0.1501	0	0	\$300	243
8	BAT	FREIGHTER	239	22	0.0170	0.09205	0.0187	0	1	\$35,000	2117
8	BAT	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	BAT	TANKER	6	0	0.0000	0.00000	0.0000	0	0	\$0	0
8	BRN	FREIGHTER	28	2	0.0015	0.07143	0.0487	0	0	\$0	1
8	BRN	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	BRN	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	COR	FREIGHTER	390	32	0.0247	0.08205	0.0139	0	1	\$515,000	1273
8	COR	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	COR	TANKER	183	28	0.0216	0.15301	0.0266	0	0	\$207,500	21502

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
8	GAL	FREIGHTER	331	11	0.0085	0.03323	0.0099	0	0	\$268,348	680
8	GAL	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	GAL	TANKER	127	28	0.0216	0.22047	0.0368	0	1	\$85,425	3967
8	HOU	FREIGHTER	1068	67	0.0517	0.06273	0.0074	0	2	\$1,770,751	252971
8	HOU	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	HOU	TANKER	8	2	0.0015	0.25000	0.1531	0	0	\$0	5
8	LKC	FREIGHTER	84	7	0.0054	0.08333	0.0302	0	0	\$143,500	16
8	LKC	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	LKC	TANKER	2	0	0.0000	0.00000	0.0000	0	0	\$0	0
8	MOB	FREIGHTER	516	37	0.0286	0.07171	0.0114	1	1	\$10,765	1717
8	MOB	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	MOB	TANKER	35	9	0.0069	0.25714	0.0739	0	0	\$230,000	2103
8	MOR	FREIGHTER	4	0	0.0000	0.00000	0.0000	0	0	\$0	0

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
8	MOR	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	MOR	TANKER	229	11	0.0085	0.04803	0.0141	0	0	\$11,000	10
8	NEW	FREIGHTER	2412	51	0.0394	0.02114	0.0029	1	2	\$2,780,625	589
8	NEW	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	NEW	TANKER	215	33	0.0255	0.15349	0.0246	1	0	\$530,520	1594
8	PAT	FREIGHTER	256	14	0.0108	0.05469	0.0142	0	0	\$55,100	904
8	PAT	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	PAT	TANKER	148	23	0.0178	0.15541	0.0298	0	8	\$260,489	12036
8	PCD	FREIGHTER	8	0	0.0000	0.00000	0.0000	0	0	\$0	0
8	PCD	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	PCD	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	PLA	FREIGHTER	41	0	0.0000	0.00000	0.0000	0	0	\$0	0

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
8	PLA	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
8	PLA	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	BUF	FREIGHTER	20	1	0.0008	0.05000	0.0487	0	0	\$20,000	0
9	BUF	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	BUF	TANKER	11	0	0.0000	0.00000	0.0000	0	0	\$0	0
9	CHI	FREIGHTER	40	1	0.0008	0.02500	0.0247	0	0	\$25,000	0
9	CHI	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	CHI	TANKER	4	0	0.0000	0.00000	0.0000	0	0	\$0	0
9	CLE	FREIGHTER	58	4	0.0031	0.06897	0.0333	0	1	\$0	0
9	CLE	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	CLE	TANKER	5	3	0.0023	0.60000	0.2191	0	0	\$250,000	0
9	DET	FREIGHTER	59	3	0.0023	0.05085	0.0286	0	0	\$0	0
9	DET	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
9	DET	TANKER	4	0	0.0000	0.00000	0.0000	0	0	\$0	0
9	DUL	FREIGHTER	129	23	0.0178	0.17829	0.0337	1	0	\$554,100	122
9	DUL	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	DUL	TANKER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
9	MAS	FREIGHTER	77	6	0.0046	0.07792	0.0305	0	0	\$0	2
9	MAS	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	MAS	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	MIL	FREIGHTER	28	1	0.0008	0.03571	0.0351	0	0	\$150,175	0
9	MIL	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	MIL	TANKER	3	0	0.0000	0.00000	0.0000	0	0	\$0	0
9	SIM	FREIGHTER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	SIM	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
9	SIM	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	SSM	FREIGHTER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	SSM	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	SSM	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	STB	FREIGHTER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	STB	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	STB	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	TOL	FREIGHTER	114	14	0.0108	0.12281	0.0307	0	0	\$991,150	25
9	TOL	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
9	TOL	TANKER	3	0	0.0000	0.00000	0.0000	0	0	\$0	0
11	CON	FREIGHTER	91	8	0.0062	0.08791	0.0297	0	1	\$0	6551

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
11	CON	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
11	CON	TANKER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
11	LOS	FREIGHTER	1622	47	0.0363	0.02898	0.0042	0	3	\$7,177,673	1011
11	LOS	PASSENGER	2	1	0.0008	0.50000	0.3536	0	0	\$0	0
11	LOS	TANKER	143	11	0.0085	0.07692	0.0223	0	0	\$50,000	211
11	SBC	FREIGHTER	19	0	0.0000	0.00000	0.0000	0	0	\$0	0
11	SBC	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
11	SBC	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
11	SDC	FREIGHTER	43	1	0.0008	0.02326	0.0230	0	0	\$0	0
11	SDC	PASSENGER	11	4	0.0031	0.36364	0.1450	0	0	\$0	2
11	SDC	TANKER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
11	SFC	FREIGHTER	498	27	0.0208	0.05422	0.0101	0	0	\$292,296	1136
11	SFC	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
11	SFC	TANKER	50	6	0.0046	0.12000	0.0460	0	0	\$250,000	128
13	GRA	FREIGHTER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
13	GRA	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
13	GRA	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
13	POR	FREIGHTER	1379	56	0.0432	0.04061	0.0053	2	1	\$273,550	6624
13	POR	PASSENGER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
13	POR	TANKER	47	4	0.0031	0.08511	0.0407	0	1	\$0	42
13	SEA	FREIGHTER	812	26	0.0201	0.03202	0.0062	0	1	\$81,050	1292
13	SEA	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
13	SEA	TANKER	14	3	0.0023	0.21429	0.1097	0	0	\$10,100	15
14	ASO	FREIGHTER	11	0	0.0000	0.00000	0.0000	0	0	\$0	0
14	ASO	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
14	ASO	TANKER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
14	GUA	FREIGHTER	99	2	0.0015	0.02020	0.0141	0	0	\$0	175

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
14	GUA	PASSENGER	3	0	0.0000	0.00000	0.0000	0	0	\$0	0
14	GUA	TANKER	67	1	0.0008	0.01493	0.0148	0	0	\$30,000	0
14	HON	FREIGHTER	367	9	0.0069	0.02452	0.0081	0	0	\$0	292
Bad Data 14	HON	PASSENGER	19	28	0.0216	Bad Data	Bad Data	1	24	\$13,000,000	3
14	HON	TANKER	144	12	0.0093	0.08333	0.0230	0	0	\$208,000	11
17	ANC	FREIGHTER	36	3	0.0023	0.08333	0.0461	0	0	\$150,000	0
17	ANC	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	ANC	TANKER	21	0	0.0000	0.00000	0.0000	0	0	\$0	0
17	DHA	FREIGHTER	59	1	0.0008	0.01695	0.0168	0	0	\$0	11
17	DHA	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	DHA	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	JUN	FREIGHTER	110	5	0.0039	0.04545	0.0199	0	0	\$7,700	50
17	JUN	PASSENGER	2	0	0.0000	0.00000	0.0000	0	0	\$0	0

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
17	JUN	TANKER	3	1	0.0008	0.33333	0.2722	0	1	\$0	0
17	KEN	FREIGHTER	29	0	0.0000	0.00000	0.0000	0	0	\$0	0
17	KEN	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	KEN	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	KET	FREIGHTER	38	2	0.0015	0.05263	0.0362	0	0	\$0	50
17	KET	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	KET	TANKER	1	0	0.0000	0.00000	0.0000	0	0	\$0	0
17	KOD	FREIGHTER	3	0	0.0000	0.00000	0.0000	0	0	\$0	0
17	KOD	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	KOD	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	SIT	FREIGHTER	3	0	0.0000	0.00000	0.0000	0	0	\$0	0
17	SIT	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0

Table A.4.1 Risk-Based Ranking Bin Data Summary - Marine Safety Offices, Foreign Flag

Bin			inspections	casualties	Relative Freq.	Casualty Freq.	Casualty Freq. Standard Deviation	Consequences			
District	MSO	Service						Deaths	injuries	property	pollution
17	SIT	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	VAL	FREIGHTER	3	0	0.0000	0.00000	0.0000	0	0	\$0	0
17	VAL	PASSENGER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
17	VAL	TANKER	0	0	0.0000	NOINSPECTIONS	NOINSPECTIONS	0	0	\$0	0
			20572	1295	1.0000			13	66	\$39,659,837	601979

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	BOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	ALL MSOs	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	ALL MSOs	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
2	ALL MSOs	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	FREIGHTER	0.0093	0.0093	0.0000	0.0015	0.0000	0.0008	0.0000	0.0008	0.0000	0.0008
5	HMR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	FREIGHTER	0.0124	0.0100	0.0000	0.0008	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000
5	PHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	TANKER	0.0023	0.0062	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	MIA	FREIGHTER	0.0633	0.0247	0.0000	0.0015	0.0000	0.0000	0.0000	0.0077	0.0000	0.0015
7	MIA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PTC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PTC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PTC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SIP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SIP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SIP	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	TAM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	RRN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	LKC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	LKC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
8	LKC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	FREIGHTER	0.0100	0.0077	0.0000	0.0023	0.0000	0.0008	0.0000	0.0015	0.0000	0.0008
8	MOB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	FREIGHTER	0.0085	0.0147	0.0000	0.0039	0.0000	0.0046	0.0000	0.0000	0.0000	0.0023
8	NEW	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	TANKER	0.0069	0.0069	0.0000	0.0015	0.0000	0.0000	0.0023	0.0008	0.0000	0.0015
8	PAT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PCD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PCD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PCD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PLA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PLA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PLA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	BUF	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	FREIGHTER	0.0039	0.0054	0.0000	0.0023	0.0000	0.0000	0.0008	0.0008	0.0000	0.0000
9	DUL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MAS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MAS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MAS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Details

Bin												Level III Intervention Strategy Importance											
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	9	MIL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	SIM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	SIM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	SIM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	SSM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	STB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	STB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	TOL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	TOL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	11	CON	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	11	CON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	11	LOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	11	LOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
11	LOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SBC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SBC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SBC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	GRA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	GRA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	GRA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	FREIGHTER	0.0247	0.0185	0.0000	0.0062	0.0000	0.0046	0.0015	0.0015	0.0000	0.0062
13	POR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
14	ASO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ASO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ASO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bad Data 14	HON	PASSENGER	0.0031	0.0023	0.0000	0.0162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.2 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poli.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
17	KEN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KEN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KEN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
1	BOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	FREIGHTER	0.0023	0.0031	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	FREIGHTER	0.0324	0.0247	0.0000	0.0031	0.0000	0.0031	0.0046	0.0015	0.0000	0.0015
1	NYC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	TANKER	0.0154	0.0069	0.0000	0.0008	0.0000	0.0023	0.0000	0.0000	0.0000	0.0000
1	POM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	FREIGHTER	0.0031	0.0046	0.0000	0.0008	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000
1	PRO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	ALL MSOs	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	ALL MSOs	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	ALL MSOs	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
5	BAL	FREIGHTER	0.0124	0.0185	0.0000	0.0031	0.0000	0.0015	0.0000	0.0015	0.0000	0.0000
5	BAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	FREIGHTER	0.0093	0.0093	0.0000	0.0015	0.0000	0.0008	0.0000	0.0008	0.0000	0.0008
5	HMR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	TANKER	0.0170	0.0046	0.0000	0.0031	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031
5	WNC	FREIGHTER	0.0031	0.0023	0.0000	0.0008	0.0000	0.0008	0.0000	0.0000	0.0000	0.0008
5	WNC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	TANKER	0.0031	0.0008	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
7	MIA	PASSENGER	0.0185	0.0000	0.0000	0.0093	0.0000	0.0000	0.0031	0.0000	0.0000	0.0000
7	MIA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PTC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PTC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PTC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	FREIGHTER	0.0085	0.0054	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
7	TAM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	FREIGHTER	0.0039	0.0054	0.0000	0.0008	0.0000	0.0015	0.0000	0.0000	0.0000	0.0008
8	BAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	FREIGHTER	0.0085	0.0077	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	TANKER	0.0077	0.0093	0.0000	0.0015	0.0000	0.0008	0.0015	0.0008	0.0000	0.0000
8	HOU	FREIGHTER	0.0371	0.0448	0.0000	0.0046	0.0000	0.0031	0.0000	0.0031	0.0000	0.0015
8	HOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	LKC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	LKC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	LKC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
8	MOB	FREIGHTER	0.0100	0.0077	0.0000	0.0023	0.0000	0.0008	0.0000	0.0015	0.0000	0.0008
8	MOB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	FREIGHTER	0.0170	0.0293	0.0000	0.0077	0.0000	0.0093	0.0000	0.0000	0.0000	0.0046
8	NEW	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	TANKER	0.0432	0.0494	0.0000	0.0185	0.0000	0.0062	0.0000	0.0124	0.0000	0.0062
8	PCD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PCD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PCD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PLA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PLA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PLA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
9	BUF	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	FREIGHTER	0.0000	0.0008	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MAS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MAS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MAS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
9	MIL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	FREIGHTER	0.0015	0.0031	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	FREIGHTER	0.0278	0.0324	0.0000	0.0093	0.0000	0.0046	0.0000	0.0023	0.0000	0.0046
11	LOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Bin		Level III Intervention Strategy Importance										
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
11	SBC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SBC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SBC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	GRA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	GRA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	GRA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	FREIGHTER	0.0124	0.0093	0.0000	0.0031	0.0000	0.0023	0.0008	0.0008	0.0000	0.0031
13	POR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	TANKER	0.0015	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	FREIGHTER	0.0077	0.0046	0.0000	0.0008	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000
13	SEA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ASO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
14	ASO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ASO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bad Data 14	HON	PASSENGER	0.0741	0.0556	0.0000	0.3892	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	TANKER	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KEN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KEN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.3 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire	Hull	Lifesaving	Other
17	KEN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	BOS	FREIGHTER	\$1,469	\$5,875	\$0	\$0	\$0	\$0	\$0	\$1,469	\$0	\$734
1	BOS	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	BOS	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	LIS	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	LIS	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	LIS	TANKER	\$93	\$185	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	NYC	FREIGHTER	\$10,066	\$7,669	\$0	\$959	\$0	\$959	\$1,438	\$479	\$0	\$479
1	NYC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	NYC	TANKER	\$1,544	\$695	\$0	\$77	\$0	\$232	\$0	\$0	\$0	\$0
1	POM	FREIGHTER	\$131	\$394	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	POM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	POM	TANKER	\$263	\$53	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	PRO	FREIGHTER	\$94	\$141	\$0	\$24	\$0	\$0	\$0	\$24	\$0	\$0
1	PRO	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	PRO	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	ALL MSOs	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	ALL MSOs	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
2	ALL MSOs	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	BAL	FREIGHTER	\$3,651	\$5,476	\$0	\$913	\$0	\$456	\$0	\$456	\$0	\$0
5	BAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	BAL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	HMR	FREIGHTER	\$372	\$372	\$0	\$62	\$0	\$31	\$0	\$31	\$0	\$31
5	HMR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	HMR	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	PHI	FREIGHTER	\$19,058	\$15,485	\$0	\$1,191	\$0	\$0	\$0	\$1,191	\$0	\$0
5	PHI	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	PHI	TANKER	\$978	\$267	\$0	\$178	\$0	\$0	\$0	\$0	\$0	\$178
5	WNC	FREIGHTER	\$185	\$139	\$0	\$46	\$0	\$46	\$0	\$0	\$0	\$46
5	WNC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	WNC	TANKER	\$347	\$927	\$0	\$116	\$0	\$0	\$0	\$0	\$0	\$0
7	CHA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	CHA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	CHA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	JAC	FREIGHTER	\$936	\$156	\$0	\$0	\$0	\$0	\$0	\$156	\$0	\$156
7	JAC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	JAC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifeaving	Other
7	MIA	FREIGHTER	\$33,924	\$13,239	\$0	\$827	\$0	\$0	\$0	\$4,137	\$0	\$827
7	MIA	PASSENGER	\$46	\$0	\$0	\$23	\$0	\$0	\$8	\$0	\$0	\$0
7	MIA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	PTC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	PTC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	PTC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SAV	FREIGHTER	\$284	\$150	\$0	\$0	\$0	\$50	\$17	\$0	\$0	\$17
7	SAV	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SAV	TANKER	\$0	\$116	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SJP	FREIGHTER	\$25,715	\$18,001	\$0	\$0	\$0	\$0	\$2,572	\$0	\$0	\$0
7	SJP	PASSENGER	\$8	\$15	\$0	\$0	\$0	\$8	\$8	\$0	\$0	\$0
7	SJP	TANKER	\$100	\$46	\$0	\$0	\$0	\$0	\$0	\$8	\$0	\$0
7	STC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STT	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STT	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STT	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	TAM	FREIGHTER	\$229	\$146	\$0	\$21	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	TAM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	TAM	TANKER	\$1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BAT	FREIGHTER	\$135	\$189	\$0	\$27	\$0	\$54	\$0	\$0	\$0	\$27
8	BAT	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BAT	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BRN	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BRN	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BRN	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	COR	FREIGHTER	\$4,375	\$3,977	\$0	\$398	\$0	\$0	\$0	\$0	\$0	\$0
8	COR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	COR	TANKER	\$1,442	\$1,282	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$160
8	GAL	FREIGHTER	\$1,036	\$2,901	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	GAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	GAL	TANKER	\$660	\$792	\$0	\$132	\$0	\$66	\$132	\$66	\$0	\$0
8	HOU	FREIGHTER	\$32,817	\$39,654	\$0	\$4,102	\$0	\$2,735	\$0	\$2,735	\$0	\$1,367
8	HOU	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	HOU	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	LKC	FREIGHTER	\$222	\$776	\$0	\$0	\$0	\$111	\$0	\$0	\$0	\$111
8	LKC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss												
Bin										Level III Intervention Strategy Importance		
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
8	LKC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOB	FREIGHTER	\$108	\$83	\$0	\$25	\$0	\$8	\$0	\$17	\$0	\$8
8	MOB	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOB	TANKER	\$355	\$355	\$0	\$178	\$0	\$0	\$0	\$0	\$0	\$0
8	MOR	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOR	TANKER	\$17	\$8	\$0	\$0	\$0	\$0	\$8	\$0	\$0	\$0
8	NEW	FREIGHTER	\$23,619	\$40,797	\$0	\$10,736	\$0	\$12,883	\$0	\$0	\$0	\$6,442
8	NEW	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	NEW	TANKER	\$3,687	\$3,687	\$0	\$819	\$0	\$0	\$1,229	\$410	\$0	\$819
8	PAT	FREIGHTER	\$383	\$85	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$43
8	PAT	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PAT	TANKER	\$1,408	\$1,609	\$0	\$603	\$0	\$201	\$0	\$402	\$0	\$201
8	PCD	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PCD	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PCD	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PLA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PLA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PLA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	BUF	FREIGHTER	\$0	\$15	\$0	\$0	\$0	\$0	\$0	\$15	\$0	\$0
9	BUF	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	BUF	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CHI	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CHI	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CHI	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	TANKER	\$0	\$193	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DUL	FREIGHTER	\$2,139	\$2,995	\$0	\$1,284	\$0	\$0	\$428	\$428	\$0	\$0
9	DUL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DUL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MAS	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MAS	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MAS	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MIL	FREIGHTER	\$0	\$116	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	MIL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MIL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SIM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SIM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SIM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	TOL	FREIGHTER	\$1,531	\$7,654	\$0	\$0	\$0	\$0	\$765	\$765	\$0	\$0
9	TOL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	TOL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	CON	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	CON	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	CON	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	LOS	FREIGHTER	\$66,511	\$77,596	\$0	\$22,170	\$0	\$11,085	\$0	\$5,543	\$0	\$11,085
11	LOS	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
11	LOS	TANKER	\$77	\$154	\$0	\$0	\$0	\$39	\$0	\$0	\$0	\$0
11	SBC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SBC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SBC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SFC	FREIGHTER	\$3,160	\$1,129	\$0	\$451	\$0	\$226	\$226	\$226	\$0	\$0
11	SFC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SFC	TANKER	\$772	\$193	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	GRA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	GRA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	GRA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	POR	FREIGHTER	\$3,380	\$2,535	\$0	\$845	\$0	\$634	\$211	\$211	\$0	\$845
13	POR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	POR	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	SEA	FREIGHTER	\$626	\$376	\$0	\$63	\$0	\$0	\$63	\$0	\$0	\$0
13	SEA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	SEA	TANKER	\$8	\$8	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifeaving	Other
14	ASO	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	ASO	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	ASO	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	HON	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$23	\$0	\$0	\$0
Bad Data 14	HON	PASSENGER	\$40,154	\$30,116	\$0	\$210,811	\$0	\$0	\$0	\$0	\$0	\$0
14	HON	TANKER	\$642	\$161	\$0	\$0	\$0	\$0	\$321	\$0	\$0	\$161
17	ANC	FREIGHTER	\$232	\$0	\$0	\$0	\$0	\$0	\$0	\$232	\$0	\$0
17	ANC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	ANC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	DHA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	DHA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	DHA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	JUN	FREIGHTER	\$12	\$30	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	JUN	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6	\$0	\$0
17	JUN	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.4 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Property Loss

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
17	KEN	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	KEN	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	KEN	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	KET	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	KET	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	KET	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	KOD	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	KOD	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	KOD	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	SIT	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	SIT	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	SIT	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	VAL	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	VAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	VAL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	BOS	FREIGHTER	0	0	0	0	0	0	0	0	0	0
1	BOS	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	BOS	TANKER	0	0	0	0	0	0	0	0	0	0
1	LIS	FREIGHTER	0	0	0	0	0	0	0	0	0	0
1	LIS	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	LIS	TANKER	0	0	0	0	0	0	0	0	0	0
1	NYC	FREIGHTER	12	9	0	1	0	1	2	1	0	1
1	NYC	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	NYC	TANKER	17	8	0	1	0	3	0	0	0	0
1	POM	FREIGHTER	0	0	0	0	0	0	0	0	0	0
1	POM	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	POM	TANKER	382	76	0	0	0	0	0	0	0	0
1	PRO	FREIGHTER	0	0	0	0	0	0	0	0	0	0
1	PRO	PASSENGER	0	0	0	0	0	0	0	0	0	0
1	PRO	TANKER	1	0	0	0	0	0	0	0	0	0
2	ALL MSOs	FREIGHTER	0	0	0	0	0	0	0	0	0	0
2	ALL MSOs	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
2	ALL MSOs	TANKER	0	0	0	0	0	0	0	0	0	0
5	BAL	FREIGHTER	31	47	0	8	0	4	0	4	0	0
5	BAL	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	BAL	TANKER	1	1	0	0	0	0	0	0	0	0
5	HMR	FREIGHTER	9	9	0	1	0	1	0	1	0	1
5	HMR	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	HMR	TANKER	87	43	0	11	0	0	0	0	0	0
5	PHI	FREIGHTER	11	9	0	1	0	0	0	1	0	0
5	PHI	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	PHI	TANKER	6	2	0	1	0	0	0	0	0	1
5	WNC	FREIGHTER	2	1	0	0	0	0	0	0	0	0
5	WNC	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	WNC	TANKER	0	0	0	0	0	0	0	0	0	0
7	CHA	FREIGHTER	15	1	0	0	0	0	0	0	0	0
7	CHA	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	CHA	TANKER	0	0	0	0	0	0	0	0	0	0
7	JAC	FREIGHTER	1	0	0	0	0	0	0	0	0	0
7	JAC	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	JAC	TANKER	2	1	0	1	0	0	0	0	0	0

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	MIA	FREIGHTER	4770	1861	0	116	0	0	0	582	0	116
7	MIA	PASSENGER	1	0	0	1	0	0	0	0	0	0
7	MIA	TANKER	0	0	0	0	0	0	0	0	0	0
7	PTC	FREIGHTER	0	0	0	0	0	0	0	0	0	0
7	PTC	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	PTC	TANKER	0	0	0	0	0	0	0	0	0	0
7	SAV	FREIGHTER	15	8	0	0	0	3	1	0	0	1
7	SAV	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	SAV	TANKER	0	0	0	0	0	0	0	0	0	0
7	SJP	FREIGHTER	1	1	0	0	0	0	0	0	0	0
7	SJP	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	SJP	TANKER	30	14	0	0	0	0	0	2	0	0
7	STC	FREIGHTER	0	0	0	0	0	0	0	0	0	0
7	STC	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	STC	TANKER	0	0	0	0	0	0	0	0	0	0
7	STT	FREIGHTER	0	0	0	0	0	0	0	0	0	0
7	STT	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	STT	TANKER	0	0	0	0	0	0	0	0	0	0
7	TAM	FREIGHTER	5	3	0	0	0	0	0	0	0	0

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution												
Bin												
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	TAM	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	TAM	TANKER	1	0	0	0	0	0	0	0	0	0
8	BAT	FREIGHTER	8	11	0	2	0	3	0	0	0	2
8	BAT	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	BAT	TANKER	0	0	0	0	0	0	0	0	0	0
8	BRN	FREIGHTER	0	0	0	0	0	0	0	0	0	0
8	BRN	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	BRN	TANKER	0	0	0	0	0	0	0	0	0	0
8	COR	FREIGHTER	11	10	0	1	0	0	0	0	0	0
8	COR	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	COR	TANKER	149	133	0	0	0	0	0	0	0	17
8	GAL	FREIGHTER	3	7	0	0	0	0	0	0	0	0
8	GAL	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	GAL	TANKER	31	37	0	6	0	3	6	3	0	0
8	HOU	FREIGHTER	4688	5665	0	586	0	391	0	391	0	195
8	HOU	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	HOU	TANKER	0	0	0	0	0	0	0	0	0	0
8	LKC	FREIGHTER	0	0	0	0	0	0	0	0	0	0
8	LKC	PASSENGER	0	0	0	0	0	0	0	0	0	0

Level III Intervention Strategy Importance

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
8	LKC	TANKER	0	0	0	0	0	0	0	0	0	0
8	MOB	FREIGHTER	17	13	0	4	0	1	0	3	0	1
8	MOB	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	MOB	TANKER	3	3	0	2	0	0	0	0	0	0
8	MOR	FREIGHTER	0	0	0	0	0	0	0	0	0	0
8	MOR	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	MOR	TANKER	0	0	0	0	0	0	0	0	0	0
8	NEW	FREIGHTER	5	9	0	2	0	3	0	0	0	1
8	NEW	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	NEW	TANKER	11	11	0	2	0	0	4	1	0	2
8	PAT	FREIGHTER	6	1	0	0	0	0	0	0	0	1
8	PAT	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	PAT	TANKER	65	74	0	28	0	9	0	19	0	9
8	PCD	FREIGHTER	0	0	0	0	0	0	0	0	0	0
8	PCD	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	PCD	TANKER	0	0	0	0	0	0	0	0	0	0
8	PLA	FREIGHTER	0	0	0	0	0	0	0	0	0	0
8	PLA	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	PLA	TANKER	0	0	0	0	0	0	0	0	0	0

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	BUF	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	BUF	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	BUF	TANKER	0	0	0	0	0	0	0	0	0	0
9	CHI	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	CHI	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	CHI	TANKER	0	0	0	0	0	0	0	0	0	0
9	CLE	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	CLE	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	CLE	TANKER	0	0	0	0	0	0	0	0	0	0
9	DET	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	DET	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	DET	TANKER	0	0	0	0	0	0	0	0	0	0
9	DUL	FREIGHTER	0	1	0	0	0	0	0	0	0	0
9	DUL	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	DUL	TANKER	0	0	0	0	0	0	0	0	0	0
9	MAS	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	MAS	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	MAS	TANKER	0	0	0	0	0	0	0	0	0	0
9	MIL	FREIGHTER	0	0	0	0	0	0	0	0	0	0

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	MIL	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	MIL	TANKER	0	0	0	0	0	0	0	0	0	0
9	SIM	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	SIM	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	SIM	TANKER	0	0	0	0	0	0	0	0	0	0
9	SSM	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	SSM	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	SSM	TANKER	0	0	0	0	0	0	0	0	0	0
9	STB	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	STB	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	STB	TANKER	0	0	0	0	0	0	0	0	0	0
9	TOL	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	TOL	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	TOL	TANKER	0	0	0	0	0	0	0	0	0	0
11	CON	FREIGHTER	10	20	0	5	0	0	0	0	0	0
11	CON	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	CON	TANKER	0	0	0	0	0	0	0	0	0	0
11	LOS	FREIGHTER	9	11	0	3	0	2	0	1	0	2
11	LOS	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
11	LOS	TANKER	0	1	0	0	0	0	0	0	0	0
11	SBC	FREIGHTER	0	0	0	0	0	0	0	0	0	0
11	SBC	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	SBC	TANKER	0	0	0	0	0	0	0	0	0	0
11	SDC	FREIGHTER	0	0	0	0	0	0	0	0	0	0
11	SDC	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	SDC	TANKER	0	0	0	0	0	0	0	0	0	0
11	SFC	FREIGHTER	12	4	0	2	0	1	1	1	0	0
11	SFC	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	SFC	TANKER	0	0	0	0	0	0	0	0	0	0
13	GRA	FREIGHTER	0	0	0	0	0	0	0	0	0	0
13	GRA	PASSENGER	0	0	0	0	0	0	0	0	0	0
13	GRA	TANKER	0	0	0	0	0	0	0	0	0	0
13	POR	FREIGHTER	82	61	0	20	0	15	5	5	0	20
13	POR	PASSENGER	0	0	0	0	0	0	0	0	0	0
13	POR	TANKER	0	0	0	0	0	0	0	0	0	0
13	SEA	FREIGHTER	10	6	0	1	0	0	1	0	0	0
13	SEA	PASSENGER	0	0	0	0	0	0	0	0	0	0
13	SEA	TANKER	0	0	0	0	0	0	0	0	0	0

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution												
Bin												Level III Intervention Strategy Importance
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
14	ASO	FREIGHTER	0	0	0	0	0	0	0	0	0	0
14	ASO	PASSENGER	0	0	0	0	0	0	0	0	0	0
14	ASO	TANKER	0	0	0	0	0	0	0	0	0	0
14	GUA	FREIGHTER	0	0	0	0	0	0	0	0	0	0
14	GUA	PASSENGER	0	0	0	0	0	0	0	0	0	0
14	GUA	TANKER	0	0	0	0	0	0	0	0	0	0
14	HON	FREIGHTER	1	0	0	0	0	0	0	0	0	0
14	HON	PASSENGER	0	0	0	0	0	0	0	0	0	0
14	Bad Data											
14	HON	TANKER	0	0	0	0	0	0	0	0	0	0
17	ANC	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	ANC	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	ANC	TANKER	0	0	0	0	0	0	0	0	0	0
17	DHA	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	DHA	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	DHA	TANKER	0	0	0	0	0	0	0	0	0	0
17	JUN	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	JUN	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	JUN	TANKER	0	0	0	0	0	0	0	0	0	0

Table A.4.5 Risk-Based Rankings - Foreign Flag, MSO, Relative Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
17	KEN	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	KEN	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	KEN	TANKER	0	0	0	0	0	0	0	0	0	0
17	KET	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	KET	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	KET	TANKER	0	0	0	0	0	0	0	0	0	0
17	KOD	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	KOD	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	KOD	TANKER	0	0	0	0	0	0	0	0	0	0
17	SIT	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	SIT	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	SIT	TANKER	0	0	0	0	0	0	0	0	0	0
17	VAL	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	VAL	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	VAL	TANKER	0	0	0	0	0	0	0	0	0	0

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	BOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	ALL MSOs	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	ALL MSOs	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths

Bin		Level III Intervention Strategy Importance										
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
2	ALL MSOs	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	FREIGHTER	0.0160	0.0160	0.0000	0.0027	0.0000	0.0013	0.0000	0.0013	0.0000	0.0013
5	HMR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	FREIGHTER	0.0142	0.0115	0.0000	0.0009	0.0000	0.0000	0.0000	0.0009	0.0000	0.0000
5	PHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	TANKER	0.1429	0.3810	0.0000	0.0476	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

[illegible]

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	TAM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	LKC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	LKC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths													
Bin			Level III Intervention Strategy Importance										
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	
8	LKC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	MOB	FREIGHTER	0.0252	0.0194	0.0000	0.0058	0.0000	0.0019	0.0000	0.0039	0.0000	0.0019	
8	MOB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	MOB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	MOR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	MOR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	MOR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	NEW	FREIGHTER	0.0046	0.0079	0.0000	0.0021	0.0000	0.0025	0.0000	0.0000	0.0000	0.0012	
8	NEW	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	NEW	TANKER	0.0419	0.0419	0.0000	0.0093	0.0000	0.0000	0.0140	0.0047	0.0000	0.0093	
8	PAT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	PAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	PAT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	PCD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	PCD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	PCD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	PLA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	PLA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
8	PLA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	BUF	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	BUF	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CHI	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	CLE	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	FREIGHTER	0.0388	0.0543	0.0000	0.0233	0.0000	0.0000	0.0078	0.0078	0.0000	0.0000
9	DUL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	DUL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MAS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MAS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MAS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	MIL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
11	LOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SBC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SBC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SBC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SDC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	SFC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	GRA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	GRA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	GRA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	FREIGHTER	0.0232	0.0174	0.0000	0.0058	0.0000	0.0044	0.0015	0.0015	0.0000	0.0058
13	POR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	POR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	SEA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
14	ASO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ASO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ASO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	PASSENGER	0.2105	0.1579	0.0000	1.1053	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ANC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ANC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KEN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.6 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Deaths

Bin		Level III Intervention Strategy Importance										
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
17	KEN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KEN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
1	BOS	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	BOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	FREIGHTER	0.0188	0.0250	0.0000	0.0063	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	LIS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	FREIGHTER	0.0559	0.0426	0.0000	0.0053	0.0000	0.0053	0.0080	0.0027	0.0000	0.0027
1	NYC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	NYC	TANKER	0.0735	0.0331	0.0000	0.0037	0.0000	0.0110	0.0000	0.0000	0.0000	0.0000
1	POM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	POM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	FREIGHTER	0.0313	0.0469	0.0000	0.0078	0.0000	0.0000	0.0000	0.0078	0.0000	0.0000
1	PRO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	PRO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	ALL MSOs	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	ALL MSOs	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries

Level III Intervention Strategy Importance										
Bin										
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Other
2	ALL MSOs	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	FREIGHTER	0.0304	0.0455	0.0000	0.0076	0.0000	0.0038	0.0000	0.0000
5	BAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	BAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	FREIGHTER	0.0160	0.0160	0.0000	0.0027	0.0000	0.0013	0.0000	0.0013
5	HMR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	HMR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	PHI	TANKER	0.1294	0.0353	0.0000	0.0235	0.0000	0.0000	0.0000	0.0235
5	WNC	FREIGHTER	0.0211	0.0158	0.0000	0.0053	0.0000	0.0053	0.0000	0.0053
5	WNC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	WNC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	CHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	JAC	TANKER	0.2667	0.0667	0.0000	0.0667	0.0000	0.0000	0.0000	0.0000

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	MIA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	MIA	PASSENGER	1.6000	0.0000	0.0000	0.8000	0.0000	0.0000	0.2667	0.0000	0.0000	0.0000
7	MIA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PTC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PTC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PTC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SAV	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	SJP	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	STT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	FREIGHTER	0.0248	0.0158	0.0000	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	TAM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	TAM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	FREIGHTER	0.0209	0.0293	0.0000	0.0042	0.0000	0.0084	0.0000	0.0000	0.0000	0.0042
8	BAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BAT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	BRN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	FREIGHTER	0.0282	0.0256	0.0000	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	COR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	GAL	TANKER	0.0787	0.0945	0.0000	0.0157	0.0000	0.0079	0.0157	0.0079	0.0000	0.0000
8	HOU	FREIGHTER	0.0449	0.0543	0.0000	0.0056	0.0000	0.0037	0.0000	0.0037	0.0000	0.0019
8	HOU	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	HOU	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	LKC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	LKC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
8	LKC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	FREIGHTER	0.0252	0.0194	0.0000	0.0058	0.0000	0.0019	0.0000	0.0039	0.0000	0.0019
8	MOB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	MOR	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	FREIGHTER	0.0091	0.0158	0.0000	0.0041	0.0000	0.0050	0.0000	0.0000	0.0000	0.0025
8	NEW	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	NEW	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PAT	TANKER	0.3784	0.4324	0.0000	0.1622	0.0000	0.0541	0.0000	0.1081	0.0000	0.0541
8	PCD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PCD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PCD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PLA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PLA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	PLA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

[illegible]

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	MIL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	MIL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SIM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	SSM	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	STB	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	TOL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	FREIGHTER	0.0220	0.0440	0.0000	0.0110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	CON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	LOS	FREIGHTER	0.0222	0.0259	0.0000	0.0074	0.0000	0.0037	0.0000	0.0018	0.0000	0.0037
11	LOS	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries

District	MSO	Bin								Level III Intervention Strategy Importance			
		Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	
11	LOS	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SBC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SBC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SBC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SDC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SDC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SDC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SFC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SFC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
11	SFC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	GRA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	GRA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	GRA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	POR	FREIGHTER	0.0116	0.0087	0.0000	0.0029	0.0000	0.0022	0.0007	0.0007	0.0000	0.0029	
13	POR	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	POR	TANKER	0.0426	0.0000	0.0000	0.0213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	SEA	FREIGHTER	0.0123	0.0074	0.0000	0.0012	0.0000	0.0000	0.0012	0.0000	0.0000	0.0000	
13	SEA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	SEA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries

Bin		Level III Intervention Strategy Importance										
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
14	ASO	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ASO	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ASO	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	GUA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	PASSENGER	5.0526	3.7895	0.0000	26.5263	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	HON	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ANC	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	ANC	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ANC	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	DHA	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	JUN	TANKER	0.0000	0.0000	0.0000	0.3333	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KEN	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.7 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Injuries

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
17	KEN	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KEN	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KET	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	KOD	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	SIT	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	FREIGHTER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	PASSENGER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	VAL	TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage											
Bin											District
MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	
1	BOS	FREIGHTER	\$15,216	\$60,864	\$0	\$0	\$0	\$0	\$15,216	\$0	\$7,608
1	BOS	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	BOS	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	LIS	FREIGHTER	\$2	\$3	\$0	\$1	\$0	\$0	\$0	\$0	\$0
1	LIS	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	LIS	TANKER	\$3,529	\$7,059	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	NYC	FREIGHTER	\$17,357	\$13,225	\$0	\$1,653	\$0	\$1,653	\$2,480	\$827	\$827
1	NYC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	NYC	TANKER	\$7,353	\$3,309	\$0	\$368	\$1,103	\$0	\$0	\$0	\$0
1	POM	FREIGHTER	\$2,000	\$6,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	POM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	POM	TANKER	\$6,415	\$1,283	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	PRO	FREIGHTER	\$953	\$1,430	\$0	\$238	\$0	\$0	\$238	\$0	\$0
1	PRO	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1	PRO	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	ALL MSOs	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	ALL MSOs	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage										Bin		Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Pol.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	2	ALL MSOs	TANKER	\$0	\$0	\$0	\$0	\$0	\$0
5	BAL	FREIGHTER	\$8,971	\$13,456	\$0	\$2,243	\$0	\$1,121	\$0	\$0	\$0	\$0	5	BAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0
5	BAL	TANKER	\$4	\$3	\$0	\$1	\$0	\$0	\$0	\$0	\$0	\$0	5	BAL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0
5	HMR	FREIGHTER	\$641	\$641	\$0	\$107	\$0	\$53	\$0	\$53	\$0	\$53	5	HMR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0
5	HMR	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	5	HMR	TANKER	\$0	\$0	\$0	\$0	\$0	\$0
5	PHI	FREIGHTER	\$21,899	\$17,793	\$0	\$1,369	\$0	\$0	\$0	\$1,369	\$0	\$0	5	PHI	FREIGHTER	\$21,899	\$17,793	\$0	\$0	\$0	\$0
5	PHI	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	5	PHI	TANKER	\$7,447	\$2,031	\$0	\$0	\$0	\$1,354
5	WNC	FREIGHTER	\$1,263	\$947	\$0	\$316	\$0	\$316	\$0	\$0	\$0	\$0	5	WNC	FREIGHTER	\$1,263	\$947	\$0	\$0	\$0	\$316
5	WNC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	5	WNC	TANKER	\$21,429	\$57,143	\$0	\$0	\$0	\$0
7	CHA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	7	CHA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0
7	CHA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	7	CHA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0
7	IAC	FREIGHTER	\$3,836	\$639	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$639	7	IAC	FREIGHTER	\$3,836	\$639	\$0	\$0	\$0	\$639
7	IAC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	7	IAC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0
7	IAC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	7	IAC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	MIA	FREIGHTER	\$59,771	\$23,325	\$0	\$1,458	\$0	\$0	\$0	\$7,289	\$0	\$1,458
7	MIA	PASSENGER	\$4,000	\$0	\$0	\$2,000	\$0	\$0	\$667	\$0	\$0	\$0
7	MIA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	PTC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	PTC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	PTC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SAV	FREIGHTER	\$697	\$369	\$0	\$0	\$0	\$123	\$41	\$0	\$0	\$41
7	SAV	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SAV	TANKER	\$0	\$11,538	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	SJP	FREIGHTER	\$54,148	\$37,904	\$0	\$0	\$0	\$0	\$5,415	\$0	\$0	\$0
7	SJP	PASSENGER	\$250	\$500	\$0	\$0	\$0	\$250	\$250	\$0	\$0	\$0
7	SJP	TANKER	\$707	\$326	\$0	\$0	\$0	\$0	\$0	\$54	\$0	\$0
7	STC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STT	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STT	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	STT	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	TAM	FREIGHTER	\$669	\$426	\$0	\$61	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	TAM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	TAM	TANKER	\$82	\$55	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BAT	FREIGHTER	\$732	\$1,025	\$0	\$146	\$0	\$293	\$0	\$0	\$0	\$146
8	BAT	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BAT	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BRN	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BRN	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	BRN	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	COR	FREIGHTER	\$14,526	\$13,205	\$0	\$1,321	\$0	\$0	\$0	\$0	\$0	\$0
8	COR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	COR	TANKER	\$10,205	\$9,071	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,134
8	GAL	FREIGHTER	\$4,054	\$11,350	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	GAL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	GAL	TANKER	\$6,726	\$8,072	\$0	\$1,345	\$0	\$673	\$1,345	\$673	\$0	\$0
8	HOU	FREIGHTER	\$39,792	\$48,082	\$0	\$4,974	\$0	\$3,316	\$0	\$3,316	\$0	\$1,658
8	HOU	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	HOU	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	LKC	FREIGHTER	\$3,417	\$11,958	\$0	\$0	\$0	\$1,708	\$0	\$0	\$0	\$1,708
8	LKC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
8	LKC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOB	FREIGHTER	\$271	\$209	\$0	\$63	\$0	\$21	\$0	\$42	\$0	\$21
8	MOB	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOB	TANKER	\$13,143	\$13,143	\$0	\$6,571	\$0	\$0	\$0	\$0	\$0	\$0
8	MOR	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	MOR	TANKER	\$96	\$48	\$0	\$0	\$0	\$0	\$48	\$0	\$0	\$0
8	NEW	FREIGHTER	\$12,681	\$21,904	\$0	\$5,764	\$0	\$6,917	\$0	\$0	\$0	\$3,458
8	NEW	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	NEW	TANKER	\$22,208	\$22,208	\$0	\$4,935	\$0	\$0	\$7,403	\$2,468	\$0	\$4,935
8	PAT	FREIGHTER	\$1,937	\$430	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$215
8	PAT	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PAT	TANKER	\$12,320	\$14,080	\$0	\$5,280	\$0	\$1,760	\$0	\$3,520	\$0	\$1,760
8	PCD	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PCD	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PCD	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PLA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PLA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	PLA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	BUF	FREIGHTER	\$0	\$1,000	\$0	\$0	\$0	\$0	\$0	\$1,000	\$0	\$0
9	BUF	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	BUF	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CHI	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CHI	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CHI	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	CLE	TANKER	\$0	\$50,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DET	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DUL	FREIGHTER	\$21,477	\$30,067	\$0	\$12,886	\$0	\$0	\$4,295	\$4,295	\$0	\$0
9	DUL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	DUL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MAS	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MAS	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MAS	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MIL	FREIGHTER	\$0	\$5,363	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	MIL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	MIL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SIM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SIM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SIM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	SSM	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	STB	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	TOL	FREIGHTER	\$17,389	\$86,943	\$0	\$0	\$0	\$0	\$8,694	\$8,694	\$0	\$0
9	TOL	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	TOL	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	CON	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	CON	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	CON	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	LOS	FREIGHTER	\$53,102	\$61,953	\$0	\$17,701	\$0	\$8,850	\$0	\$4,425	\$0	\$8,850
11	LOS	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
11	LOS	TANKER	\$699	\$1,399	\$0	\$0	\$0	\$350	\$0	\$0	\$0	\$0
11	SBC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SBC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SBC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SDC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SFC	FREIGHTER	\$8,217	\$2,935	\$0	\$1,174	\$0	\$587	\$587	\$587	\$0	\$0
11	SFC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	SFC	TANKER	\$20,000	\$5,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	GRA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	GRA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	GRA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	POR	FREIGHTER	\$3,174	\$2,380	\$0	\$793	\$0	\$595	\$198	\$198	\$0	\$793
13	POR	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	POR	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	SEA	FREIGHTER	\$998	\$599	\$0	\$100	\$0	\$0	\$100	\$0	\$0	\$0
13	SEA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	SEA	TANKER	\$721	\$721	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table A.4.8 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Property Damage												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll.	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
14	ASO	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	ASO	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	ASO	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	GUA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$448	\$0	\$0	\$0
14	HON	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bad Data	HON	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	HON	TANKER	\$5,778	\$1,444	\$0	\$0	\$0	\$0	\$2,889	\$0	\$0	\$1,444
17	ANC	FREIGHTER	\$8,333	\$0	\$0	\$0	\$0	\$0	\$0	\$8,333	\$0	\$0
17	ANC	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	ANC	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	DHA	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	DHA	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	DHA	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	JUN	FREIGHTER	\$140	\$350	\$0	\$0	\$0	\$0	\$0	\$70	\$0	\$0
17	JUN	PASSENGER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	JUN	TANKER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	KEN	FREIGHTER	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

[illegible]

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution													
Bin												Level III Intervention Strategy Importance	
District	MSO	Service	Cargo/Pol	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other	
1	BOS	FREIGHTER	0	0	0	0	0	0	0	0	0	0	0
1	BOS	PASSENGER	0	0	0	0	0	0	0	0	0	0	0
1	BOS	TANKER	0	0	0	0	0	0	0	0	0	0	0
1	LIS	FREIGHTER	0	0	0	0	0	0	0	0	0	0	0
1	LIS	PASSENGER	0	0	0	0	0	0	0	0	0	0	0
1	LIS	TANKER	4	7	0	0	0	0	0	0	0	0	0
1	NYC	FREIGHTER	21	16	0	2	0	2	3	1	0	1	1
1	NYC	PASSENGER	0	0	0	0	0	0	0	0	0	0	0
1	NYC	TANKER	82	37	0	4	0	12	0	0	0	0	0
1	POM	FREIGHTER	0	0	0	0	0	0	0	0	0	0	0
1	POM	PASSENGER	0	0	0	0	0	0	0	0	0	0	0
1	POM	TANKER	9344	1869	0	0	0	0	0	0	0	0	0
1	PRO	FREIGHTER	3	4	0	1	0	0	0	1	0	0	0
1	PRO	PASSENGER	0	0	0	0	0	0	0	0	0	0	0
1	PRO	TANKER	19	6	0	0	0	0	0	0	0	0	0
2	ALL MSOs	FREIGHTER	0	0	0	0	0	0	0	0	0	0	0
2	ALL MSOs	PASSENGER	0	0	0	0	0	0	0	0	0	0	0

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
2	ALL MSOs	TANKER	0	0	0	0	0	0	0	0	0	0
5	BAL	FREIGHTER	77	115	0	19	0	10	0	10	0	0
5	BAL	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	BAL	TANKER	33	24	0	5	0	0	0	0	0	0
5	HMR	FREIGHTER	15	15	0	2	0	1	0	1	0	1
5	HMR	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	HMR	TANKER	836	418	0	105	0	0	0	0	0	0
5	PHI	FREIGHTER	13	11	0	1	0	0	0	1	0	0
5	PHI	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	PHI	TANKER	46	13	0	8	0	0	0	0	0	8
5	WNC	FREIGHTER	12	9	0	3	0	3	0	0	0	3
5	WNC	PASSENGER	0	0	0	0	0	0	0	0	0	0
5	WNC	TANKER	1	2	0	0	0	0	0	0	0	0
7	CHA	FREIGHTER	78	7	0	0	0	0	0	0	0	0
7	CHA	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	CHA	TANKER	0	0	0	0	0	0	0	0	0	0
7	JAC	FREIGHTER	3	1	0	0	0	0	0	1	0	1
7	JAC	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	JAC	TANKER	184	46	0	46	0	0	0	0	0	0

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	MIA	FREIGHTER	8404	3279	0	205	0	0	0	1025	0	205
7	MIA	PASSENGER	116	0	0	58	0	0	19	0	0	0
7	MIA	TANKER	4	0	0	0	0	0	0	0	0	0
7	PTC	FREIGHTER	0	0	0	0	0	0	0	0	0	0
7	PTC	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	PTC	TANKER	0	0	0	0	0	0	0	0	0	0
7	SAV	FREIGHTER	37	20	0	0	0	7	2	0	0	2
7	SAV	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	SAV	TANKER	0	23	0	0	0	0	0	0	0	0
7	SJP	FREIGHTER	3	2	0	0	0	0	0	0	0	0
7	SJP	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	SJP	TANKER	213	98	0	0	0	0	0	16	0	0
7	STC	FREIGHTER	0	0	0	0	0	0	0	0	0	0
7	STC	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	STC	TANKER	0	0	0	0	0	0	0	0	0	0
7	STT	FREIGHTER	0	0	0	0	0	0	0	0	0	0
7	STT	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	STT	TANKER	0	0	0	0	0	0	0	0	0	0
7	TAM	FREIGHTER	15	9	0	1	0	0	0	0	0	0

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
7	TAM	PASSENGER	0	0	0	0	0	0	0	0	0	0
7	TAM	TANKER	66	44	0	0	0	0	0	0	0	0
8	BAT	FREIGHTER	44	62	0	9	0	18	0	0	0	9
8	BAT	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	BAT	TANKER	0	0	0	0	0	0	0	0	0	0
8	BRN	FREIGHTER	0	0	0	0	0	0	0	0	0	0
8	BRN	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	BRN	TANKER	0	0	0	0	0	0	0	0	0	0
8	COR	FREIGHTER	36	33	0	3	0	0	0	0	0	0
8	COR	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	COR	TANKER	1057	940	0	0	0	0	0	0	0	117
8	GAL	FREIGHTER	10	29	0	0	0	0	0	0	0	0
8	GAL	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	GAL	TANKER	312	375	0	62	0	31	62	31	0	0
8	HOU	FREIGHTER	5685	6869	0	711	0	474	0	474	0	237
8	HOU	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	HOU	TANKER	1	1	0	0	0	0	0	0	0	0
8	LKC	FREIGHTER	0	1	0	0	0	0	0	0	0	0
8	LKC	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
8	LKC	TANKER	0	0	0	0	0	0	0	0	0	0
8	MOB	FREIGHTER	43	33	0	10	0	3	0	7	0	3
8	MOB	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	MOB	TANKER	120	120	0	60	0	0	0	0	0	0
8	MOR	FREIGHTER	0	0	0	0	0	0	0	0	0	0
8	MOR	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	MOR	TANKER	0	0	0	0	0	0	0	0	0	0
8	NEW	FREIGHTER	3	5	0	1	0	1	0	0	0	1
8	NEW	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	NEW	TANKER	67	67	0	15	0	0	22	7	0	15
8	PAT	FREIGHTER	32	7	0	0	0	0	0	0	0	4
8	PAT	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	PAT	TANKER	569	651	0	244	0	81	0	163	0	81
8	PCD	FREIGHTER	0	0	0	0	0	0	0	0	0	0
8	PCD	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	PCD	TANKER	0	0	0	0	0	0	0	0	0	0
8	PLA	FREIGHTER	0	0	0	0	0	0	0	0	0	0
8	PLA	PASSENGER	0	0	0	0	0	0	0	0	0	0
8	PLA	TANKER	0	0	0	0	0	0	0	0	0	0

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution												
Bin												Level III Intervention Strategy Importance
District	MSO	Service	Cargo/Pol	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	BUF	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	BUF	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	BUF	TANKER	0	0	0	0	0	0	0	0	0	0
9	CHI	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	CHI	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	CHI	TANKER	0	0	0	0	0	0	0	0	0	0
9	CLE	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	CLE	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	CLE	TANKER	0	0	0	0	0	0	0	0	0	0
9	DET	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	DET	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	DET	TANKER	0	0	0	0	0	0	0	0	0	0
9	DUL	FREIGHTER	5	7	0	3	0	0	1	1	1	0
9	DUL	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	DUL	TANKER	0	0	0	0	0	0	0	0	0	0
9	MAS	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	MAS	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	MAS	TANKER	0	0	0	0	0	0	0	0	0	0
9	MIL	FREIGHTER	0	0	0	0	0	0	0	0	0	0

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
9	MIL	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	MIL	TANKER	0	0	0	0	0	0	0	0	0	0
9	SIM	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	SIM	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	SIM	TANKER	0	0	0	0	0	0	0	0	0	0
9	SSM	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	SSM	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	SSM	TANKER	0	0	0	0	0	0	0	0	0	0
9	STB	FREIGHTER	0	0	0	0	0	0	0	0	0	0
9	STB	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	STB	TANKER	0	0	0	0	0	0	0	0	0	0
9	TOL	FREIGHTER	0	2	0	0	0	0	0	0	0	0
9	TOL	PASSENGER	0	0	0	0	0	0	0	0	0	0
9	TOL	TANKER	0	0	0	0	0	0	0	0	0	0
11	CON	FREIGHTER	144	288	0	72	0	0	0	0	0	0
11	CON	PASSENGER	0	0	0	0	0	0	0	0	0	0
11	CON	TANKER	0	0	0	0	0	0	0	0	0	0
11	LOS	FREIGHTER	7	9	0	2	0	0	0	0	0	1
11	LOS	PASSENGER	0	0	0	0	0	0	0	0	0	0

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution											
District	MSO	Bin									
		Service	Cargo/Poll	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving
11	LOS	TANKER	3	6	0	0	0	1	0	0	0
11	SBC	FREIGHTER	0	0	0	0	0	0	0	0	0
11	SBC	PASSENGER	0	0	0	0	0	0	0	0	0
11	SBC	TANKER	0	0	0	0	0	0	0	0	0
11	SDC	FREIGHTER	0	0	0	0	0	0	0	0	0
11	SDC	PASSENGER	0	0	0	0	0	0	0	0	0
11	SDC	TANKER	0	0	0	0	0	0	0	0	0
11	SFC	FREIGHTER	32	11	0	5	0	2	2	2	0
11	SFC	PASSENGER	0	0	0	0	0	0	0	0	0
11	SFC	TANKER	10	3	0	0	0	0	0	0	0
13	GRA	FREIGHTER	0	0	0	0	0	0	0	0	0
13	GRA	PASSENGER	0	0	0	0	0	0	0	0	0
13	GRA	TANKER	0	0	0	0	0	0	0	0	0
13	POR	FREIGHTER	77	58	0	19	0	14	5	5	19
13	POR	PASSENGER	0	0	0	0	0	0	0	0	0
13	POR	TANKER	2	0	0	1	0	0	0	0	0
13	SEA	FREIGHTER	16	10	0	2	0	0	2	0	0
13	SEA	PASSENGER	0	0	0	0	0	0	0	0	0
13	SEA	TANKER	1	1	0	0	0	0	0	0	0

Level III Intervention Strategy Importance

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution												
Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
14	ASO	FREIGHTER	0	0	0	0	0	0	0	0	0	0
14	ASO	PASSENGER	0	0	0	0	0	0	0	0	0	0
14	ASO	TANKER	0	0	0	0	0	0	0	0	0	0
14	GUA	FREIGHTER	5	0	0	0	0	0	0	0	0	0
14	GUA	PASSENGER	0	0	0	0	0	0	0	0	0	0
14	GUA	TANKER	0	0	0	0	0	0	0	0	0	0
14	HON	FREIGHTER	3	2	0	0	0	1	0	0	0	0
Bad Data	HON	PASSENGER	0	0	0	0	0	0	0	0	0	0
14	HON	TANKER	0	0	0	0	0	0	0	0	0	0
17	ANC	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	ANC	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	ANC	TANKER	0	0	0	0	0	0	0	0	0	0
17	DHA	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	DHA	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	DHA	TANKER	0	0	0	0	0	0	0	0	0	0
17	JUN	FREIGHTER	1	2	0	0	0	0	0	0	0	0
17	JUN	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	JUN	TANKER	0	0	0	0	0	0	0	0	0	0
17	KEN	FREIGHTER	0	0	0	0	0	0	0	0	0	0

Table A.4.9 Risk-Based Rankings - Foreign Flag, MSO, Casualty Frequency, Pollution

Bin			Level III Intervention Strategy Importance									
District	MSO	Service	Cargo/Poll	Steering	Documents	Drills	Auxiliary Sys.	Power Plant	Fire Prevention	Hull	Lifesaving	Other
17	KEN	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	KEN	TANKER	0	0	0	0	0	0	0	0	0	0
17	KET	FREIGHTER	1	0	0	0	0	0	0	0	0	0
17	KET	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	KET	TANKER	0	0	0	0	0	0	0	0	0	0
17	KOD	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	KOD	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	KOD	TANKER	0	0	0	0	0	0	0	0	0	0
17	SIT	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	SIT	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	SIT	TANKER	0	0	0	0	0	0	0	0	0	0
17	VAL	FREIGHTER	0	0	0	0	0	0	0	0	0	0
17	VAL	PASSENGER	0	0	0	0	0	0	0	0	0	0
17	VAL	TANKER	0	0	0	0	0	0	0	0	0	0

Appendix B MSMS SYBASE Query Input And Output Files

B.1 Aggregation Of Data For U.S. Flag Deep Draft Vessels

The logic of the binning process illustrated in Figure 3.1 is:

- Maritime Casualty - All CIRT records are queried for the MCCASE number, which is matched against the MCCASE field in the Casualty Vessel Involved Record Table (CIVT) to identify those CIRT records that involve vessels. This allows for each specific vessel involved in a particular casualty report to be identified and counted as a "vessel casualty". All non-vessel records are filtered from further queries at this point.
- Vessel Flag - After the CIRT records have been filtered based on vessel involvement they are then filter for flag against the CIVT and VIDT tables using the VKEY field.
- Casualty Consequence - Four characteristics of maritime vessel casualties have been defined for the purpose of aggregating data. The first characteristic is "Vessel", meaning that the MCCASE number in a particular CIRT record has been matched to one or more MCCASE numbers in CIVT, as discussed above under the Maritime Casualty attribute. This attribute identifies each CIVT record as an individual vessel casualty. Thus, if more than one vessel is involved in a specific casualty logged in a particular CIVT record then each such vessel is counted as an individual vessel casualty. This characteristic leads to the calculation of high level casualty frequency rates that incorporated all vessel casualties regardless of the nature of the consequence. All of the other characteristics represent subsets of the set of all vessel casualties.

The next characteristic is "Pollution", meaning that a vessel casualty occurred that resulted in a pollution incident. This characteristic leads to the calculation of vessel casualty rates based only on vessel casualties that result in pollution incidents. This information is collected by matching the MCCASE number in each CIRT casualty report with the MCCASE numbers in the CIVT and the Casualty Pollution Details Record Table (CPDT) to identify pollution events that correspond to each CIRT casualty report.

The next characteristic is "Death", meaning at least one death occurred as the result of a vessel casualty. This characteristic leads to the calculation of casualty frequencies based on fatalities only, yielding an estimate of "Deaths/Inspection" frequency. This information is collected by matching MCCASE in each CIRT record to the CIRT and Casualty Personnel Casualty Record Table (CPCT) to count the number of Deaths resulting from the vessel casualties.

The last characteristic is "Injury", meaning that a vessel casualty resulted in at least injury. This characteristic leads to the calculation of casualty frequencies based on non-fatal injuries, yielding an estimate of "injuries/Inspection" frequency. This information is collected in the same way as for Deaths. In the event that a particular casualty

involves both Deaths and injuries, the casualty is binned under both the "death" and "injury" characteristic.

Vessel Service - The data can be aggregated so that casualty frequency rates are calculated based on the type of service of the vessel.

Aggregation Of Data For Districts and MSOs

Figures 3.2 and 3.3 represent similar but more detailed aggregation of casualty data. Figure 3.2 represents the aggregation of data by the District that last inspected a vessel before the occurrence of a casualty. Figure 3.3 represents the aggregation of data by the MSO that last inspected a vessel before the occurrence of a casualty. Each vessel casualty recorded in CIRT was "assigned" or binned to the last District and MSO where it received an inspection. The inspecting District and MSO were identified by comparing the casualty date in each CIRT vessel casualty report to the inspection dates for the relevant vessel in the Inspection Report Identification Table (IRIT). In this way, casualty counts were calculated for each District and MSO based on the location of the last inspection. Information in CIRT and IRIT was linked using VILT, VINTAB, the Port Identification Table (PORTS), and VIDT.

The total number of vessel inspections conducted by each District and MSO was calculated by counting the number of IRIT records logged by each District and MSO. The MSO for each IRIT record was identified directly using the UNIT element name in each IRIT record. The District for each IRIT record was identified by matching the UNIT element name to its appropriate District in PORTS. No distinction was made between the different types of inspections performed. IRIT contains indicator fields for each type of inspection that might be performed by an MSO (e.g., Initial Inspection, Certificate Of Inspection (COI), Annual Reinspection, Hull Inspection). As stated in the introduction of this report, the MSMS database is not designed to link casualties to particular inspection activities. Additionally, a particular IRIT record could have more than one indicator marked. This would indicate a situation in which a vessel underwent more than one inspection at the same time. Although some inspections are clearly unique in terms of the scope of inspection (e.g., Hull Inspection), other inspections (such as the COI and Annual Reinspection) may be designed to consider similar risks, even if at different levels of scrutiny. Therefore, the casualty frequency estimates here present a high level of data aggregation with respect to the type of inspection activities performed. A more detailed aggregation of vessel casualty data might be possible if casualty casual data in the Casualty Event Record Table (CEVT) could be used to reliably identify the specific USCG inspections that are designed to cover the types of events attributed to each vessel casualty. Based on discussions with USCG Marine Planning personnel at the May 13, 1994 project review meeting, future queries for U.S. flag inspections will focus only on the COI, the Annual Reinspection, and the Hull inspection.

All data queries were restricted to the MSMS database for the time period of January 1991 through October, 1993. Data consistency between the 1980's and the 1990's in IRIT was a

concern. For the time period of 1983 to 1990, approximately 114,000 IRT records were logged. For the time period 1991 through October 1993, approximately 166,000 records were logged. This represents an average of only about 14,000 records annually during the 1980's versus over 40,000 records annually during the 1990's. The focus of this assessment was therefore limited to the 1991 through 1993 time period. This is consistent with the advent of the use of MINMOD as the repository of maritime casualty data.

B.2 INFORMIX Query Files For The Risk-Based Ranking Analysis

This appendix contains the SQL programs used to query the MSMS database and construct the data sets used in the econometric analysis. The programs are written in INFORMIX (ISQL) and are easily translated into other SQL-based database software that are designed to manage relational databases such as SYBASE. Minor syntax modifications may be needed before these programs can be implemented from SQL-based software other than INFORMIX.

B.2.1 INFORMIX Preliminary Queries For Setting Up INFORMIX Tables From The MSMS MINMOD Database

DATABASE msms

MAIN

```
DEFINE counter INT,  
      p_brst RECORD LIKE brst.*
```

```
DECLARE brst_cursor CURSOR FOR  
  SELECT * FROM brst  
  FOR UPDATE
```

```
LET counter = 0
```

```
FOREACH brst_cursor INTO p_brst.*
```

```
LET p_brst.d2b1 = 0  
LET p_brst.d2b2 = 0  
LET p_brst.d2b3 = 0  
LET p_brst.d31  = 0  
LET p_brst.d32  = 0  
LET p_brst.d33  = 0  
LET p_brst.d34  = 0  
LET p_brst.d35  = 0  
LET p_brst.d36  = 0  
LET p_brst.d37  = 0  
LET p_brst.d38  = 0  
LET p_brst.d39  = 0
```

```
IF p_brst.activity_typ = "POLL PREV" THEN  
  LET p_brst.d2b1  = 1.0  
  LET p_brst.d2b2  = 1.0  
  LET p_brst.d2b3  = 1.0
```

```
    LET p_brst.d31 = 1.0  
END IF
```

```
IF p_brst.activity_typ = "NAV SAFETY" THEN  
    LET p_brst.d2b1 = 1.0  
    LET p_brst.d2b2 = 1.0  
    LET p_brst.d2b3 = 1.0  
    LET p_brst.d32 = 1.0  
END IF
```

```
IF p_brst.activity_typ = "ANNUAL EXAMINATION" THEN  
    LET p_brst.d2b1 = 1.0  
    LET p_brst.d2b2 = 1.0  
    LET p_brst.d2b3 = 1.0  
END IF
```

```
IF p_brst.activity_typ = "FIRE PROT" THEN  
    LET p_brst.d2b1 = 1.0  
    LET p_brst.d2b2 = 1.0  
    LET p_brst.d2b3 = 1.0  
    LET p_brst.d37 = 1.0  
END IF
```

```
IF p_brst.activity_typ = "MARPOL REQ" THEN  
    LET p_brst.d2b1 = 1.0  
    LET p_brst.d2b2 = 1.0  
    LET p_brst.d2b3 = 1.0  
    LET p_brst.d31 = 0.2  
    LET p_brst.d32 = 0.2  
    LET p_brst.d33 = 0.2  
    LET p_brst.d34 = 0.2  
    LET p_brst.d37 = 0.2  
END IF
```

```
IF p_brst.activity_typ = "LOADLINE" THEN  
    LET p_brst.d2b1 = 1.0  
    LET p_brst.d2b2 = 1.0  
    LET p_brst.d2b3 = 1.0  
    LET p_brst.d33 = 0.5  
    LET p_brst.d38 = 0.5  
END IF
```

```
IF p_brst.activity_typ = "MANNING" THEN  
    LET p_brst.d2b1 = 1.0
```

```
    LET p_brst.d2b2 = 1.0
    LET p_brst.d2b3 = 1.0
    LET p_brst.d33 = 1.0
END IF
```

```
IF p_brst.activity_typ = "PASS FRGT" THEN
    LET p_brst.d2b1 = 1.0
END IF
```

```
IF p_brst.activity_typ = "CARGO VENT" THEN
    LET p_brst.d2b2 = 1.0
    LET p_brst.d31 = 1.0
END IF
```

```
IF p_brst.activity_typ = "CARGO PIPE" THEN
    LET p_brst.d2b2 = 1.0
    LET p_brst.d31 = 1.0
END IF
```

```
IF p_brst.activity_typ = "ANNUAL FREIGH" THEN
    LET p_brst.d2b1 = 1.0
END IF
```

```
IF p_brst.activity_typ = "DISCREPANCY FOLLOWUP" THEN
    LET p_brst.d2b1 = 1.0
    LET p_brst.d2b2 = 1.0
    LET p_brst.d2b3 = 1.0
    LET p_brst.d31 = 0.1667
    LET p_brst.d32 = 0.1667
    LET p_brst.d33 = 0.1667
    LET p_brst.d34 = 0.1667
    LET p_brst.d37 = 0.1667
    LET p_brst.d39 = 0.1667
END IF
```

```
IF p_brst.activity_typ = "DOCUMENT CHEC" THEN
    LET p_brst.d2b1 = 1.0
    LET p_brst.d2b2 = 1.0
    LET p_brst.d2b3 = 1.0
    LET p_brst.d33 = 1.0
END IF
```

```
IF p_brst.activity_typ = "MARPOL V" THEN
    LET p_brst.d2b1 = 1.0
```

```
LET p_brst.d2b2 = 1.0
LET p_brst.d2b3 = 1.0
LET p_brst.d31 = 0.333
LET p_brst.d32 = 0.333
LET p_brst.d33 = 0.333
END IF
```

```
IF p_brst.activity_typ = "TANK VESS" THEN
  LET p_brst.d2b2 = 1.0
END IF
```

```
IF p_brst.activity_typ = "DISCREP FLWUP" THEN
  LET p_brst.d2b1 = 1.0
  LET p_brst.d2b2 = 1.0
  LET p_brst.d2b3 = 1.0
  LET p_brst.d31 = 0.1667
  LET p_brst.d32 = 0.1667
  LET p_brst.d33 = 0.1667
  LET p_brst.d34 = 0.1667
  LET p_brst.d37 = 0.1667
  LET p_brst.d39 = 0.1667
END IF
```

```
IF p_brst.activity_typ = "MARPOL GEN" THEN
  LET p_brst.d2b1 = 1.0
  LET p_brst.d2b2 = 1.0
  LET p_brst.d2b3 = 1.0
  LET p_brst.d31 = 0.3333
  LET p_brst.d32 = 0.3333
  LET p_brst.d33 = 0.3333
END IF
```

```
IF p_brst.activity_typ = "CREW LIC. CHK" THEN
  LET p_brst.d2b1 = 1.0
  LET p_brst.d2b2 = 1.0
  LET p_brst.d2b3 = 1.0
  LET p_brst.d33 = 1.0
END IF
```

```
IF p_brst.activity_typ = "WS SYS MAINT" THEN
END IF
```

```
IF p_brst.activity_typ = "MON SHIP OIL" THEN
END IF
```

```
IF p_brst.activity_typ = "ANNUAL SHIP" THEN  
END IF
```

```
IF p_brst.activity_typ = "SOL TRANS" THEN  
END IF
```

```
IF p_brst.activity_typ = "MARPOL I" THEN  
  LET p_brst.d2b1 = 1.0  
  LET p_brst.d2b2 = 1.0  
  LET p_brst.d2b3 = 1.0  
  LET p_brst.d31 = 0.5  
  LET p_brst.d33 = 0.5  
END IF
```

```
IF p_brst.activity_typ = "IGS" THEN  
  LET p_brst.d2b2 = 1.0  
  LET p_brst.d31 = 1.0  
END IF
```

```
IF p_brst.activity_typ = "CONTAIN INSP" THEN  
END IF
```

```
IF p_brst.activity_typ = "PUMP ROOM" THEN  
END IF
```

```
IF p_brst.activity_typ = "ANNUAL CONTAI" THEN  
  LET p_brst.d2b1 = 1.0  
END IF
```

```
IF p_brst.activity_typ = "MARPOL DIS" THEN  
END IF
```

```
IF p_brst.activity_typ = "COW" THEN  
  LET p_brst.d2b2 = 1.0  
  LET p_brst.d31 = 1.0  
END IF
```

```
IF p_brst.activity_typ = "MARPOL II" THEN  
  LET p_brst.d2b1 = 1.0  
  LET p_brst.d2b2 = 1.0  
  LET p_brst.d2b3 = 1.0  
  LET p_brst.d31 = 0.5  
  LET p_brst.d33 = 0.5
```

```

END IF

IF p_brst.activity_typ = "MARPOL EQU" THEN
    LET p_brst.d2b1 = 1.0
    LET p_brst.d2b2 = 1.0
    LET p_brst.d2b3 = 1.0
    LET p_brst.d31 = 0.5
    LET p_brst.d33 = 0.5
END IF

IF p_brst.activity_typ = "ANNUAL PASSEN" THEN
    LET p_brst.d33 = 1.0
END IF

IF p_brst.activity_typ = "ANNUAL FREIGH ON" THEN
    LET p_brst.d2b1 = 1.0
END IF

IF p_brst.activity_typ = "DISCREP FLWUP OWUP" THEN
    LET p_brst.d2b1 = 1.0
    LET p_brst.d2b2 = 1.0
    LET p_brst.d2b3 = 1.0
    LET p_brst.d31 = 0.1667
    LET p_brst.d32 = 0.1667
    LET p_brst.d33 = 0.1667
    LET p_brst.d34 = 0.1667
    LET p_brst.d37 = 0.1667
    LET p_brst.d39 = 0.1667
END IF

UPDATE brst
    SET brst.* = p_brst.*
    WHERE CURRENT OF brst_cursor

LET counter = counter + 1

IF counter mod 1000 = 0 THEN
    DISPLAY counter, " rows have been updated in BRST"
END IF

END FOREACH

END MAIN

```


DATABASE msms

MAIN

DEFINE counter INT,
p_brst RECORD LIKE brst.*

DECLARE brst_cursor CURSOR FOR
SELECT * FROM brst
FOR UPDATE

LET counter = 0

FOREACH brst_cursor INTO p_brst.*

LET p_brst.d2a1 = 0
LET p_brst.d2a2 = 0
LET p_brst.d2a3 = 0

IF p_brst.activity_typ = "DISCREPANCY FOLLOWUP" THEN

LET p_brst.d2b1 = 1
LET p_brst.d2b2 = 1
LET p_brst.d2b3 = 1
LET p_brst.d31 = 1
LET p_brst.d32 = 1
LET p_brst.d33 = 1
LET p_brst.d34 = 1
LET p_brst.d37 = 1
LET p_brst.d39 = 1

END IF

UPDATE brst
SET brst.* = p_brst.*
WHERE CURRENT OF brst_cursor

LET counter = counter + 1

IF counter mod 1000 = 0 THEN
DISPLAY counter, " rows have been updated in BRST"
END IF

END FOREACH

END MAIN

DATABASE msms

MAIN

```
DEFINE counter INT,  
      p_cevt RECORD LIKE cevt.*
```

```
DECLARE cevt_cursor CURSOR FOR  
  SELECT * FROM cevt  
  FOR UPDATE
```

```
LET counter = 0
```

```
FOREACH cevt_cursor INTO p_cevt.*
```

```
  LET p_cevt.dtype = "0"
```

```
  IF p_cevt.type = "POLLUTION" THEN  
    LET p_cevt.dtype = "1"  
  END IF
```

```
  IF p_cevt.type = "ALLISION" THEN  
    LET p_cevt.dtype = "2"  
  END IF
```

```
  IF p_cevt.type = "GROUNDING ACC" THEN  
    LET p_cevt.dtype = "2"  
  END IF
```

```
  IF p_cevt.type = "LOSS VES CNTRL" THEN  
    LET p_cevt.dtype = "2"  
  END IF
```

```
  IF p_cevt.type = "PERSONNEL CAS" THEN  
    LET p_cevt.dtype = "4"  
  END IF
```

```
  IF p_cevt.type = "LOSS ELEC POWER" THEN  
    LET p_cevt.dtype = "6"  
  END IF
```

```
  IF p_cevt.type = "FIRE" THEN  
    LET p_cevt.dtype = "7"  
  END IF
```

```
  IF p_cevt.type = "SINK" THEN  
    LET p_cevt.dtype = "8"  
  END IF
```

```
  IF p_cevt.type = "FLOODING" THEN  
    LET p_cevt.dtype = "8"  
  END IF
```

```
IF p_cevt.type = "STRUCTURAL FAIL" THEN
  LET p_cevt.dtype = "8"
END IF

LET p_cevt.counter = 1

UPDATE cevt
  SET cevt.* = p_cevt.*
  WHERE CURRENT OF cevt_cursor

LET counter = counter + 1

IF counter mod 1000 = 0 THEN
  DISPLAY counter, " rows have been updated in CEVT"
END IF

END FOREACH

END MAIN
```

DATABASE msms

MAIN

DEFINE counter INT,
 p_cpct RECORD LIKE cpct.*

DECLARE cpct_cursor CURSOR FOR
 SELECT * FROM cpct
 FOR UPDATE

LET counter = 0

FOREACH cpct_cursor INTO p_cpct.*

LET p_cpct.ddead = 0
LET p_cpct.dinjury = 0

IF p_cpct.dead = "X" THEN
 LET p_cpct.ddead = 1
END IF

IF p_cpct.injury = "X" THEN
 LET p_cpct.dinjury = 1
END IF

UPDATE cpct
 SET cpct.* = p_cpct.*
 WHERE CURRENT OF cpct_cursor

LET counter = counter + 1

IF counter mod 1000 = 0 THEN
 DISPLAY counter, " rows have been updated in CPCT"
END IF

END FOREACH

END MAIN

DATABASE msms

MAIN

DEFINE counter INT,
p_crst RECORD LIKE crst.*

DECLARE crst_cursor CURSOR FOR
SELECT * FROM crst
FOR UPDATE

LET counter = 0

FOREACH crst_cursor INTO p_crst.*

LET p_crst.d2a1 = 0
LET p_crst.d2a2 = 0
LET p_crst.d2a3 = 0
LET p_crst.d31 = 0
LET p_crst.d32 = 0
LET p_crst.d33 = 0
LET p_crst.d34 = 0
LET p_crst.d35 = 0
LET p_crst.d36 = 0
LET p_crst.d37 = 0
LET p_crst.d38 = 0
LET p_crst.d39 = 0

IF p_crst.inspect_typ = "ANNUAL EXAMINATION" THEN
END IF

IF p_crst.inspect_typ = "POLL PREV" THEN
LET p_crst.d2a1 = 1.0
LET p_crst.d2a2 = 1.0
LET p_crst.d31 = 1.0
END IF

IF p_crst.inspect_typ = "LOADLINE" THEN
LET p_crst.d2a1 = 1.0
LET p_crst.d2a2 = 1.0
LET p_crst.d2a3 = 1.0
LET p_crst.d38 = 1.0
END IF

```

IF p_crst.inspect_typ = "PASS FRGT" THEN
END IF

IF p_crst.inspect_typ = "NAV SAFETY" THEN
    LET p_crst.d2a1 = 1.0
    LET p_crst.d2a2 = 1.0
    LET p_crst.d32 = 1.0
END IF

IF p_crst.inspect_typ = "REINSPECTION" THEN
    LET p_crst.d2a2 = 1.0
    LET p_crst.d31 = 0.1111
    LET p_crst.d32 = 0.1111
    LET p_crst.d33 = 0.1111
    LET p_crst.d34 = 0.1111
    LET p_crst.d35 = 0.1111
    LET p_crst.d36 = 0.1111
    LET p_crst.d37 = 0.1111
    LET p_crst.d38 = 0.1111
    LET p_crst.d39 = 0.1111
END IF

IF p_crst.inspect_typ = "MARPOL REQ" THEN
    LET p_crst.d2a1 = 1.0
    LET p_crst.d2a2 = 1.0
    LET p_crst.d31 = 1.0
END IF

IF p_crst.inspect_typ = "ADMIN" THEN
    LET p_crst.d2a1 = 1.0
    LET p_crst.d2a2 = 1.0
    LET p_crst.d2a3 = 1.0
    LET p_crst.d31 = 0.1111
    LET p_crst.d32 = 0.1111
    LET p_crst.d33 = 0.1111
    LET p_crst.d34 = 0.1111
    LET p_crst.d35 = 0.1111
    LET p_crst.d36 = 0.1111
    LET p_crst.d37 = 0.1111
    LET p_crst.d38 = 0.1111
    LET p_crst.d39 = 0.1111
END IF

IF p_crst.inspect_typ = "CARGO VENT" THEN

```

```

        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d2a3 = 1.0
        LET p_crst.d31 = 1.0
        LET p_crst.d38 = 1.0
    END IF

    IF p_crst.inspect_typ = "MANNING" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d33 = 1.0
    END IF

    IF p_crst.inspect_typ = "CARGO PIPE" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d31 = 1.0
    END IF

    IF p_crst.inspect_typ = "FIRE PROT" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d37 = 1.0
    END IF

    IF p_crst.inspect_typ = "HULL EXAM" THEN
        LET p_crst.d2a3 = 1.0
        LET p_crst.d31 = 0.1111
        LET p_crst.d32 = 0.1111
        LET p_crst.d33 = 0.1111
        LET p_crst.d34 = 0.1111
        LET p_crst.d35 = 0.1111
        LET p_crst.d36 = 0.1111
        LET p_crst.d37 = 0.1111
        LET p_crst.d38 = 0.1111
        LET p_crst.d39 = 0.1111
    END IF

    IF p_crst.inspect_typ = "TANK VESS" THEN
    END IF

    IF p_crst.inspect_typ = "DISCREPANCY FOLLOWUP" THEN
    END IF

```

```

IF p_crst.inspect_typ = "DD EXTEND" THEN
    LET p_crst.d2a3 = 1.0
    LET p_crst.d38 = 1.0
END IF

IF p_crst.inspect_typ = "COC" THEN
END IF

IF p_crst.inspect_typ = "CONTROL VERIF" THEN
END IF

IF p_crst.inspect_typ = "SOL TRANS" THEN
END IF

IF p_crst.inspect_typ = "DEFICIENCY CK" THEN
    LET p_crst.d2a1 = 1.0
    LET p_crst.d2a2 = 1.0
    LET p_crst.d2a3 = 1.0
    LET p_crst.d31 = 0.1111
    LET p_crst.d32 = 0.1111
    LET p_crst.d33 = 0.1111
    LET p_crst.d34 = 0.1111
    LET p_crst.d35 = 0.1111
    LET p_crst.d36 = 0.1111
    LET p_crst.d37 = 0.1111
    LET p_crst.d38 = 0.1111
    LET p_crst.d39 = 0.1111
END IF

IF p_crst.inspect_typ = "CERTIFICATION" THEN
    LET p_crst.d2a1 = 1.0
    LET p_crst.d31 = 0.1111
    LET p_crst.d32 = 0.1111
    LET p_crst.d33 = 0.1111
    LET p_crst.d34 = 0.1111
    LET p_crst.d35 = 0.1111
    LET p_crst.d36 = 0.1111
    LET p_crst.d37 = 0.1111
    LET p_crst.d38 = 0.1111
    LET p_crst.d39 = 0.1111
END IF

IF p_crst.inspect_typ = "LIFERAFT SVC" THEN
    LET p_crst.d2a1 = 1.0

```



```

        LET p_crst.d2a2 = 1.0
        LET p_crst.d39 = 1.0
    END IF

    IF p_crst.inspect_typ = "IGS" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d31 = 1.0
    END IF

    IF p_crst.inspect_typ = "MARPOL EQU" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d31 = 1.0
    END IF

    IF p_crst.inspect_typ = "MARPOLII SURV" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d31 = 1.0
    END IF

    IF p_crst.inspect_typ = "MARPOL" THEN
    END IF

    IF p_crst.inspect_typ = "MARPOL DIS" THEN
    END IF

    IF p_crst.inspect_typ = "DAMAGE SURVEY" THEN
        LET p_crst.d2a3 = 1.0
        LET p_crst.d38 = 1.0
    END IF

    IF p_crst.inspect_typ = "INITIAL CERT" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 0
        LET p_crst.d2a3 = 0
        LET p_crst.d31 = 0.1111
        LET p_crst.d32 = 0.1111
        LET p_crst.d33 = 0.1111
        LET p_crst.d34 = 0.1111
        LET p_crst.d35 = 0.1111
        LET p_crst.d36 = 0.1111
        LET p_crst.d37 = 0.1111
    
```

```

        LET p_crst.d38 = 0.1111
        LET p_crst.d39 = 0.1111
    END IF

    IF p_crst.inspect_typ = "L/S SVC OTHER" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d39 = 1.0
    END IF

    IF p_crst.inspect_typ = "MACHINERY" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d2a3 = 1.0
        LET p_crst.d31 = 0.2
        LET p_crst.d32 = 0.2
        LET p_crst.d35 = 0.2
        LET p_crst.d36 = 0.2
        LET p_crst.d37 = 0.2
    END IF

    IF p_crst.inspect_typ = "CONSTRUCTION" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a3 = 1.0
        LET p_crst.d38 = 1.0
    END IF

    IF p_crst.inspect_typ = "WELDER QUAL" THEN
    END IF

    IF p_crst.inspect_typ = "OVERSIGHT" THEN
        LET p_crst.d2a1 = 1.0
    END IF

    IF p_crst.inspect_typ = "MARPOLII TEST" THEN
        LET p_crst.d2a2 = 1.0
        LET p_crst.d31 = 1.0
    END IF

    IF p_crst.inspect_typ = "ANNUAL" THEN
    END IF

    IF p_crst.inspect_typ = "PUMP ROOM" THEN
        LET p_crst.d2a1 = 1.0
    
```

```

        LET p_crst.d2a2 = 1.0
        LET p_crst.d2a3 = 1.0
        LET p_crst.d31 = 0.3333
        LET p_crst.d35 = 0.3333
        LET p_crst.d38 = 0.3333
    END IF

    IF p_crst.inspect_typ = "CONSTRUCT O/S" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d38 = 1.0
    END IF

    IF p_crst.inspect_typ = "OP MAN REVIEW" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d31 = 1.0
    END IF

    IF p_crst.inspect_typ = "MARPOL II" THEN
    END IF

    IF p_crst.inspect_typ = "ANNUAL FREIGH" THEN
    END IF

    IF p_crst.inspect_typ = "NLS SURVEY" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
    END IF

    IF p_crst.inspect_typ = "MARPOL V" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d31 = 1.0
    END IF

    IF p_crst.inspect_typ = "INCL EXP" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d38 = 1.0
    END IF

    IF p_crst.inspect_typ = "LIFE JACKET" THEN
        LET p_crst.d2a1 = 1.0
        LET p_crst.d2a2 = 1.0
        LET p_crst.d39 = 1.0
    
```

END IF

IF p_crst.inspect_typ = "MARPOL GEN" THEN
END IF

IF p_crst.inspect_typ = "REFLAGGING" THEN
 LET p_crst.d2a1 = 1.0
 LET p_crst.d31 = 0.1111
 LET p_crst.d32 = 0.1111
 LET p_crst.d33 = 0.1111
 LET p_crst.d34 = 0.1111
 LET p_crst.d35 = 0.1111
 LET p_crst.d36 = 0.1111
 LET p_crst.d37 = 0.1111
 LET p_crst.d38 = 0.1111
 LET p_crst.d39 = 0.1111
END IF

IF p_crst.inspect_typ = "FIREFIGHTING" THEN
 LET p_crst.d2a1 = 1.0
 LET p_crst.d2a2 = 1.0
 LET p_crst.d37 = 1.0
END IF

IF p_crst.inspect_typ = "COW" THEN
 LET p_crst.d2a1 = 1.0
 LET p_crst.d2a2 = 1.0
 LET p_crst.d31 = 1.0
END IF

IF p_crst.inspect_typ = "ANNUAL SHIP" THEN
END IF

IF p_crst.inspect_typ = "POL PREV EQUIP" THEN
 LET p_crst.d2a1 = 1.0
 LET p_crst.d2a2 = 1.0
 LET p_crst.d31 = 1.0
END IF

IF p_crst.inspect_typ = "SANITARY INSP" THEN
 LET p_crst.d2a1 = 1.0
 LET p_crst.d2a2 = 1.0
 LET p_crst.d35 = 1.0
END IF

```
IF p_crst.inspect_typ = "DWT SURVEY" THEN
    LET p_crst.d2a1 = 1.0
    LET p_crst.d38 = 1.0
END IF
```

```
IF p_crst.inspect_typ = "DISCREP FLWUP" THEN
END IF
```

```
IF p_crst.inspect_typ = "FIRE PROTECTN" THEN
    LET p_crst.d2a1 = 1.0
    LET p_crst.d2a2 = 1.0
    LET p_crst.d2a3 = 1.0
    LET p_crst.d37 = 1.0
END IF
```

```
IF p_crst.inspect_typ = "ANNUAL FREIGH  ON" THEN
END IF
```

```
IF p_crst.inspect_typ = "DISCREP FLWUP  OWUP" THEN
END IF
```

```
IF p_crst.inspect_typ = "SAFETY EQ MAT" THEN
END IF
```

```
IF p_crst.inspect_typ = "MON SHIP DC" THEN
END IF
```

```
IF p_crst.inspect_typ = "MARPOL I" THEN
END IF
```

```
IF p_crst.inspect_typ = "CREW LIC. CHK" THEN
    LET p_crst.d2a1 = 1.0
    LET p_crst.d2a2 = 1.0
    LET p_crst.d33 = 1.0
END IF
```

```
IF p_crst.inspect_typ = "COA MARPOL I" THEN
END IF
```

```
IF p_crst.inspect_typ = "COA MARPOL V" THEN
END IF
```

```
IF p_crst.inspect_typ = "COA MARPOL II" THEN
```

END IF

UPDATE crst

SET crst.* = p_crst.*

WHERE CURRENT OF crst_cursor

LET counter = counter + 1

IF counter mod 1000 = 0 THEN

DISPLAY counter, " rows have been updated in CRST"

END IF

END FOREACH

END MAIN

DATABASE msms

MAIN

DEFINE counter INT,
p_last RECORD LIKE insp.*

DECLARE last_cursor CURSOR FOR
SELECT * FROM insp
FOR UPDATE

LET counter = 0

FOREACH last_cursor INTO p_last.*

IF p_last.service = "FREIGHT SHIP" THEN
LET p_last.service = "FREIGHTER"
END IF
IF p_last.service = "PUBLIC FREIGHT" THEN
LET p_last.service = "FREIGHTER"
END IF
IF p_last.service = "TANK SHIP" THEN
LET p_last.service = "TANKER"
END IF
IF p_last.service = "PUB. TANKSHIP/BARGE" THEN
LET p_last.service = "TANKER"
END IF
IF p_last.service = "PASSENGER SHIP" THEN
LET p_last.service = "PASSENGER"
END IF

UPDATE insp
SET insp.* = p_last.*
WHERE CURRENT OF last_cursor

LET counter = counter + 1

IF counter mod 1000 = 0 THEN
DISPLAY counter, " rows have been updated in INSP"
END IF

END FOREACH

END MAIN

DATABASE msms

MAIN

DEFINE counter INT,
p_last RECORD LIKE last_insp.*

DECLARE last_cursor CURSOR FOR
SELECT * FROM last_insp
FOR UPDATE

LET counter = 0

FOREACH last_cursor INTO p_last.*

IF p_last.service = "FREIGHT SH" THEN
LET p_last.service = "FREIGHTER"
END IF
IF p_last.service = "FREIGHT SHIP" THEN
LET p_last.service = "FREIGHTER"
END IF
IF p_last.service = "PUBLIC FREIGHT" THEN
LET p_last.service = "FREIGHTER"
END IF
IF p_last.service = "TANK SHIP" THEN
LET p_last.service = "TANKER"
END IF
IF p_last.service = "PUB. TANKSHIP/BARGE" THEN
LET p_last.service = "TANKER"
END IF
IF p_last.service = "PASSENGER SHIP" THEN
LET p_last.service = "PASSENGER"
END IF

LET p_last.counter = 1

UPDATE last_insp
SET last_insp.* = p_last.*
WHERE CURRENT OF last_cursor

LET counter = counter + 1

IF counter mod 1000 = 0 THEN
DISPLAY counter, " rows have been updated in LAST_INSP"

END IF

END FOREACH

END MAIN

B.2.2 INFORMIX Query Files For The Risk-Based Ranking Analysis - US Flag Vessels

```
--          File: per_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the number of deaths and injuries to be
-- attributed to each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  SUM(cpct.ddead) deaths,
  SUM(cpct.dinjury) injuries
FROM
  last_insp,
  cpct
WHERE
  last_insp.subject = cpct.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;
```

```
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
```

```
SUM(t1.deaths) deaths,  
SUM(t1.injuries) injuries  
FROM  
  t1  
GROUP BY  
  t1.dist,  
  t1.unit[1,3],  
  t1.service  
ORDER BY  
  t1.dist,  
  t1.unit[1,3],  
  t1.service;
```

```
--          File: pol_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the amount of damage to be attributed to each MSO
-- last inspecting the vessel which had the casualty. The results are
-- grouped by vessel service and MSO and finally district.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  SUM(cpd.in_water_spilled + cpdt.out_water_spilled) quantity
FROM
  last_insp,
  cpdt,
  civt
WHERE
  civt.subject = cpdt.subject
  AND cpdt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;
```

```
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.quantity) quantity
FROM
  t1
```

```
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service
```

```
--          File: prop_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the dollar amount of damage to be attributed to
-- each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.
```

```
--DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
FROM
  last_insp,
  civt,
  cirt
WHERE
  cirt.mccase = civt.mccase
  AND civt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;
```

```
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.total_damage) total_damage
FROM
```

```
t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service;
```

```
--          File: cas_mso.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Determine from LAST_INSP how many casualties are to be counted against the
-- district/unit performing the last inspection prior to the casualty.
```

OUTPUT TO ../output/cas_mso.out

```
SELECT
  last_insp.dist      district,
  last_insp.unit[1,3] mso,
  last_insp.service   service,
  SUM(counter)        casualties
FROM
  last_insp
GROUP BY
  last_insp.dist,
  last_insp.unit[1,3],
  last_insp.service
ORDER BY
  last_insp.dist,
  last_insp.unit[1,3],
  last_insp.service
```

```
--          File: insp_mso.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Determine from INSP how many inspections by district, unit, and vessel
-- service were performed on US vessels between the years 1992 and 1993
-- inclusive.
```

OUTPUT TO ../output/insp_mso.out

```
SELECT
  last_insp.dist      district,
  last_insp.unit[1,3] mso,
  insp.service        service,
  SUM(insp.counter)   inspections
FROM
  insp
GROUP BY
  last_insp.dist,
  last_insp.unit[1,3],
```



```
    insp.service  
ORDER BY  
    last_insp.dist,  
    last_insp.unit[1,3],  
    insp.service
```

```

--          File: us_insp.sql
--          Author: Michael M. Delleney
-- Date of last revision: 16 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file creates a new table in the MSMS database called INSP.
-- It brings data from the tables PORTS, IRIT, and VIDT into one place.
-- The records in the table represent all inspections performed on US
-- flagged freighters, tankers, and large passenger ships between the
-- 1990 through the most recent inspection listed in IRIT. Only the
-- CERT, HULL and REINSPECT inspection types are used, ADMIN, COC, and OTHER
-- were excluded from consideration.

```

```

DROP TABLE insp;

```

```

CREATE TABLE insp
(dist          SMALLINT,
 unit         CHAR(5),
 service      CHAR(19),
 flag         CHAR(2),
 vkey         CHAR(10),
 micase       CHAR(10),
 insp_typ     CHAR(10),
 insp_dt      DATE,
 counter      SMALLINT);

```

```

INSERT INTO insp
SELECT
  ports.dist,
  irit.unit,
  vidt.service,
  vidt.flag,
  irit.vkey,
  irit.micase,
  irit.inspect_type,
  irit.dt,
  1
FROM
  irit,
  ports,
  vidt
WHERE
  vidt.vkey = irit.vkey
  AND irit.unit = ports.unit

```

```
AND irit.inspect_type IN ("CERT", "HULL", "REINSPECT")
AND irit.dt >= "01/01/1990"
AND (vidt.service IN ("FREIGHT SHIP", "PUBLIC FREIGHT",
                     "TANK SHIP", "PUB. TANKSHIP/BARGE")
     OR (vidt.service in ("PASSENGER", "PASSENGER SHIP")
         AND vidt.num_pass >= 100))
GROUP BY
ports.dist,
irit.unit,
vidt.service,
vidt.flag,
irit.vkey,
irit.micase,
irit.inspect_type,
irit.dt;
```

```
--          File: cnt_vsl.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of vessels involved in casualties and
-- provides totals for the MSO and SERVICE.
```

```
--DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  SUM(last_insp.counter) num_svc
FROM
  last_insp
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service
INTO TEMP
  t1;
```

```
OUTPUT TO cnt_vsl.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.num_svc) num_svc
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service;
```

OUTPUT TO in_cevt.out

```
--          File: counting.sql
--          Author: Michael M. Delleney
-- Date of last revision: 26 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
--
-- The purpose of the queries in this file are to determine, by MSO, MIO, and
-- service, how many of the cases involving vessel casualties are listed in
-- and out of cevt. Of those so listed as being in cevt, how many map to the
-- intervention activities outlined in "Progress Report on Project 3304.3 -
-- Research Methods to Analyze the Relationships Between the Inspection
-- Boarding Process and the Office of Marine Safety Goals: Task 3.1 -
-- Intervention Analysis, Draft TTC-1321" and how many map to "other"
-- activities.

-- Select those entries in last_insp which are also in cevt.
```

```
SELECT
  dist,
  unit[1,3],
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase IN (SELECT mccase FROM cevt)
GROUP BY
  dist,
  unit[1,3],
  service
ORDER BY
  dist,
  unit[1,3],
  service;
```

OUTPUT TO out_cevt.out

```
-- Now we want to determine how many vessel casualties listed in last_insp are
-- not also listed in cevt.
```

```
SELECT
  dist,
  unit[1,3],
  service,
```

```

SUM(counter) counter
FROM
  last_insp
WHERE
  mccase NOT IN (SELECT mccase FROM cevt)
GROUP BY
  dist,
  unit[1,3],
  service
ORDER BY
  dist,
  unit[1,3],
  service;

```

OUTPUT TO intervene.out

```

-- Select and count those entries in last_insp which do not have an "other"
-- ("0") entry in cevt but have some other entry from the set "1"-"9".

```

```

SELECT
  dist,
  unit[1,3],
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase IN (SELECT mccase FROM cevt WHERE dtype
            IN ("1","2","3","4","5","6","7","8","9"))
GROUP BY
  dist,
  unit[1,3],
  service,
  counter
ORDER BY
  dist,
  unit[1,3],
  service,
  counter;

```

OUTPUT TO other.out

```

-- Select and count those entries in last_insp which have an "other" ("0")
-- entry in cevt. Be sure and filter out those entries that do, in fact
-- have intervention activities also listed.

```

```

SELECT
  dist,
  unit[1,3],
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase IN (SELECT mccase FROM cevt WHERE dtype IN ("0"))
  AND mccase NOT IN (SELECT mccase FROM cevt WHERE dtype
                      IN ("1","2","3","4","5","6","7","8","9"))
GROUP BY
  dist,
  unit[1,3],
  service
ORDER BY
  dist,
  unit[1,3],
  service;

```

```
--          File: int_act_1.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Cargo Handling/Pollution Control
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "1"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
OUTPUT TO int_act_1.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
```



```
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_2.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Steering/Navigation
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "2"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO int_act_2.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
```

```
t1.dtype,  
SUM(t1.counter) counter  
FROM  
t1  
GROUP BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype;
```

```

--          File: int_act_3.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Document/Paperwork
-- intervention activities from cevt.

```

```

DROP TABLE t1;

```

```

SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "3"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;

```

```

OUTPUT TO int_act_3.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,

```

```
t1.dtype,  
SUM(t1.counter) counter  
FROM  
t1  
GROUP BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype;
```

```
--          File: int_act_4.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Drills/Human Factors
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "4"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO int_act_4.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
```

```
    t1.dtype,  
    SUM(t1.counter) counter  
FROM  
    t1  
GROUP BY  
    t1.dist,  
    t1.unit[1,3],  
    t1.service,  
    t1.dtype  
ORDER BY  
    t1.dist,  
    t1.unit[1,3],  
    t1.service,  
    t1.dtype;
```

```
--          File: int_act_5.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Auxiliary Systems
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "5"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO int_act_5.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
```



```
t1.dtype,  
SUM(t1.counter) counter  
FROM  
t1  
GROUP BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype;
```

```
--          File: int_act_6.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Power Plant intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "6"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO int_act_6.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_7.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Fire Fighting and Prevention
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "7"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO int_act_7.out
```

```
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
```

```
    t1.dtype,  
    SUM(t1.counter) counter  
FROM  
    t1  
GROUP BY  
    t1.dist,  
    t1.unit[1,3],  
    t1.service,  
    t1.dtype  
ORDER BY  
    t1.dist,  
    t1.unit[1,3],  
    t1.service,  
    t1.dtype;
```

```
--          File: int_act_8.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of HULL intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "8"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO int_act_8.out
```

```
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
```

```
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_9.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Life Saving
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "9"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO int_act_9.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```



```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```

--          File: last_insp.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file creates a new table in the MSMS database called LAST_INSP.
-- It determines which USCG activity performed the last inspection on a
-- vessel prior to a casualty listed in CIRT and CIVT.
-- The tables used are INSP, CIVT, and CIRT.
-- Three temporary tables are created TINSP, TINSP_2, and TINSP_3.
-- The table INSP must be present in MSMS in order for LAST_INSP to be
-- created. If it is not then run the SQL file INSP.SQL contain in the same
-- directory as this file.
--
-- See each SELECT statement for information concerning what it does.
--
-- These are here depending on whether the table was created during the
-- current invocation of ISQL or not.

--DROP TABLE tinsp;
--DROP TABLE tinsp_2;
--DROP TABLE tinsp_3;
DROP TABLE last_insp;

CREATE TABLE last_insp
(dist          SMALLINT,
 unit         CHAR(5),
 service      CHAR(19),
 vkey         CHAR(10),
 micase       CHAR(10),
 mccase       CHAR(10),
 subject      CHAR(10),
 insp_dt      DATE,
 incident_dt  DATE,
 counter      SMALLINT);

-- This select statement takes all vessel incidents occurring in 1992 and
-- 1993 and extracts all records where the vessel was inspected on or before
-- the casualty date and places the results in the temporary table
-- TINSP.

SELECT
  insp.unit,
  insp.dist,

```

```

    civt.service,
    insp.vkey,
    insp.micase,
    civt.mccase,
    civt.subject,
    insp.insp_dt,
    cirt.incident_dt
FROM
    cirt,
    civt,
    insp
WHERE
    cirt.mccase = civt.mccase
    AND civt.vkey = insp.vkey
    AND cirt.incident_dt BETWEEN "01/01/1992" AND "12/31/1993"
    AND insp.insp_dt <= cirt.incident_dt
    AND civt.flag = "US"
GROUP BY
    insp.dist,
    insp.unit,
    civt.service,
    insp.vkey,
    insp.micase,
    civt.mccase,
    civt.subject,
    insp.insp_dt,
    cirt.incident_dt
ORDER BY
    insp.dist,
    insp.unit,
    civt.service,
    insp.vkey,
    insp.micase,
    civt.mccase,
    civt.subject,
    cirt.incident_dt
INTO TEMP
    tinsp;

-- This SELECT statement simply extracts the most recent inspection date
-- for a given vessel in a particular accident and places it into temporary
-- table TINSF_2

SELECT

```

```

    tinsp.subject,
    MAX(tinsp.insp_dt) insp_dt
FROM
    tinsp
GROUP BY
    tinsp.subject
INTO TEMP
    tinsp_2;

```

```

-- If there are more than one inspection on a particular date for a given
-- vessel in a given accident, then the record with the largest case number
-- is selected on the assumption that it is the most recent inspection.
-- TINSP_3 now contains only one inspection for a particular ship
-- involved in a particular casualty along with the date of its last
-- inspection.

```

```

SELECT
    tinsp.subject,
    MAX(tinsp.micase) micase,
    tinsp.insp_dt
FROM
    tinsp,
    tinsp_2
WHERE
    tinsp.subject = tinsp_2.subject
    AND tinsp.insp_dt = tinsp_2.insp_dt
GROUP BY
    tinsp.subject,
    tinsp.insp_dt
INTO TEMP
    tinsp_3;

```

```

-- From TINSP which contains all of the columns of interest (and all
-- inspections performed before the casualty) and TINSP_3 which contains the
-- SUBJECT (particular ship for a particular casualty), MICASE (inspection
-- case number), and INSP_DT (date of the last inspection prior to the
-- casualty) the table LAST_INSP is generated by comparing the two and
-- taking only those records occurring in both tables.

```

```

INSERT INTO last_insp
    (dist,
    unit,
    service,
    vkey,

```

```

micase,
mccase,
subject,
insp_dt,
incident_dt)
SELECT
    tinsp.dist,
    tinsp.unit,
    tinsp.service,
    tinsp.vkey,
    tinsp.micase,
    tinsp.mccase,
    tinsp.subject,
    tinsp.insp_dt,
    tinsp.incident_dt
FROM
    tinsp,
    tinsp_2,
    tinsp_3
WHERE
    tinsp.subject = tinsp_3.subject
    AND tinsp.micase = tinsp_3.micase
    AND tinsp.insp_dt = tinsp_3.insp_dt
GROUP BY
    tinsp.dist,
    tinsp.unit,
    tinsp.service,
    tinsp.vkey,
    tinsp.micase,
    tinsp.mccase,
    tinsp.subject,
    tinsp.insp_dt,
    tinsp.incident_dt;

```

```

--          File: per_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the number of deaths and injuries to be
-- attributed to each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.

```

```

DROP TABLE t1;

```

```

SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  SUM(cpct.ddead) deaths,
  SUM(cpct.dinjury) injuries
FROM
  last_insp,
  cpct
WHERE
  last_insp.subject = cpct.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;

```

```

OUTPUT TO output/per_cas.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.deaths) deaths,
  SUM(t1.injuries) injuries
FROM

```

```
t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service;
```

```

--          File: pol_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the amount of damage to be attributed to each MSO
-- last inspecting the vessel which had the casualty. The results are
-- grouped by vessel service and MSO and finally district.

```

```

DROP TABLE t1;

```

```

SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  SUM(cpd.in_water_spilled + cpdt.out_water_spilled) quantity
FROM
  last_insp,
  cpdt,
  civt
WHERE
  civt.subject = cpdt.subject
  AND cpdt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;

```

```

OUTPUT TO output/pol_cas.out

```

```

SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,

```



```
SUM(t1.quantity) quantity
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service;
```

```

--          File: prop_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the dollar amount of damage to be attributed to
-- each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.

```

```

DROP TABLE t1;

```

```

SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
FROM
  last_insp,
  civt,
  cirt
WHERE
  cirt.mccase = civt.mccase
  AND civt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;

```

```

OUTPUT TO output/prop_cas.out

```

```

SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,

```

```
SUM(t1.total_damage) total_damage
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service;

OUTPUT TO output/cas_mso.out
```

```
--          File: cas_mso.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Determine from LAST_INSP how many casualties are to be counted against the
-- district/unit performing the last inspection prior to the casualty.
```

```
SELECT
  last_insp.dist      district,
  last_insp.unit[1,3] mso,
  last_insp.service   service,
  SUM(counter)        casualties
FROM
  last_insp
GROUP BY
  last_insp.dist,
  last_insp.unit[1,3],
  last_insp.service
ORDER BY
  last_insp.dist,
  last_insp.unit[1,3],
  last_insp.service;
```

```
OUTPUT TO output/insp_mso.out
--          File: insp_mso.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Determine from INSP how many inspections by district, unit, and vessel
-- service were performed on US vessels between the years 1992 and 1993
-- inclusive.
```

```
SELECT
  insp.dist      district,
  insp.unit[1,3] mso,
  insp.service   service,
  SUM(insp.counter) inspections
FROM
  insp
GROUP BY
  insp.dist,
  insp.unit[1,3],
```

```
    insp.service  
ORDER BY  
    insp.dist,  
    insp.unit[1,3],  
    insp.service;
```

```
--          File: cnt_vsl.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of vessels involved in casualties and
-- provides totals for the MSO and SERVICE.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  SUM(last_insp.counter) num_svc
FROM
  last_insp
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service
INTO TEMP
  t1;
```

```
OUTPUT TO output/cnt_vsl.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.num_svc) num_svc
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service;
```

OUTPUT TO output/in_cevt.out

```

--          File: counting.sql
--          Author: Michael M. Delleney
-- Date of last revision: 26 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
--
-- The purpose of the queries in this file are to determine, by MSO, MIO, and
-- service, how many of the cases involving vessel casualties are listed in
-- and out of cevt. Of those so listed as being in cevt, how many map to the
-- intervention activities outlined in "Progress Report on Project 3304.3 -
-- Research Methods to Analyze the Relationships Between the Inspection
-- Boarding Process and the Office of Marine Safety Goals: Task 3.1 -
-- Intervention Analysis, Draft TTC-1321" and how many map to "other"
-- activities.

-- Select those entries in last_insp which are also in cevt.

SELECT
    dist,
    unit[1,3],
    service,
    SUM(counter) counter
FROM
    last_insp
WHERE
    mccase IN (SELECT mccase FROM cevt)
GROUP BY
    dist,
    unit[1,3],
    service
ORDER BY
    dist,
    unit[1,3],
    service;

OUTPUT TO output/out_cevt.out
-- Now we want to determine how many vessel casualties listed in last_insp are
-- not also listed in cevt.

```

```

SELECT
    dist,
    unit[1,3],
    service,

```



```

SUM(counter) counter
FROM
  last_insp
WHERE
  mccase NOT IN (SELECT mccase FROM cevt)
GROUP BY
  dist,
  unit[1,3],
  service
ORDER BY
  dist,
  unit[1,3],
  service;

```

OUTPUT TO output/intervene.out

```

-- Select and count those entries in last_insp which do not have an "other"
-- ("0") entry in cevt but have some other entry from the set "1"-"9".

```

```

SELECT
  dist,
  unit[1,3],
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase IN (SELECT mccase FROM cevt WHERE dtype
            IN ("1","2","3","4","5","6","7","8","9"))
GROUP BY
  dist,
  unit[1,3],
  service,
  counter
ORDER BY
  dist,
  unit[1,3],
  service,
  counter;

```

OUTPUT TO output/other.out

```

-- Select and count those entries in last_insp which have an "other" ("0")
-- entry in cevt. Be sure and filter out those entries that do, in fact
-- have intervention activities also listed.

```

```

SELECT
  dist,
  unit[1,3],
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase IN (SELECT mccase FROM cevt WHERE dtype IN ("0"))
  AND mccase NOT IN (SELECT mccase FROM cevt WHERE dtype
                      IN ("1","2","3","4","5","6","7","8","9"))
GROUP BY
  dist,
  unit[1,3],
  service
ORDER BY
  dist,
  unit[1,3],
  service;

```

```
--          File: int_act_1.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Cargo Handling/Pollution Control
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "1"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
OUTPUT TO output/int_act_1.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
```

```
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_2.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Steering/Navigation
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "2"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_2.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter  
FROM  
  t1  
GROUP BY  
  t1.dist,  
  t1.unit[1,3],  
  t1.service,  
  t1.dtype  
ORDER BY  
  t1.dist,  
  t1.unit[1,3],  
  t1.service,  
  t1.dtype;
```

```
--          File: int_act_3.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Document/Paperwork
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "3"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_3.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```



```
--          File: int_act_4.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Drills/Human Factors
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "4"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_4.out
```

```
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_5.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Auxiliary Systems
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "5"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_5.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_6.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Power Plant intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "6"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_6.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
```

```
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_7.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Fire Fighting and Prevention
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "7"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_7.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```



```
--          File: int_act_8.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of HULL intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "8"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_8.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
```

FROM
t1
GROUP BY
t1.dist,
t1.unit[1,3],
t1.service,
t1.dtype
ORDER BY
t1.dist,
t1.unit[1,3],
t1.service,
t1.dtype;

```

--          File: int_act_9.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Life Saving
-- intervention activities from cevt.

```

```

DROP TABLE t1;

```

```

SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "9"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;

```

```

OUTPUT TO output/int_act_9.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,

```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

B.2.4 INFORMIX Query Files For The Risk-Based Ranking Analysis - Foreign Flag Vessels

```
--          File: per_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the number of deaths and injuries to be
-- attributed to each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  SUM(cpct.ddead) deaths,
  SUM(cpct.dinjury) injuries
FROM
  last_insp,
  cpct
WHERE
  last_insp.subject = cpct.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;
```

```
OUTPUT TO output/per_cas.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.deaths) deaths,
```

```
SUM(t1.injuries) injuries
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service;
```

```
--          File: pol_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the amount of damage to be attributed to each MSO
-- last inspecting the vessel which had the casualty. The results are
-- grouped by vessel service and MSO and finally district.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  SUM(cpdt.in_water_spilled + cpdt.out_water_spilled) quantity
FROM
  last_insp,
  cpdt,
  civt
WHERE
  civt.subject = cpdt.subject
  AND cpdt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;
```

```
OUTPUT TO output/pol_cas.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.quantity) quantity
FROM
```

t1
GROUP BY
t1.dist,
t1.unit[1,3],
t1.service
ORDER BY
t1.dist,
t1.unit[1,3],
t1.service


```

--          File: prop_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the dollar amount of damage to be attributed to
-- each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.

```

```
--DROP TABLE t1;
```

```

SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
FROM
  last_insp,
  civt,
  cirt
WHERE
  cirt.mccase = civt.mccase
  AND civt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;

```

```

OUTPUT TO output/prop_cas.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.total_damage) total_damage

```

```
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service;
```

OUTPUT TO output/cas_mso.out

-- File: cas_mso.sql

-- Author: Michael M. Delleney

-- Date of last revision: 18 AUG 1994

-- Environment: Informix Online 5.01 and I-SQL 4.11

--

-- Determine from LAST_INSP how many casualties are to be counted against the

-- district/unit performing the last inspection prior to the casualty.

SELECT

last_insp.dist district,

last_insp.unit[1,3] mso,

last_insp.service service,

SUM(counter) casualties

FROM

last_insp

GROUP BY

last_insp.dist,

last_insp.unit[1,3],

last_insp.service

ORDER BY

last_insp.dist,

last_insp.unit[1,3],

last_insp.service;

OUTPUT TO output/insp_mso.out

```
--          File: insp_mso.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Determine from INSP how many inspections by district, unit, and vessel
-- service were performed on US vessels between the years 1992 and 1993
-- inclusive.
```

```
SELECT
    insp.dist          district,
    insp.unit[1,3]     mso,
    insp.service       service,
    SUM(insp.counter)  inspections
FROM
    insp
GROUP BY
    insp.dist,
    insp.unit[1,3],
    insp.service
ORDER BY
    insp.dist,
    insp.unit[1,3],
    insp.service;
```

```

--          File: per_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the number of deaths and injuries to be
-- attributed to each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.

```

```

DROP TABLE t1;

```

```

SELECT
    last_insp.dist,
    last_insp.service,
    last_insp.subject,
    SUM(cpct.ddead) deaths,
    SUM(cpct.dinjury) injuries
FROM
    last_insp,
    cpct
WHERE
    last_insp.subject = cpct.subject
GROUP BY
    last_insp.dist,
    last_insp.service,
    last_insp.subject
ORDER BY
    last_insp.dist,
    last_insp.service,
    last_insp.subject
INTO TEMP
    t1;

```

```

OUTPUT TO output/pers_cas.out
SELECT
    t1.dist,
    t1.service,
    SUM(t1.deaths) deaths,
    SUM(t1.injuries) injuries
FROM
    t1
GROUP BY
    t1.dist,
    t1.service

```

ORDER BY
t1.dist,
t1.service;

```
--          File: pol_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the amount of damage to be attributed to each MSO
-- last inspecting the vessel which had the casualty. The results are
-- grouped by vessel service and MSO and finally district.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  SUM(cpdt.in_water_spilled + cpdt.out_water_spilled) quantity
FROM
  last_insp,
  cpdt,
  civt
WHERE
  civt.subject = cpdt.subject
  AND cpdt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject
ORDER BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;
```

```
OUTPUT TO output/pol_cas.out
SELECT
  t1.dist,
  t1.service,
  SUM(t1.quantity) quantity
FROM
  t1
GROUP BY
  t1.dist,
  t1.service
```

ORDER BY
t1.dist,
t1.service;


```
--          File: prop_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the dollar amount of damage to be attributed to
-- each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
FROM
  last_insp,
  civt,
  cirt
WHERE
  cirt.mccase = civt.mccase
  AND civt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
ORDER BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;
```

```
OUTPUT TO output/prop_cas.out
SELECT
  t1.dist,
  t1.service,
  SUM(t1.total_damage) total_damage
FROM
  t1
GROUP BY
  t1.dist,
```

t1.service
ORDER BY
t1.dist,
t1.service;

OUTPUT TO output/cas_dist.out

```
--          File: cas_dist.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Determine from LAST_INSP how many casualties are to be counted against the
-- district performing the last inspection prior to the casualty.
```

```
SELECT
    last_insp.dist      district,
    last_insp.service   service,
    SUM(counter)        casualties
FROM
    last_insp
GROUP BY
    last_insp.dist,
    last_insp.service
ORDER BY
    last_insp.dist,
    last_insp.service;
```

```
OUTPUT TO output/insp_dist.out
```

```
--          File: insp_dist.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Determine from INSP how many inspections by district and vessel
-- service were performed on US vessels between the years 1992 and 1993
-- inclusive.
```

```
SELECT
    insp.dist          district,
    insp.service       service,
    SUM(insp.counter)  inspections
FROM
    insp
GROUP BY
    insp.dist,
    insp.service
ORDER BY
    insp.dist,
    insp.service;
```

```
OUTPUT TO output/in_cevt.out
```

```
--          File: counting.sql
--          Author: Michael M. Delleney
-- Date of last revision: 26 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
--
-- The purpose of the queries in this file are to determine, by MSO, MIO, and
-- service, how many of the cases involving vessel casualties are listed in
-- and out of cevt. Of those so listed as being in cevt, how many map to the
-- intervention activities outlined in "Progress Report on Project 3304.3 -
-- Research Methods to Analyze the Relationships Between the Inspection
-- Boarding Process and the Office of Marine Safety Goals: Task 3.1 -
-- Intervention Analysis, Draft TTC-1321" and how many map to "other"
-- activities.
```

```
-- Select those entries in last_insp which are also in cevt.
```

```
SELECT
  dist,
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase IN (SELECT mccase FROM cevt)
GROUP BY
  dist,
  service
ORDER BY
  dist,
  service;
```

```
OUTPUT TO output/out_cevt.out
```

```
-- Now we want to determine how many vessel casualties listed in last_insp are
-- not also listed in cevt.
```

```
SELECT
  dist,
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase NOT IN (SELECT mccase FROM cevt)
```

GROUP BY

dist,
service

ORDER BY

dist,
service;

OUTPUT TO output/intervene.out

- Select and count those entries in last_insp which do not have an "other"
- ("0") entry in cevt but have some other entry from the set "1"-"9".

SELECT

dist,
service,
SUM(counter) counter

FROM

last_insp

WHERE

mccase IN (SELECT mccase FROM cevt WHERE dtype
IN ("1","2","3","4","5","6","7","8","9"))

GROUP BY

dist,
service,
counter

ORDER BY

dist,
service,
counter;

OUTPUT TO output/other.out

- Select and count those entries in last_insp which have an "other" ("0")
- entry in cevt. Be sure and filter out those entries that do, in fact
- have intervention activities also listed.

SELECT

dist,
service,
SUM(counter) counter

FROM

last_insp

WHERE

mccase IN (SELECT mccase FROM cevt WHERE dtype IN ("0"))
AND mccase NOT IN (SELECT mccase FROM cevt WHERE dtype
IN ("1","2","3","4","5","6","7","8","9"))

GROUP BY
dist,
service
ORDER BY
dist,
service;

```
--          File: int_act_1.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Cargo Handling/Pollution Control
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "1"
GROUP BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_1.out
SELECT
  t1.dist,
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
FROM
  t1
GROUP BY
```



```
t1.dist,  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.service,  
t1.dtype;
```

```
--          File: int_act_2.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Steering/Navigation
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "2"
GROUP BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_2.out
SELECT
  t1.dist,
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
FROM
  t1
```

GROUP BY

t1.dist,

t1.service,

t1.dtype

ORDER BY

t1.dist,

t1.service,

t1.dtype;

-- File: int_act_3.sql
-- Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
-- Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Document/Paperwork
-- intervention activities from cevt.

DROP TABLE t1;

SELECT
last_insp.dist,
last_insp.service,
last_insp.subject,
cevt.dtype,
SUM(cevt.counter) counter
FROM
last_insp,
cevt
WHERE
last_insp.mccase = cevt.mccase
AND cevt.dtype = "3"
GROUP BY
last_insp.dist,
last_insp.service,
last_insp.subject,
cevt.dtype
ORDER BY
last_insp.dist,
last_insp.service,
last_insp.subject,
cevt.dtype
INTO TEMP
t1;

OUTPUT TO output/int_act_3.out
SELECT
t1.dist,
t1.service,
t1.dtype,
SUM(t1.counter) counter
FROM
t1
GROUP BY

```
t1.dist,  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.service,  
t1.dtype;
```

```
--          File: int_act_4.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Drills/Human Factors
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "4"
GROUP BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_4.out
SELECT
  t1.dist,
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
FROM
  t1
GROUP BY
```

```
t1.dist,  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.service,  
t1.dtype;
```

```
--          File: int_act_5.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Auxiliary Systems
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "5"
GROUP BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_5.out
SELECT
  t1.dist,
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
FROM
  t1
GROUP BY
```



```
t1.dist,  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.service,  
t1.dtype;
```

-- File: int_act_6.sql
-- Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
-- Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Power Plant intervention activities from cevt.

DROP TABLE t1;

SELECT
last_insp.dist,
last_insp.service,
last_insp.subject,
cevt.dtype,
SUM(cevt.counter) counter
FROM
last_insp,
cevt
WHERE
last_insp.mccase = cevt.mccase
AND cevt.dtype = "6"
GROUP BY
last_insp.dist,
last_insp.service,
last_insp.subject,
cevt.dtype
ORDER BY
last_insp.dist,
last_insp.service,
last_insp.subject,
cevt.dtype
INTO TEMP
t1;

OUTPUT TO output/int_act_6.out
SELECT
t1.dist,
t1.service,
t1.dtype,
SUM(t1.counter) counter
FROM
t1
GROUP BY
t1.dist,

t1.service,
t1.dtype
ORDER BY
t1.dist,
t1.service,
t1.dtype;

```
--          File: int_act_7.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Fire Fighting and Prevention
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "7"
GROUP BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
t1;
```

```
OUTPUT TO output/int_act_7.out
SELECT
  t1.dist,
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
FROM
  t1
GROUP BY
```

```
t1.dist,  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.service,  
t1.dtype;
```

```
--          File: int_act_8.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of HULL intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "8"
GROUP BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
t1;
```

```
OUTPUT TO output/int_act_8.out
SELECT
  t1.dist,
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
```

```
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.service,  
t1.dtype;
```

```
--          File: int_act_9.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Life Saving
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
    last_insp.dist,
    last_insp.service,
    last_insp.subject,
    cevt.dtype,
    SUM(cevt.counter) counter
FROM
    last_insp,
    cevt
WHERE
    last_insp.mccase = cevt.mccase
    AND cevt.dtype = "9"
GROUP BY
    last_insp.dist,
    last_insp.service,
    last_insp.subject,
    cevt.dtype
ORDER BY
    last_insp.dist,
    last_insp.service,
    last_insp.subject,
    cevt.dtype
INTO TEMP
    t1;
```

```
OUTPUT TO output/int_act_9.out
SELECT
    t1.dist,
    t1.service,
    t1.dtype,
    SUM(t1.counter) counter
FROM
    t1
GROUP BY
```


t1.dist,
t1.service,
t1.dtype
ORDER BY
t1.dist,
t1.service,
t1.dtype;

```

OUTPUT TO output/in_cevt.out
--          File: counting.sql
--          Author: Michael M. Delleney
-- Date of last revision: 26 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
--
-- The purpose of the queries in this file are to determine, by MSO, MIO, and
-- service, how many of the cases involving vessel casualties are listed in
-- and out of cevt. Of those so listed as being in cevt, how many map to the
-- intervention activities outlined in "Progress Report on Project 3304.3 -
-- Research Methods to Analyze the Relationships Between the Inspection
-- Boarding Process and the Office of Marine Safety Goals: Task 3.1 -
-- Intervention Analysis, Draft TTC-1321" and how many map to "other"
-- activities.

-- Select those entries in last_insp which are also in cevt.

SELECT
  dist,
  unit[1,3],
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase IN (SELECT mccase FROM cevt)
GROUP BY
  dist,
  unit[1,3],
  service
ORDER BY
  dist,
  unit[1,3],
  service;

OUTPUT TO output/out_cevt.out
-- Now we want to determine how many vessel casualties listed in last_insp are
-- not also listed in cevt.

SELECT
  dist,
  unit[1,3],

```

```

    service,
    SUM(counter) counter
FROM
    last_insp
WHERE
    mccase NOT IN (SELECT mccase FROM cevt)
GROUP BY
    dist,
    unit[1,3],
    service
ORDER BY
    dist,
    unit[1,3],
    service;

```

OUTPUT TO output/intervene.out

```

-- Select and count those entries in last_insp which do not have an "other"
-- ("0") entry in cevt but have some other entry from the set "1"-"9".

```

```

SELECT
    dist,
    unit[1,3],
    service,
    SUM(counter) counter
FROM
    last_insp
WHERE
    mccase IN (SELECT mccase FROM cevt WHERE dtype
                IN ("1","2","3","4","5","6","7","8","9"))
GROUP BY
    dist,
    unit[1,3],
    service,
    counter
ORDER BY
    dist,
    unit[1,3],
    service,
    counter;

```

OUTPUT TO output/other.out

```

-- Select and count those entries in last_insp which have an "other" ("0")
-- entry in cevt. Be sure and filter out those entries that do, in fact
-- have intervention activities also listed.

```

```

SELECT
    dist,
    unit[1,3],
    service,
    SUM(counter) counter
FROM
    last_insp
WHERE
    mccase IN (SELECT mccase FROM cevt WHERE dtype IN ("0"))
    AND mccase NOT IN (SELECT mccase FROM cevt WHERE dtype
                        IN ("1","2","3","4","5","6","7","8","9"))
GROUP BY
    dist,
    unit[1,3],
    service
ORDER BY
    dist,
    unit[1,3],
    service;

```

```
--          File: int_act_1.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Cargo Handling/Pollution Control
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "1"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_1.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_2.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Steering/Navigation
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "2"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_2.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```



```
--          File: int_act_3.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Document/Paperwork
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "3"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_3.out
```

```
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_4.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Drills/Human Factors
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "4"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_4.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_5.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Auxiliary Systems
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "5"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_5.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_6.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Power Plant intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "6"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_6.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
```

```
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```



```

--          File: int_act_7.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Fire Fighting and Prevention
-- intervention activities from cevt.

```

```

DROP TABLE t1;

```

```

SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "7"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;

```

```

OUTPUT TO output/int_act_7.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,

```

```
t1.dtype,  
SUM(t1.counter) counter  
FROM  
t1  
GROUP BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype;
```

```
--          File: int_act_8.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of HULL intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "8"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_8.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
```

```
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_9.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Life Saving
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "9"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_9.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```

--          File: per_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the number of deaths and injuries to be
-- attributed to each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.

```

```
--DROP TABLE t1;
```

```

SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  SUM(cpct.ddead) deaths,
  SUM(cpct.dinjury) injuries
FROM
  last_insp,
  cpct
WHERE
  last_insp.subject = cpct.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;

```

```

OUTPUT TO output/per_cas.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.deaths) deaths,
  SUM(t1.injuries) injuries

```

```
FROM  
  t1  
GROUP BY  
  t1.dist,  
  t1.unit[1,3],  
  t1.service  
ORDER BY  
  t1.dist,  
  t1.unit[1,3],  
  t1.service;
```



```

--          File: pol_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the amount of damage to be attributed to each MSO
-- last inspecting the vessel which had the casualty. The results are
-- grouped by vessel service and MSO and finally district.

```

```

DROP TABLE t1;

```

```

SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  SUM(cpd.in_water_spilled + cpdt.out_water_spilled) quantity
FROM
  last_insp,
  cpdt,
  civt
WHERE
  civt.subject = cpdt.subject
  AND cpdt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;

```

```

OUTPUT TO output/pol_cas.out

```

```

SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.quantity) quantity
FROM

```

```
t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service
```

```
--          File: prop_cas.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- This file calculates the dollar amount of damage to be attributed to
-- each MSO last inspecting the vessel which had the casualty.
-- The results are grouped by vessel service and MSO and finally district.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
FROM
  last_insp,
  civt,
  cirt
WHERE
  cirt.mccase = civt.mccase
  AND civt.subject = last_insp.subject
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cirt.total_damage
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject
INTO TEMP
  t1;
```

```
OUTPUT TO output/prop_cas.out
```

```
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  SUM(t1.total_damage) total_damage
```

```

FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service;

OUTPUT TO output/cas_mso.out
--          File: cas_mso.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Determine from LAST_INSP how many casualties are to be counted against the
-- district/unit performing the last inspection prior to the casualty.

SELECT
  last_insp.dist      district,
  last_insp.unit[1,3] mso,
  last_insp.service   service,
  SUM(counter)        casualties
FROM
  last_insp
GROUP BY
  last_insp.dist,
  last_insp.unit[1,3],
  last_insp.service
ORDER BY
  last_insp.dist,
  last_insp.unit[1,3],
  last_insp.service;

```

```

OUTPUT TO output/insp_mso.out
--           File: insp_mso.sql
--           Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--           Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Determine from INSP how many inspections by district, unit, and vessel
-- service were performed on US vessels between the years 1992 and 1993
-- inclusive.

```

```

SELECT
    insp.dist          district,
    insp.unit[1,3]     mso,
    insp.service        service,
    SUM(insp.counter)  inspections
FROM
    insp
GROUP BY
    insp.dist,
    insp.unit[1,3],
    insp.service
ORDER BY
    insp.dist,
    insp.unit[1,3],
    insp.service;

```

```

OUTPUT TO output/in_cevt.out
--           File: counting.sql
--           Author: Michael M. Delleney
-- Date of last revision: 26 AUG 1994
--           Environment: Informix Online 5.01 and I-SQL 4.11
--
--
-- The purpose of the queries in this file are to determine, by MSO, MIO, and
-- service, how many of the cases involving vessel casualties are listed in
-- and out of cevt. Of those so listed as being in cevt, how many map to the
-- intervention activities outlined in "Progress Report on Project 3304.3 -
-- Research Methods to Analyze the Relationships Between the Inspection
-- Boarding Process and the Office of Marine Safety Goals: Task 3.1 -
-- Intervention Analysis, Draft TTC-1321" and how many map to "other"
-- activities.

-- Select those entries in last_insp which are also in cevt.

SELECT
  dist,
  unit[1,3],
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase IN (SELECT mccase FROM cevt)
GROUP BY
  dist,
  unit[1,3],
  service
ORDER BY
  dist,
  unit[1,3],
  service;

OUTPUT TO output/out_cevt.out
-- Now we want to determine how many vessel casualties listed in last_insp are
-- not also listed in cevt.

```

```

SELECT
  dist,
  unit[1,3],

```

```

    service,
    SUM(counter) counter
FROM
    last_insp
WHERE
    mccase NOT IN (SELECT mccase FROM cevt)
GROUP BY
    dist,
    unit[1,3],
    service
ORDER BY
    dist,
    unit[1,3],
    service;

```

OUTPUT TO output/intervene.out

```

-- Select and count those entries in last_insp which do not have an "other"
-- ("0") entry in cevt but have some other entry from the set "1"-"9".

```

```

SELECT
    dist,
    unit[1,3],
    service,
    SUM(counter) counter
FROM
    last_insp
WHERE
    mccase IN (SELECT mccase FROM cevt WHERE dtype
                IN ("1","2","3","4","5","6","7","8","9"))
GROUP BY
    dist,
    unit[1,3],
    service,
    counter
ORDER BY
    dist,
    unit[1,3],
    service,
    counter;

```

OUTPUT TO output/other.out

```

-- Select and count those entries in last_insp which have an "other" ("0")
-- entry in cevt. Be sure and filter out those entries that do, in fact
-- have intervention activities also listed.

```

```
SELECT
  dist,
  unit[1,3],
  service,
  SUM(counter) counter
FROM
  last_insp
WHERE
  mccase IN (SELECT mccase FROM cevt WHERE dtype IN ("0"))
  AND mccase NOT IN (SELECT mccase FROM cevt WHERE dtype
    IN ("1","2","3","4","5","6","7","8","9"))
GROUP BY
  dist,
  unit[1,3],
  service
ORDER BY
  dist,
  unit[1,3],
  service;
```



```
--          File: int_act_1.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Cargo Handling/Pollution Control
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "1"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_1.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_2.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Steering/Navigation
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "2"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_2.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_3.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Document/Paperwork
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "3"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_3.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
```

```
t1.dtype,  
SUM(t1.counter) counter  
FROM  
t1  
GROUP BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype  
ORDER BY  
t1.dist,  
t1.unit[1,3],  
t1.service,  
t1.dtype;
```

```
--          File: int_act_4.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Drills/Human Factors
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "4"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_4.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```



```
--          File: int_act_5.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Auxiliary Systems
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "5"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_5.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_6.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Power Plant intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "6"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_6.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
```

```
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_7.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Fire Fighting and Prevention
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "7"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_7.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

```
--          File: int_act_8.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of HULL intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "8"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_8.out
```

```
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
  SUM(t1.counter) counter
```

```
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```



```
--          File: int_act_9.sql
--          Author: Michael M. Delleney
-- Date of last revision: 18 AUG 1994
--          Environment: Informix Online 5.01 and I-SQL 4.11
--
-- Finds and totals the number of Life Saving
-- intervention activities from cevt.
```

```
DROP TABLE t1;
```

```
SELECT
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype,
  SUM(cevt.counter) counter
FROM
  last_insp,
  cevt
WHERE
  last_insp.mccase = cevt.mccase
  AND cevt.dtype = "9"
GROUP BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
ORDER BY
  last_insp.dist,
  last_insp.unit,
  last_insp.service,
  last_insp.subject,
  cevt.dtype
INTO TEMP
  t1;
```

```
OUTPUT TO output/int_act_9.out
SELECT
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype,
```

```
SUM(t1.counter) counter
FROM
  t1
GROUP BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype
ORDER BY
  t1.dist,
  t1.unit[1,3],
  t1.service,
  t1.dtype;
```

B.3 INFORMIX Query Files For the Econometric Analysis

This appendix contains the SQL programs used to query the MSMS database and construct the data sets used in the econometric analysis. The programs are written in INFORMIX (ISQL) and are easily translated into other SQL-based database software that are designed to manage relational databases such as SYBASE. Minor syntax modifications may be needed before these programs can be implemented from SQL-based software other than INFORMIX.

The program names appear in bold and the following contains the sequence of runs required to create each econometric data set. Programs must be run in the order in which they appear in the instructions below.

I. Poisson Model runs for Level I and Level III activities, MI and PS cases.

(i) MI Cases

1. Level I: Run MIINSP1.SQL, MIINSP2.SQL, MIINSP3.SQL.
Then run MIPERS1.SQL, and MIPERS2.SQL for Personnel casualties, and MIPERS1.SQL, and MIPERS2.SQL for Pollution casualties.
2. Level III: Run MID3139.SQL. It includes everything from start to finish, but takes 4-5 hours to run.

(ii) PS Cases

1. Level I: Run PSINSP1.SQL, PSINSP2.SQL, PSINSP3.SQL.
Then run PSPERS1.SQL, and PSPERS2.SQL for Personnel casualties, and PSPERS1.SQL, and PSPERS2.SQL for Pollution casualties.

II. Duration Model runs for Level II activities: U.S. flag (A-activities), Foreign flag (B-activities)

(i) A-activities

1. Level II: Run DUR_A1.SQL, DUR_A2.SQL, DUR_A3.SQL duration data sets for each activity, A1, A2, A3, respectively.

(ii) B-activities

2. Level II: Run DUR_B.SQL. Since the activities B1, B2, and B3 are distinguished by vessel service, separate analysis by service is done in the econometric analysis. The SQL program produces just one data set (that includes all services).

PROGRAMS FOR POISSON DATA SETS

MIINSP1.SQL

{For the hours of inspection equation have (i) num_def from IRIT and
(ii) indicators for inspection types from both CRST and IRIT added up here.
Need to check them against each other for integrity, and also the average
for the data set to see if they make sense. See handout for logic of their
inclusion in the manner of this program}

{This joins CRST and IRIT by case and aggregates CRST hours by IRIT's vkey
This is different from earlier programs only in that VILT was being used.
Upon USCG (Dr. Hantzes) recommendation (June meeting), IRIT is used instead}

{drop table crst_temp0}

```
select
  irit.vkey iritvkey,
  count(*) numcases, sum(hr_hull) hull_hr, sum(hr_mach) mach_hr,
  sum(hr_train) train_hr, sum(hr_extra) extra_hr, sum(hr_textra) textra_hr,
  sum(hr_admin) admin_hr, sum(hr_travel) travel_hr, sum(hr_ttravel) ttravel_hr,
  sum(hr_other) other_hr,
  sum(irit.num_def) num_def,
  sum(irit.dinit) iritinit, sum(irit.dcert) iritcert,
  sum(irit.dreinsp) iritreinsp, sum(irit.dcoc) iritcoc, sum(irit.dhull) irithull,
  sum(irit.dother) iritother, sum(irit.dadmin) iritadmin,
  sum(crst.dannual) crstannual, sum(crst.dreinsp) crstreinsp,
  sum(crst.dadmin) crstadmin, sum(crst.dhull) crsthull, sum(crst.dcoc) crstcoc,
  sum(crst.dconstr) crstconstr, sum(crst.dcert) crstcert,
  sum(crst.dinit) crstinit, sum(crst.dmach) crstmach, sum(crst.ddeficit) crstdef,
  sum(crst.dother) crstother, sum(crst.drest) crstrest
```

from crst, irit

{Note the date >= 89. This is since only post-91 casualties are being
considered. Hence choose a year with which I am comfortable (years to
failure is not badly measured so that it affects the results. can try
with other years e.g. 90, 88 as well).}

```
where
  irit.micase[1,2]="MI" and
  irit.vkey[1,2]="VN" and
  crst.case[1,2]="MI" and
  crst.case[3,4]>="89" and
  crst.case=irit.micase
```

```
group by irit.vkey
into temp crst_temp0;
```

```
select count(*) countcrst_temp0
from crst_temp0;
```

MIINSP2.SQL

{This file joins CRST_TEMP0 (agg hours by vkey) to VIDT to identify the flag:
service, flag, reg_gt, bld_yr, route.}

{drop table vidtcrst;}

```
select
  crst_temp0.*,
  vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
  year(vidt.bld_dt) yearbld, vidt.route route,
  {These have many nulls and are used only for model of inspection if adequate}
  vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat

from crst_temp0, vidt
where
  crst_temp0.iritvkey=vidt.vkey and
  (
    vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
    vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
    vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)
  ) and
  vidt.flag="US"
into temp vidtcrst;

select count(*)
from vidtcrst;
```

MIINSP3.SQL

{Check to see if numbers make sense}

```
select count(*) observations, avg(hull_hr) AVG_hullhr, avg(mach_hr) AVG_machhr,  
      avg(admin_hr) AVG_adminhr, avg(reg_gt) AVG_reggt  
from persinsp;
```

```
select iritvkey, hull_hr, mach_hr, admin_hr, reg_gt  
from persinsp  
order by hull_hr;
```

MIPERS1.SQL

(Be sure to run MIINSP1 and MIINSP2 before these two progs)
(No incident date. But since MINMOD, post-1991(few 91s mostly 92,93))

{ Here, casualty data is assembled from CIVT and CIRT.
CIRT, and CIVT are joined by (unique) Mccase and select out only
deep-draft vessels (hence a little use of VIDT). Personnel casualties are
constructed from CIRT (which has no vkey) and joined to CIVT to associate
them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821
records, 13,548 have unique Vkey), so we need to choose only unique records}

```
{
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
}
select
    civt.vkey civtvkey,deaths,missing,injured,incident_dt
```

```
from cirt, civt, vidt
(Note that in CIVT, the vkey is not unique (in VIDT vkey is unique). Hence
first get temp table civt_dups (with duplicates). Then check for number
of duplicates before grouping by vkey)
```

```
where
    cirt.mccase=civt.mccase and
    civt.vkey=vidt.vkey and
```

{Jim Law: conversion on July 14, 1994. The following query contracts
CIRT to cases that are correct (drop mystery and inconsequential
casualties). ctf_ind=X are inconsequential cases. command_endorse and
command_cls are mutually exclusive. command_endorse=X implies that
case has been reviewed and fwd to dt/HQ for review. command_cls=X means that
case is done and does not require review at dt/HQ. command_endorse=X are
legit cases and all should be considered. Of the command_cls=X cases, only
those with ctf_ind=null should be considered since ctf_ind=X implies an
inconsequential case. }

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and
```

```
(cirt.deaths>0 or cirt.missing>0 or cirt.injured>0) and
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
vidt.reg_gt>=100) )
```

```
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

{This set of statements selects non-duplicate rows in civt_dup. If group
by just civtvkey,incident_dt, get almost same rows as this}

```
select * from civt_dups
group by civtvkey,incident_dt, deaths,missing,injured
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;
```

(group by vkey to attach to the inspections file. Note that numdates now
gives the number of unique incident dates associated with that vessel)
select civtvkey, sum(deaths) deaths, sum(missing) missing,
sum(injured) injured, count(unique incident_dt) numdates


```
from civt_nodups
group by civtvkey
order by deaths desc, injured desc, numdates desc
into temp cirt_civt0;

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)
```

MIPERS2.SQL

```
{drop table persinsp;}
```

```
select unique vidtcrst.*, cirt_civt0.*  
from vidtcrst, outer cirt_civt0  
where cirt_civt0.civtvkey=vidtcrst.iritvkey  
into temp persinsp;
```

```
select unique iritvkey  
from persinsp  
into temp junk0;  
select count(*) chekpersinsp  
from junk0;  
drop table junk0;
```

```
{Count number of casualty vkeys that Are in vidtcrst}  
select count(*) vidtcrst_keep  
from persinsp  
where civtvkey is not null;
```

```
unload to "/nfs/ttd32/optical/50b/trix.dat/mi.pers" delimiter ","  
select *  
from persinsp;
```

```
{print this out to see the variable names and format for use in ATOG cmd file}  
output to /users/gawande/mipers.out  
select *  
from persinsp  
where reg_gt>100000;
```

MIPOLL1.SQL

{Be sure to run MIINSP1 and MIINSP2 before these two progs}

{ Here, pollution casualty data is assembled from CIVT and CIRT. CIRT, and CIVT are joined by (unique) Mccase and select out only deep-draft vessels (hence a little use of VIDT). Pollution incidents are constructed from CIRT (which has no vkey) and joined to CIVT to associate them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821 records, 13,548 have unique Vkey), so we need to choose only unique records)

```
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
```

```
select
  civt.vkey civtvkey, incident_dt
from cirt, civt, vidt
{Note that using VIDT for the reg_gt>100 info and hence need Unique in select
statement since in CIVT, the vkey is not unique (in VIDT vkey is unique)}
where
  cirt.mccase=civt.mccase and
  civt.vkey=vidt.vkey and
  civt.flag="US" and
```

{Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case. }

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and
```

```
cirt.mcpd_ind>=1 and
(cirt.pol_ind="X" or pri_nature="POLLUTION") and
```

{To select Only BAD cases, unblock this statement}
{severity in ("MAJOR","POTENT","MEDIUM") and}

```
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
  vidt.reg_gt>=100) )
```

```
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

{This set of statements selects non-duplicate rows in civt_dup. If group by just civtvkey,incident_dt, get almost same rows as this}

```
select * from civt_dups
group by civtvkey,incident_dt
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;
```

{group by vkey to attach to the inspections file. Note that numdates now

```
gives the number of unique incident dates associated with that vessel)
select civtvkey, count(*) poll_incids
from civt_nodups
group by civtvkey
order by poll_incids desc
into temp cirt_civt0;

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)
```

MIPOLL2.SQL

```
{drop table pollinsp;}

select unique vidtcrst.*, cirt_civt0.*
from vidtcrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtcrst.iritvkey
into temp pollinsp;

{count number of unique inspection vkeys in final data set}
select unique iritvkey
from pollinsp
into temp junk0;
select count(*) chekpollinsp
from junk0;
drop table junk0;

{Count number of casualty vkeys that Are in vidtcrst}
select count(*) vidtcrst_keep
from pollinsp
where civtvkey is not null;

unload to "/nfs/ttd32/optical/50b/trix.dat/mi.pollall" delimiter ","
select *
from pollinsp;

{print this out to see the variable names and format for use in ATOG cmd file}
output to /users/gawande/mipollall.out
select *
from pollinsp
where reg_gt>100000;
```

MID3139.SQL

{MI Cases}

{This program After resolution of Level III activity discrimination problem Use of Peggy's mapping, but proportion the hours equally wherever one CRST activity type maps into more than one Level III activity. See also readme.doc file. The way this is accomplished is by using, instead of dummies in d3x variables, we use fractions to proportion the hours.}

{Another modif to old file is that numd3x is deleted since no longer have dummies from Mike but have the fraction that proportions the hours in the 1-to-many mapping cases. Instead, the number of cases in "d3xcases" serves the same purpose}

{Level III activities. This is a long run. Each of the 9 activities have associated with them hull, machinery, and admin hours. So there are 9 separate crst_temp0 runs. They are then joined into one file comprising these 3 inspections for each of the 9 activities. This broad file is then joined with casualty data to get the data set for Level III analysis}

{This is Not a duration analysis, just Poisson/Probit/Regression analysis}

{1. Fill in for d3x in 3 places appropriately, to change Level III activity}

{For the hours of inspection equation have (i) num_def from IRIT and (ii) indicators for inspection types for other CRST inspections}

{*****HOOURS of INSPECTIONS*****}

{First we make a "vkey file" which is the base file with a full list of vkeys (relevant to us) to use for joining the 9 crst files for Level III activities: 31-39}

{vkey file}

```
select
  irit.vkey iritvkey
from irit, crst
where
  irit.micase[1,2]="MI" and
  irit.vkey[1,2]="VN" and
  crst.case[1,2]="MI" and
  crst.case[3,4]>="89" and
  crst.case=irit.micase
```

```
group by irit.vkey
into temp crst_vkey;
```

```
select count(*) count_crstvkey
from crst_vkey;
```

{Now there are 9 hours of inspection files, one for each Level III activity, 31-39.}

{d31}

```
select
  irit.vkey d31vkey, count(*) d31cases,
  sum(hr_hull*d31) d31hhr, sum(hr_mach*d31) d31mhr, sum(hr_admin*d31) d31ahr,
  sum(irit.num_def) d31_ndef,
```

```
{CRST types of inspections: only Major ones to show these Level III activities
are a sub-part of these}
sum(crst.dannual) d31ann, sum(crst.dreinsp) d31re, sum(crst.dadmin) d31ad,
sum(crst.dhull1) d31h, sum(crst.dconstr) d31con, sum(crst.dcert) d31coi,
sum(crst.dinit) d31ini
```

```
from crst, irit
```

{Note the date >= 89. This is since only post-91 casualties are being considered. Hence choose a year with which I am comfortable (years to failure is not badly measured so that it affects the results. can try with other years e.g. 90, 88 as well).}

{Important Note: If the analysis is by vkey And iritdate, then Only consider inspections after 1/91}

```
where
```

```
{since considering activity III.x (fill in x appropriately)}
crst.d31>0 and
```

```
irit.micase[1,2]="MI" and
irit.vkey[1,2]="VN" and
crst.case[1,2]="MI" and
crst.case[3,4]>="89" and
crst.case=irit.micase
```

```
group by irit.vkey
into temp crst_d31;
```

```
select count(*) countcrst_d31
from crst_d31;
```

```
{d32}
```

```
select
```

```
irit.vkey d32vkey, count(*) d32cases,
sum(hr_hull*d32) d32hhr, sum(hr_mach*d32) d32mhr, sum(hr_admin*d32) d32ahr,
sum(irit.num_def) d32_ndef,
```

{CRST types of inspections: only Major ones to show these Level III activities are a sub-part of these}

```
sum(crst.dannual) d32ann, sum(crst.dreinsp) d32re, sum(crst.dadmin) d32ad,
sum(crst.dhull1) d32h, sum(crst.dconstr) d32con, sum(crst.dcert) d32coi,
sum(crst.dinit) d32ini
```

```
from crst, irit
```

{Note the date >= 89. This is since only post-91 casualties are being considered. Hence choose a year with which I am comfortable (years to failure is not badly measured so that it affects the results. can try with other years e.g. 90, 88 as well).}

{Important Note: If the analysis is by vkey And iritdate, then Only consider inspections after 1/91}

```
where
```

```
{since considering activity III.x (fill in x appropriately)}
crst.d32>0 and
```

```
irit.micase[1,2]="MI" and
irit.vkey[1,2]="VN" and
crst.case[1,2]="MI" and
crst.case[3,4]>="89" and
crst.case=irit.micase
```

```
group by irit.vkey
into temp crst_d32;
```

```
select count(*) countcrst_d32
from crst_d32;
```

```
{d33}
select
  irit.vkey d33vkey, count(*) d33cases,
  sum(hr_hull*d33) d33hhr, sum(hr_mach*d33) d33mhr, sum(hr_admin*d33) d33ahr,
  sum(irit.num_def) d33_ndef,
  {CRST types of inspections: only Major ones to show these Level III activities
  are a sub-part of these}
  sum(crst.dannual) d33ann, sum(crst.dreinsp) d33re, sum(crst.dadmin) d33ad,
  sum(crst.dhull) d33h, sum(crst.dconstr) d33con, sum(crst.dcert) d33coi,
  sum(crst.dinit) d33ini

from crst, irit
```

(Note the date >= 89. This is since only post-91 casualties are being considered. Hence choose a year with which I am comfortable (years to failure is not badly measured so that it affects the results. can try with other years e.g. 90, 88 as well).)

{Important Note: If the analysis is by vkey And iritdate, then Only consider inspections after 1/91}

```
where
  {since considering activity III.x (fill in x appropriately)}
  crst.d33>0 and
```

```
  irit.micase[1,2]="MI" and
  irit.vkey[1,2]="VN" and
  crst.case[1,2]="MI" and
  crst.case[3,4]>="89" and
  crst.case=irit.micase
```

```
group by irit.vkey
into temp crst_d33;
```

```
select count(*) countcrst_d33
from crst_d33;
```

```
{d34}
select
  irit.vkey d34vkey, count(*) d34cases,
  sum(hr_hull*d34) d34hhr, sum(hr_mach*d34) d34mhr, sum(hr_admin*d34) d34ahr,
  sum(irit.num_def) d34_ndef,
  {CRST types of inspections: only Major ones to show these Level III activities
  are a sub-part of these}
  sum(crst.dannual) d34ann, sum(crst.dreinsp) d34re, sum(crst.dadmin) d34ad,
  sum(crst.dhull) d34h, sum(crst.dconstr) d34con, sum(crst.dcert) d34coi,
  sum(crst.dinit) d34ini
```

```
from crst, irit
```

(Note the date >= 89. This is since only post-91 casualties are being considered. Hence choose a year with which I am comfortable (years to failure is not badly measured so that it affects the results. can try with other years e.g. 90, 88 as well).)

{Important Note: If the analysis is by vkey And iritdate, then Only consider inspections after 1/91}

```
where
  {since considering activity III.x (fill in x appropriately)}
```



```

    crst.d34>0 and

    irit.micase[1,2]="MI" and
    irit.vkey[1,2]="VN" and
    crst.case[1,2]="MI" and
    crst.case[3,4]>="89" and
    crst.case=irit.micase

group by irit.vkey
into temp crst_d34;

select count(*) countcrst_d34
from crst_d34;

{d35}
select
    irit.vkey d35vkey, count(*) d35cases,
    sum(hr_hull*d35) d35hhr, sum(hr_mach*d35) d35mhr, sum(hr_admin*d35) d35ahr,
    sum(irit.num_def) d35_ndef,
    {CRST types of inspections: only Major ones to show these Level III activities
    are a sub-part of these}
    sum(crst.dannual) d35ann, sum(crst.dreinsp) d35re, sum(crst.dadmin) d35ad,
    sum(crst.dhull) d35h, sum(crst.dconstr) d35con, sum(crst.dcert) d35coi,
    sum(crst.dinit) d35ini

from crst, irit

{Note the date >= 89. This is since only post-91 casualties are being
considered. Hence choose a year with which I am comfortable (years to
failure is not badly measured so that it affects the results. can try
with other years e.g. 90, 88 as well).}
{Important Note: If the analysis is by vkey And iritdate, then Only
consider inspections after 1/91}
where
    {since considering activity III.x (fill in x appropriately)}
    crst.d35>0 and

    irit.micase[1,2]="MI" and
    irit.vkey[1,2]="VN" and
    crst.case[1,2]="MI" and
    crst.case[3,4]>="89" and
    crst.case=irit.micase

group by irit.vkey
into temp crst_d35;

select count(*) countcrst_d35
from crst_d35;

{d36}
select
    irit.vkey d36vkey, count(*) d36cases,
    sum(hr_hull*d36) d36hhr, sum(hr_mach*d36) d36mhr, sum(hr_admin*d36) d36ahr,
    sum(irit.num_def) d36_ndef,
    {CRST types of inspections: only Major ones to show these Level III activities
    are a sub-part of these}
    sum(crst.dannual) d36ann, sum(crst.dreinsp) d36re, sum(crst.dadmin) d36ad,
    sum(crst.dhull) d36h, sum(crst.dconstr) d36con, sum(crst.dcert) d36coi,
    sum(crst.dinit) d36ini

```

```
from crst, irit
```

(Note the date >= 89. This is since only post-91 casualties are being considered. Hence choose a year with which I am comfortable (years to failure is not badly measured so that it affects the results. can try with other years e.g. 90, 88 as well).)

(Important Note: If the analysis is by vkey And iritdate, then Only consider inspections after 1/91)

```
where
```

```
{since considering activity III.x (fill in x appropriately)}  
crst.d36>0 and
```

```
irit.micase[1,2]="MI" and  
irit.vkey[1,2]="VN" and  
crst.case[1,2]="MI" and  
crst.case[3,4]>="89" and  
crst.case=irit.micase
```

```
group by irit.vkey  
into temp crst_d36;
```

```
select count(*) countcrst_d36  
from crst_d36;
```

```
{d37}
```

```
select
```

```
irit.vkey d37vkey, count(*) d37cases,  
sum(hr_hull*d37) d37hhr,sum(hr_mach*d37) d37mhr,sum(hr_admin*d37) d37ahr,  
sum(irit.num_def) d37_ndef,
```

(CRST types of inspections: only Major ones to show these Level III activities are a sub-part of these)

```
sum(crst.dannual) d37ann, sum(crst.dreinsp) d37re, sum(crst.dadmin) d37ad,  
sum(crst.dhull) d37h, sum(crst.dconstr) d37con,sum(crst.dcert) d37coi,  
sum(crst.dinit) d37ini
```

```
from crst, irit
```

(Note the date >= 89. This is since only post-91 casualties are being considered. Hence choose a year with which I am comfortable (years to failure is not badly measured so that it affects the results. can try with other years e.g. 90, 88 as well).)

(Important Note: If the analysis is by vkey And iritdate, then Only consider inspections after 1/91)

```
where
```

```
{since considering activity III.x (fill in x appropriately)}  
crst.d37>0 and
```

```
irit.micase[1,2]="MI" and  
irit.vkey[1,2]="VN" and  
crst.case[1,2]="MI" and  
crst.case[3,4]>="89" and  
crst.case=irit.micase
```

```
group by irit.vkey  
into temp crst_d37;
```

```
select count(*) countcrst_d37  
from crst_d37;
```

```
{d38}
select
  irit.vkey d38vkey, count(*) d38cases,
  sum(hr_hull*d38) d38hhr, sum(hr_mach*d38) d38mhr, sum(hr_admin*d38) d38ahr,
  sum(irit.num_def) d38_ndef,
{CRST types of inspections: only Major ones to show these Level III activities
are a sub-part of these}
  sum(crst.dannual) d38ann, sum(crst.dreinsp) d38re, sum(crst.dadmin) d38ad,
  sum(crst.dhull) d38h, sum(crst.dconstr) d38con, sum(crst.dcert) d38coi,
  sum(crst.dinit) d38ini
```

```
from crst, irit
```

{Note the date >= 89. This is since only post-91 casualties are being considered. Hence choose a year with which I am comfortable (years to failure is not badly measured so that it affects the results. can try with other years e.g. 90, 88 as well).}

{Important Note: If the analysis is by vkey And iritdate, then Only consider inspections after 1/91}

where

```
{since considering activity III.x (fill in x appropriately))
crst.d38>0 and
```

```
  irit.micase[1,2]="MI" and
  irit.vkey[1,2]="VN" and
  crst.case[1,2]="MI" and
  crst.case[3,4]>="89" and
  crst.case=irit.micase
```

```
group by irit.vkey
into temp crst_d38;
```

```
select count(*) countcrst_d38
from crst_d38;
```

```
{d39}
select
  irit.vkey d39vkey, count(*) d39cases,
  sum(hr_hull*d39) d39hhr, sum(hr_mach*d39) d39mhr, sum(hr_admin*d39) d39ahr,
  sum(irit.num_def) d39_ndef,
{CRST types of inspections: only Major ones to show these Level III activities
are a sub-part of these}
  sum(crst.dannual) d39ann, sum(crst.dreinsp) d39re, sum(crst.dadmin) d39ad,
  sum(crst.dhull) d39h, sum(crst.dconstr) d39con, sum(crst.dcert) d39coi,
  sum(crst.dinit) d39ini
```

```
from crst, irit
```

{Note the date >= 89. This is since only post-91 casualties are being considered. Hence choose a year with which I am comfortable (years to failure is not badly measured so that it affects the results. can try with other years e.g. 90, 88 as well).}

{Important Note: If the analysis is by vkey And iritdate, then Only consider inspections after 1/91}

where

```
{since considering activity III.x (fill in x appropriately))
crst.d39>0 and
```

```
  irit.micase[1,2]="MI" and
  irit.vkey[1,2]="VN" and
```

```

        crst.case[1,2]="MI" and
        crst.case[3,4]>="89" and
        crst.case=irit.micase

group by irit.vkey
into temp crst_d39;

select count(*) countcrst_d39
from crst_d39;

{*****
  Join the 9 crst_d3x files into a big file: crst_temp0
*****}

select crst_vkey.iritvkey,
crst_d31.*,crst_d32.*,crst_d33.*,crst_d34.*,crst_d35.*,crst_d36.*,
crst_d37.*,crst_d38.*,crst_d39.*
from      crst_vkey,Outer crst_d31,Outer crst_d32,Outer crst_d33,
         Outer crst_d34,Outer crst_d35,Outer crst_d36,
         Outer crst_d37,Outer crst_d38,Outer crst_d39
where     crst_vkey.iritvkey=crst_d31.d31vkey and
         crst_vkey.iritvkey=crst_d32.d32vkey and
         crst_vkey.iritvkey=crst_d33.d33vkey and
         crst_vkey.iritvkey=crst_d34.d34vkey and
         crst_vkey.iritvkey=crst_d35.d35vkey and
         crst_vkey.iritvkey=crst_d36.d36vkey and
         crst_vkey.iritvkey=crst_d37.d37vkey and
         crst_vkey.iritvkey=crst_d38.d38vkey and
         crst_vkey.iritvkey=crst_d39.d39vkey
into temp crst_temp0;

{*****
Join the Inspections file (big one) with vessel characteristics in VIDT
*****}

(This file joins CRST_TEMP0 (agg hours by vkey) to VIDT to identify the foll:
 service, flag, reg_gt, bld_yr, route.)

(drop table vidtcrst;)

select
  crst_temp0.*,
  vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
  year(vidt.bld_dt) yearbld, vidt.route route,
{These have many nulls and are used only for model of inspection if adequate}
  vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat

from crst_temp0, vidt
where
  crst_temp0.iritvkey=vidt.vkey and
  (
    vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
    vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
    vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)
  ) and
  vidt.flag="US"
into temp vidtcrst;

select count(*) num_vidtcrst

```

from vidtcrst;

```
{*****
      Personnel Casualties: Construct cirt_civt0, join with
      Inspections, and unload to disk
*****}
```

{No incident date. But since MINMOD, post-1991(few 91s mostly 92,93)}

{ Here, casualty data is assembled from CIVT and CIRT.
CIRT, and CIVT are joined by (unique) Mccase and select out only
deep-draft vessels (hence a little use of VIDT). Personnel casualties are
constructed from CIRT (which has no vkey) and joined to CIVT to associate
them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821
records, 13,548 have unique Vkey), so we need to choose only unique records)

```
{
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
}
select
  civt.vkey civtvkey,deaths,missing,injured,incident_dt
```

from cirt, civt, vidt
(Note that in CIVT, the vkey is not unique (in VIDT vkey is unique). Hence
first get temp table civt_dups (with duplicates). Then check for number
of duplicates before grouping by vkey)

where
 cirt.mccase=civt.mccase and
 civt.vkey=vidt.vkey and

{Jim Law: conversion on July 14, 1994. The following query contracts
CIRT to cases that are correct (drop mystery and inconsequential
casualties). ctf_ind=X are inconsequential cases. command_endorse and
command_cls are mutually exclusive. command_endorse=X implies that
case has been reviewed and fwd to dt/HQ for review. command_cls=X means that
case is done and does not require review at dt/HQ. command_endorse=X are
legit cases and all should be considered. Of the command_cls=X cases, only
those with ctf_ind=null should be considered since ctf_ind=X implies an
inconsequential case. }

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and

(cirt.deaths>0 or cirt.missing>0 or cirt.injured>0) and
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
  ((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
    vidt.reg_gt>=100) )
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

{This set of statements selects non-duplicate rows in civt_dup. If group
by just civtvkey,incident_dt, get almost same rows as this}

```
select * from civt_dups
group by civtvkey,incident_dt, deaths,missing,injured
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;
```

```
{group by vkey to attach to the inspections file. Note that numdates now
  gives the number of unique incident dates associated with that vessel}
select civtvkey, sum(deaths) deaths, sum(missing) missing,
  sum(injured) injured, count(unique incident_dt) numdates
```

```
from civt_nodups
group by civtvkey
order by deaths desc, injured desc, numdates desc
into temp cirt_civt0;
```

```
select count(*) num_cirtcivt0
from cirt_civt0;
{drop table cirt_civt0;}
```

```
{drop table persinsp;}
```

```
select unique vidtcrst.*, cirt_civt0.*
from vidtcrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtcrst.iritvkey
into temp persinsp;
```

```
select unique iritvkey
from persinsp
into temp junk0;
select count(*) chekpersinsp
from junk0;
drop table junk0;
```

```
{Count number of casualty vkeys that Are in vidtcrst}
select count(*) vidtcrst_keep
from persinsp
where civtvkey is not null;
```

```
unload to "/nfs/ttd32/optical/50b/trix.dat/mi_d3139.pers" delimiter ","
select *
from persinsp;
```

```
select      count(*) numrows, sum(d31hhr) d31hhr, sum(d31mhr) d31mhr,
            sum(d31ahr) d31ahr
from persinsp;
select      count(*) numrows, sum(d39hhr) d39hhr, sum(d39mhr) d39mhr,
            sum(d39ahr) d39ahr
from persinsp;
```

```
{print this out for var names to an output file since need also to print for
  pollution data set}
output to /users2/gawande/mid3139_pers.out
select *
from persinsp
where reg_gt>100000;
```

```
{*****
      Pollution Casualties: Construct cirt_civt0, join with
      Inspections, and unload to disk
*****}
```

```
{ Here, pollution casualty data is assembled from CIVT and CIRT.
  CIRT, and CIVT are joined by (unique) Mccase and select out only
```

deep-draft vessels (hence a little use of VIDT). Pollution incidents are constructed from CIRT (which has no vkey) and joined to CIVT to associate them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821 records, 13,548 have unique Vkey), so we need to choose only unique records)

```
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
```

```
select
    civt.vkey civtvkey, incident_dt
```

```
from cirt, civt, vidt
```

{Note that using VIDT for the reg_gt>100 info and hence need Unique in select statement since in CIVT, the vkey is not unique (in VIDT vkey is unique)}

where

```
cirt.mccase=civt.mccase and
civt.vkey=vidt.vkey and
civt.flag="US" and
```

{Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case. }

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and
```

```
cirt.mcpd_ind>=1 and
(cirt.pol_ind="X" or pri_nature="POLLUTION") and
```

{To select Only BAD cases, unblock this statement}
(severity in ("MAJOR","POTENT","MEDIUM") and)

```
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
vidt.reg_gt>=100) )
```

```
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

{This set of statements selects non-duplicate rows in civt_dup. If group by just civtvkey,incident_dt, get almost same rows as this}

```
select * from civt_dups
group by civtvkey,incident_dt
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;
```

{group by vkey to attach to the inspections file. Note that numdates now gives the number of unique incident dates associated with that vessel}

```
select civtvkey, count(*) poll_incids
from civt_nodups
group by civtvkey
order by poll_incids desc
```

```

into temp cirt_civt0;

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)

(drop table pollinsp;)

select unique vidtcrst.*, cirt_civt0.*
from vidtcrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtcrst.iritvkey
into temp pollinsp;

(count number of unique inspection vkeys in final data set)
select unique iritvkey
from pollinsp
into temp junk0;
select count(*) chekpollinsp
from junk0;
drop table junk0;

(Count number of casualty vkeys that Are in vidtcrst)
select count(*) vidtcrst_keep
from pollinsp
where civtvkey is not null;

unload to "/nfs/ttd32/optical/50b/trix.dat/mi_d3139.pollall" delimiter ","
select *
from pollinsp;

select      count(*) numrows, sum(d31hhr) d31hhr, sum(d31mhr) d31mhr,
            sum(d31ahr) d31ahr
from pollinsp;
select      count(*) numrows, sum(d39hhr) d39hhr, sum(d39mhr) d39mhr,
            sum(d39ahr) d39ahr
from pollinsp;

(print this out for var names to an output file )
output to /users2/gawande/mid3139_poll.out
select *
from pollinsp
where reg_gt>100000;

```


PSINSP1.SQL

{This joins BRST and AVST by case and aggregates BRST hours by AVST's vkey}

{drop table brst_temp0}

```
select
  avst.vkey avstvkey,
  count(*) numcases, sum(hr_reg) reg_hr, sum(hr_res) res_hr,
  sum(hr_boat) boat_hr, sum(hr_air) air_hr,
  sum(hr_regadmin) admin_hr, sum(hr_regtv1) travel_hr,
  sum(hr_other) other_hr,
  sum(num_def) avst_def, sum(num_act) avst_act,
  {Level II and III Dummies from Mike based on Peggy Thurber's mapping
  Here only II.B activities since only PS activities}
  sum(d2b1) numd2b1, sum(d2b2) numd2b2, sum(d2b3) numd2b3,
  {Note that 35, 36, and 38 for US Flag only needed, but am including it here}
  sum(d31) numd31, sum(d32) numd32, sum(d33) numd33, sum(d34) numd34,
  sum(d35) numd35, sum(d36) numd36, sum(d37) numd37, sum(d38) numd38,
  sum(d39) numd39
from brst, avst
```

{Note the date >= 89. This is since only post-91 casualties are being considered. Hence choose a year with which I am comfortable (years to failure is not badly measured so that it affects the results. can try with other years e.g. 90, 88 as well).}

```
where
  brst.pscase[3,4]>="89" and
  brst.pscase=avst.pscase
```

```
group by avst.vkey
into temp brst_temp0;
```

```
select count(*) countbrst_temp0
from brst_temp0;
```

PSINSP2.SQL

(This file joins BRST_TEMP0 (agg hours by vkey) to VIDT to identify the foll:
service, flag, reg_gt, bld_yr, route.)

(drop table vidtbrst;)

```
select
  brst_temp0.*,
  vidt.service vidtservice, vidt.flag vidtflag, vidt.reg_gt reg_gt,
  year(vidt.bld_dt) yearbld, vidt.route route,
  (These have many nulls and are used only for model of inspection if adequate)
  vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from brst_temp0, vidt
where
  brst_temp0.avstvkey=vidt.vkey and
  (
    (vidt.flag="US" and (
      vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
      vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
      vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)    ) )
    or
    (vidt.flag not in ("US") and (
      vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
      vidt.service="TANK SHIP" or vidt.service="PASSENGER" or
      vidt.service="PASSENGER SHIP" ) )
  )
into temp vidtbrst;

select count(*)
from vidtbrst;
```

PSPERS1.SQL

(Be sure to run PSINSP1 and PSINSP2 before these two progs)
(No incident date. But since MINMOD, post-1991(few 91s mostly 92,93))

{ Here, casualty data is assembled from CIVT and CIRT.
CIRT, and CIVT are joined by (unique) Mccase and select out only
deep-draft vessels (hence a little use of VIDT). Personnel casualties are
constructed from CIRT (which has no vkey) and joined to CIVT to associate
them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821
records, 13,548 have unique Vkey), so we need to choose only unique records)

```
{
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
}
select
    civt.vkey civtvkey,deaths,missing,injured,incident_dt
```

from cirt, civt, vidt
(Note that in CIVT, the vkey is not unique (in VIDT vkey is unique). Hence
first get temp table civt_dups (with duplicates). Then check for number
of duplicates before grouping by vkey)

```
where
    cirt.mccase=civt.mccase and
    civt.vkey=vidt.vkey and
```

(Jim Law: conversion on July 14, 1994. The following query contracts
CIRT to cases that are correct (drop mystery and inconsequential
casualties). ctf_ind=X are inconsequential cases. command_endorse and
command_cls are mutually exclusive. command_endorse=X implies that
case has been reviewed and fwd to dt/HQ for review. command_cls=X means that
case is done and does not require review at dt/HQ. command_endorse=X are
legit cases and all should be considered. Of the command_cls=X cases, only
those with ctf_ind=null should be considered since ctf_ind=X implies an
inconsequential case.)

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and

(cirt.deaths>0 or cirt.missing>0 or cirt.injured>0) and
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
vidt.reg_gt>=100) )
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

{This set of statements selects non-duplicate rows in civt_dup. If group
by just civtvkey,incident_dt, get almost same rows as this}
select * from civt_dups
group by civtvkey,incident_dt, deaths,missing,injured
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;

{group by vkey to attach to the inspections file. Note that numdates now
gives the number of unique incident dates associated with that vessel}
select civtvkey, sum(deaths) deaths, sum(missing) missing,
sum(injured) injured, count(unique incident_dt) numdates

```
from civt_nodups
group by civtvkey
order by deaths desc, injured desc, numdates desc
into temp cirt_civt0;

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)
```

PSPERS2.SQL

```
{drop table persinsp;}

select unique vidtbrst.*, cirt_civt0.*
from vidtbrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtbrst.avstvkey
into temp persinsp;

select unique avstvkey
from persinsp
into temp junk0;
select count(*) chekpersinsp
from junk0;
drop table junk0;

{Count number of casualty vkeys that Are in vidtbrst}
select count(*) vidtbrst_keep
from persinsp
where civtvkey is not null;

unload to */nfs/ttd32/optical/50b/trix.dat/ps.pers" delimiter ","
select *
from persinsp;

{print this out for var names to an output file}
output to /users/gawande/pspers.out
select *
from persinsp
where reg_gt>100000;
```

PSPERS3.SQL

(Check to see if numbers make sense)

```
select count(*), avg(avst_def) avg_avstdef, sum(avst_def) sum_avstdef,  
avg(avst_act) avg_avstact, sum(avst_act) sum_avstact,  
avg(numcases) avg_numcases, sum(numcases) sum_numcases  
from persinsp
```

PSPOLL1.SQL

{US and Foreign flag casualties. Deep draft but includes Passenger<100}
{Be sure to run PSINSP1 and PSINSP2 before these two progs}

{ Here, pollution casualty data is assembled from CIVT and CIRT.
CIRT, and CIVT are joined by (unique) Mccase and select out only
deep-draft vessels (hence a little use of VIDT). Pollution incidents are
constructed from CIRT (which has no vkey) and joined to CIVT to associate
them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821
records, 13,548 have unique Vkey), so we need to choose only unique records)

```
drop table civt_dups;  
drop table civt_nodups;  
drop table cirt_civt0;
```

```
select  
    civt.vkey civtvkey, incident_dt
```

```
from cirt, civt, vidt  
{Note that using VIDT for the reg_gt>100 info and hence need Unique in select  
statement since in CIVT, the vkey is not unique (in VIDT vkey is unique)}  
where  
    cirt.mccase=civt.mccase and  
    civt.vkey=vidt.vkey and
```

{Jim Law: conversion on July 14, 1994. The following query contracts
CIRT to cases that are correct (drop mystery and inconsequential
casualties). ctf_ind=X are inconsequential cases. command_endorse and
command_cls are mutually exclusive. command_endorse=X implies that
case has been reviewed and fwd to dt/HQ for review. command_cls=X means that
case is done and does not require review at dt/HQ. command_endorse=X are
legit cases and all should be considered. Of the command_cls=X cases, only
those with ctf_ind=null should be considered since ctf_ind=X implies an
inconsequential case. }

```
(cirt.command_endorse="X"  
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and
```

```
cirt.mcpd_ind>=1 and  
(cirt.pol_ind="X" or pri_nature="POLLUTION") and
```

```
{To select Only BAD cases, unblock this statement}  
{severity in ("MAJOR","POTENT","MEDIUM") and}
```

```
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"  
or civt.service="TANK SHIP" or  
civt.service="PASSENGER" or civt.service="PASSENGER SHIP")
```

```
into temp civt_dups;  
select count(*) num_civtdups  
from civt_dups;
```

```
{This set of statements selects non-duplicate rows in civt_dup. If group  
by just civtvkey,incident_dt, get almost same rows as this}  
select * from civt_dups  
group by civtvkey,incident_dt  
into temp civt_nodups;  
select count(*) num_civtnodups  
from civt_nodups;
```

```
(group by vkey to attach to the inspections file. Note that numdates now
gives the number of unique incident dates associated with that vessel)
select civtvkey, count(*) poll_incids
from civt_nodups
group by civtvkey
order by poll_incids desc
into temp cirt_civt0;

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)
```


PSPOLL2.SQL

```
{drop table pollinsp;}
```

```
select unique vidtbrst.*, cirt_civt0.*  
from vidtbrst, outer cirt_civt0  
where cirt_civt0.civtvkey=vidtbrst.avstvkey  
into temp pollinsp;
```

```
{count number of unique inspection vkeys in final data set}
```

```
select unique avstvkey  
from pollinsp  
into temp junk0;  
select count(*) chekpollinsp  
from junk0;  
drop table junk0;
```

```
{Count number of casualty vkeys that Are in vidtcrst}
```

```
select count(*) vidtbrst_keep  
from pollinsp  
where civtvkey is not null;
```

```
unload to "/nfs/ttd32/optical/50b/trix.dat/ps.pollall" delimiter ","
```

```
select *  
from pollinsp;
```

```
{print this out for var names to an output file}
```

```
output to /users/gawande/pspollall.out
```

```
select *  
from pollinsp  
where reg_gt>100000;
```

PROGRAMS FOR DURATION DATA SETS

DUR_A1.SQL

{MI Cases}

{After conversation with Wyman Briggs on 18 July, 1994: Use IRIT indicators for inspection types for Level II.A.1-3 activities, and use Peggy Thurber's mapping (grouped by Mike into d31-d39 indicators) for Level III activities}

- (1. Change inspection from IRIT appropriately: cert_inspect for COI, reinspect for Reinspection, and hull for hull exam.
2. Change the Unload to file else WILL WRITE OVER)

{Only post 1991 (incl) inspections since duration since last inspection to casualty, and first casualty in Minmod is 02/91}

{
Duration data: The idea is as follows.
The lhs variable is duration from the Last inspection till date of casualty.
Analysis will be by Level II activities: (i) 3 MI activities: COI, Annual Vessel Reinspection, Hull Exam, and (ii) 3 PS activities: Annual Foreign Freight Exam, Annual Foreign Tanker Vessel Exam, Annual Foreign Passenger.
The same vessel inspected (using same activity) twice is treated as two different vessels, and as two observations (i.e. Hence large data set.)
If the vessel has no casualty after an activity, the lhs takes the value of duration till the next activity of the same type. The problem is that
(a) casualty may not have anything to do with that activity. For, example pri_nature in CIRT may possess such info. This can (should?) be incorporated by attributing only those casualties to that activity. This requires that pri_nature should be mapped into Level II activities. This mapping will probably be one(pri_nature) to many(Level II activities).
(b) should we be taking duration till next activity of the same type, or any activity. If we take into consideration pri_nature and ascribe only the "casualties connected with that activity" in computing the lhs variable, then we take duration till next activity of the same type if no casualty in the meantime. Else not so easy, since casualty may be of a nature attributable to another kind of activity. Even if pri_nature used, probably not too easy, since mapping is probably one(pri_nature) to many or all(Level II activity).
So problem still unanswered.
Solution: We take the simple road. All casualties, not just those attributable directly to the Level II activity is considered. This is OK since anyway a large range of inspections map into a Level II activity, and Many pri_natures map into this set of inspections. Also since some vessels are subject to a Level II activity sooner than others, rather than take the duration between two inspections, in the event of No casualty we take the duration between the inspection date and 1/1/1995. The problem is that the closer the inspection to that date, the shorter the duration recorded. But mainly, it is convenient, the duration so computed does not exceed the duration where there Are casualties, and since the last inspection was in 12/1993, this simplification is not expected to qualitatively change any results.

rhs variable is still number of hours devoted to that activity etc. The main difference is the age of the vessel, which is to be computed at the time of casualty, or at the time of next inspection if no casualty.
}

{For the hours of inspection equation have (i) num_def from IRIT and
(ii) indicators for inspection types for other CRST inspections}

{*****HOURS of INSPECTIONS*****}

select
irit.vkey iritvkey, irit.dt iritdate,

```

count(*) numcases,sum(hr_hull) hull_hr,sum(hr_mach) mach_hr,
sum(hr_train) train_hr, sum(hr_extra) extra_hr,sum(hr_textra) textra_hr,
sum(hr_admin) admin_hr, sum(hr_travel) travel_hr,sum(hr_ttravel) ttravel_hr,
sum(hr_other) other_hr,
sum(irit.num_def) num_def,
{Sum of Mike's dummies (based on Peggy's mapping) gives the total of
sub-inspections for that Level II activity on that date)
sum(d2a1) numd2a1,sum(d2a2) numd2a2,sum(d2a3) numd2a3,
{CRST types of inspections: indicators)
sum(crst.dannual) crstannual, sum(crst.dreinsp) crstreinsp,
sum(crst.dadmin) crstadmin,sum(crst.dhull) crsthull,sum(crst.dcoc) crstcoc,
sum(crst.dconstr) crstconstr,sum(crst.dcert) crstcert,
sum(crst.dinit) crstinit,sum(crst.dmach) crstmach,sum(crst.ddeficit) crstdef,
sum(crst.dother) crstother,sum(crst.drest) crstrest
from crst, irit

```

{Since first casualty case is 02/91 and duration is from last inspection, only inspections after 1991 are considered. This is unlike the Poisson stuff where inspections after 1989 are considered}

where

```

(activity II.A.1=COI)
irit.cert_inspect="X" and

irit.micase[1,2]="MI" and
irit.vkey[1,2]="VN" and
crst.case[1,2]="MI" and
{since first casualty case is 02/91 and duration is from last inspec)
crst.case[3,4]>="91" and
crst.case=irit.micase

```

```

group by irit.vkey, irit.dt
into temp crst_temp0;

```

```

select count(*) countcrst_temp0
from crst_temp0;

```

{This file joins CRST_TEMP0 (agg hours by vkey) to VIDT to identify the foll: service, flag, reg_gt, bld_yr, route.}

```
{drop table vidtcrst;}
```

```

select
crst_temp0.*,
vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
year(vidt.bld_dt) yearbld, vidt.route route,
{These have many nulls and are used only for model of inspection if adequate)
vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat

```

```
from crst_temp0, vidt
```

where

```

crst_temp0.iritvkey=vidt.vkey and
(
vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)
) and
vidt.flag="US"
into temp vidtcrst;

```

```
select count(*)
from vidtcrst;
```

```
{*****Personnel Casualties*****}
```

{ Here, casualty data is assembled from CIVT and CIRT. CIRT, and CIVT are joined by (unique) Mccase and select out only deep-draft vessels (hence a little use of VIDT). Personnel casualties are constructed from CIRT (which has no vkey) and joined to CIVT to associate them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821 records, 13,548 have unique Vkey), so we need to choose only unique records)

```
{
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
}
```

```
select
    civt.vkey civtvkey,deaths,missing,injured,cirt.incident_dt cirtdate
```

```
from cirt, civt, vidt
```

(Note that in CIVT, the vkey is not unique (in VIDT vkey is unique). Hence first get temp table civt_dups (with duplicates). Then check for number of duplicates before grouping by vkey)

```
where
    cirt.mccase=civt.mccase and
    civt.vkey=vidt.vkey and
```

(Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case.)

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and
```

```
(cirt.deaths>0 or cirt.missing>0 or cirt.injured>0) and
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
vidt.reg_gt>=100) )
```

```
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

(This set of statements selects non-duplicate rows in civt_dup. If group by just civtvkey,incident_dt, get almost same rows as this)

```
select * from civt_dups
group by civtvkey,cirtdate, deaths,missing,injured
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;
```

(group by vkey to attach to the inspections file. Note that numdates now gives the number of unique incident dates associated with that vessel)

```

select      civtvkey, cirtdate,
            sum(deaths) deaths,sum(missing) missing,sum(injured) injured
from civt_nodups
group by civtvkey,cirtdate
order by deaths desc, injured desc
into temp cirt_civt0;

```

```

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)

```

{Here we do the last part: join inspection and casualty tables, and Unload
2 Personnel casualty files (one for M/Y and one for just Y)}

```

{
drop table persinsp;
drop table inspect;
drop table inspect_MY;
drop table inspect_Y;
drop table justvkey;
drop table vesschar;
drop table dur1;
drop table dur2;
drop table dur3;
}

```

{I. Join hours and casualties.

vidtcrst sorted by iritvkey,iritdate, and cirt_civt0 is sorted by civtvkey,
cirtdate. Hence there are duplicate vkeys in both and the next join
statement produces a small cartesian explosion, but this is ok since we Need
this explosion because

- (i) we need to match only where cirtdate>iritdate, and
- (ii) we need to compute MIN duration among the cartesian matches)

{This first set of statements for making persinsp and checking}

```

select unique vidtcrst.*, cirt_civt0.*
from vidtcrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtcrst.iritvkey and
      cirt_civt0.cirtdate>=vidtcrst.iritdate
into temp persinsp;
select count(*) num_persinsp from persinsp;
(Count number of unique (iritvkey,iritdate) in persinsp)
select unique iritvkey,iritdate from persinsp into temp junk0;
select count(*) numuniq_persinsp from junk0;
drop table junk0;
(Count number of casualty vkeys that Are in vidtcrst)
select count(*) vidtcrst_keep from persinsp
where civtvkey is not null;

```

{This is to make the inspections by M/Y and also by just Y to join with
the so grouped duration data below for the complete data set}

```

select *, month(iritdate) mo,year(iritdate) ye
from vidtcrst
into temp inspect;

```

{By MY}

```

select
      iritvkey, mo, ye,
      sum(numcases) numcases,sum(hull_hr) hull_hr,sum(mach_hr) mach_hr,

```

```

sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
sum(other_hr) other_hr,
sum(num_def) num_def,
{Level II Dummies from Mike: Duration model on only Level II activities
Here only II.A activities since only U.S. flag MI activities}
sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
{CRST types of inspections: indicators}
sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
sum(crstconstr) crstconstr, sum(crstcert) crstcert,
sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, mo, ye
into temp inspect_MY;

{By Y}
select
    iritvkey, ye,
    sum(numcases) numcases, sum(hull_hr) hull_hr, sum(mach_hr) mach_hr,
    sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
    sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
    sum(other_hr) other_hr,
    sum(num_def) num_def,
{Level II Dummies from Mike: Duration model on only Level II activities
Here only II.A activities since only U.S. flag MI activities}
sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
{CRST types of inspections: indicators}
sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
sum(crstconstr) crstconstr, sum(crstcert) crstcert,
sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, ye
into temp inspect_Y;

{Make a table grouped Just by iritvkey for vessel characteristics}
select iritvkey
from vidtcrst
group by iritvkey
into temp justvkey;
select count(*) num_justvkey from justvkey;

select justvkey.iritvkey,
    vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
    year(vidt.bld_dt) yearbld, vidt.route route,
{These have many nulls and are used only for model of inspection if adequate}
    vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from justvkey, vidt
where
    justvkey.iritvkey=vidt.vkey and
    (
        vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
        vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
        vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)
    ) and
    vidt.flag="US"
into temp vesschar;

```

```
select count(*) num_vesschar from vesschar;
```

{The following comments apply to when I was using Peggy's mapping for Level II activities. But since we are now using IRIT indicators are these comments still applicable? We'll find out, if there is a big difference between the M/Y and the just Y file size}

{II. Here we compute Duration, and get rid of duplicate values.

We Group by Month/Year of IRIT inspection. This is since several Level II activities may be grouped in a bunch but on several different days. We would like to count this bunch only once. There is still an approximation since bunch may overlap between two months. Can't prevent this in SQL Hence we do two data sets:

- (i) Group by Month/Year, as described above, and
- (ii) Group by just Year. This is a smaller data set, and is the correct one for Level II activities that are performed over 1 or 2 years)

{Note: for inspections with no casualty, duration=(1/1/95 - iritdate)}

{Data set 1: Group by Month/Year}

```
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
      (cirtdate-iritdate) dur_cas, ("1/1/95"-iritdate) dur_nocas
from persinsp
into temp dur1;
```

```
select iritvkey,mo,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
```

```
group by iritvkey, mo,ye
order by iritvkey,ye,mo
```

```
into temp dur2;
```

```
select count(*) all_rows_MY_1 from dur2;
```

```
select * from dur2 where mindur_cas is not null into temp junk1;
```

```
select count(*) with_casualty_MY_1 from junk1;
```

```
drop table junk1;
```

{Join duration and inspection tables}

```
select      inspect_MY.*, mindur_cas, dur_nocas,
      service , flag, reg_gt, yearbld, route,
      dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_MY, dur2, vesschar
```

```
where      inspect_MY.iritvkey=dur2.iritvkey and
      inspect_MY.iritvkey=vesschar.iritvkey and
      inspect_MY.mo=dur2.mo and
      inspect_MY.ye=dur2.ye
```

```
order by iritvkey,ye,mo
```

```
into temp dur3;
```

```
select count(*) all_rows_MY_2 from dur3;
```

```
select * from dur3 where mindur_cas is not null into temp junk1;
```

```
select count(*) with_casualty_MY_2 from junk1;
```

```
drop table junk1;
```

```
unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a1_my.pers" delimiter ","
```

```
select *
from dur3;
```

{Check the aggregation}

```
select      count(*)      numrows,      sum(hull_hr)      tot_hull_hr,      sum(mach_hr)
tot_mach_hr,
```

```
      sum(admin_hr) tot_admin_hr
```

```
from dur3;
```

```
select count(*) numrows, sum(numd2a1) numd2a1,sum(numd2a2) numd2a2,
      sum(numd2a3) numd2a3
```



```

from dur3;

drop table dur1;
drop table dur2;
drop table dur3;

(Data set 2: Group by just Year)
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
            (cirtdate-iritdate) dur_cas, ('1/1/95'-iritdate) dur_nocas
from persinsp
into temp dur1;

select iritvkey, ye, min(dur_cas) mindur_cas, max(dur_nocas) dur_nocas
from dur1
group by iritvkey, ye
order by iritvkey, ye
into temp dur2;
select count(*) all_rows_Y_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_1 from junk1;
drop table junk1;

(Join duration and inspection tables)
select      inspect_Y.*, mindur_cas, dur_nocas,
            service , flag, reg_gt, yearbld, route,
            dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_Y, dur2, vesschar
where       inspect_Y.iritvkey=dur2.iritvkey and
            inspect_Y.iritvkey=vesschar.iritvkey and
            inspect_Y.ye=dur2.ye
order by iritvkey, ye
into temp dur3;
select count(*) all_rows_Y_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_2 from junk1;
drop table junk1;

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a1_y.pers" delimiter ","
select *
from dur3;

select      count(*)    numrows,    sum(hull_hr)    tot_hull_hr,    sum(mach_hr)
tot_mach_hr,
            sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1, sum(numd2a2) numd2a2,
            sum(numd2a3) numd2a3
from dur3;

(print this out for var names to an output file since need also to print for
pollution data set)
output to /users/gawande/dur_a1_pers.out
select *
from dur3
where reg_gt>100000;

```

```

(*****Pollution Casualties*****)

```

(Be sure to run MIDUR1 and MIDUR2 before these two progs)

(Here, pollution casualty data is assembled from CIVT and CIRT. CIRT, and CIVT are joined by (unique) Mccase and select out only deep-draft vessels (hence a little use of VIDT). Pollution incidents are constructed from CIRT (which has no vkey) and joined to CIVT to associate them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821 records, 13,548 have unique Vkey), so we need to choose only unique records)

```
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
```

```
select
  civt.vkey civtvkey, cirt.incident_dt cirtdate
```

```
from cirt, civt, vidt
```

(Note that using VIDT for the reg_gt>100 info and hence need Unique in select statement since in CIVT, the vkey is not unique (in VIDT vkey is unique))

```
where
  cirt.mccase=civt.mccase and
  civt.vkey=vidt.vkey and
```

(Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case.)

(Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case.)

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and
```

```
cirt.mcpd_ind>=1 and
(cirt.pol_ind="X" or pri_nature="POLLUTION") and
```

(To select Only BAD cases, unblock this statement)
(severity in ("MAJOR","POTENT","MEDIUM") and)

```
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
  vidt.reg_gt>=100) )
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

(This set of statements selects non-duplicate rows in civt_dup. Although this is an approximation of duplicates, its not a bad one. Can't really

```

    check for the pollution cases since mostly number of cases is 1)
select * from civt_dups
group by civtvkey, cirtdate
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;

```

{group by vkey to attach to the inspections file. Note that poll_incids now gives the number of unique incident dates associated with that vessel on a cirtdate, and hence is probably always equal to 1. Actually poll_incids is superfluous and never used in the duration file anyway}

```

select civtvkey, cirtdate, count(*) poll_incids
from civt_nodups
group by civtvkey, cirtdate
order by poll_incids desc
into temp cirt_civt0;

```

```

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)

```

{Here we do the last part: join inspection and casualty tables, and Unload 2 Pollution casualty files (one for M/Y and one for just Y)}

```

drop table inspect;
drop table inspect_MY;
drop table inspect_Y;
drop table justvkey;
drop table vesschar;
drop table durl;
drop table dur2;
drop table dur3;

```

{I. Join hours and casualties.
vidtcrst sorted by iritvkey, iritdate, and cirt_civt0 is sorted by civtvkey, cirtdate. Hence there are duplicate vkeys in both and the next join statement produces a small cartesian explosion, but this is ok since we Need this explosion because
(i) we need to match only where cirtdate>iritdate, and
(ii) we need to compute MIN duration among the cartesian matches}

```

{This first set of statements for making pollinsp and checking}
select unique vdtcrst.*, cirt_civt0.*
from vdtcrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtcrst.iritvkey and
      cirt_civt0.cirtdate>=vidtcrst.iritdate
into temp pollinsp;
select count(*) num_pollinsp from pollinsp;
{Count number of unique (iritvkey,iritdate) in pollinsp}
select unique iritvkey,iritdate from pollinsp into temp junk0;
select count(*) numuniq_pollinsp from junk0;
drop table junk0;
{Count number of casualty vkeys that Are in vdtcrst}
select count(*) vdtcrst_keep from pollinsp
where civtvkey is not null;

```

{This is to make the inspections by M/Y and also by just Y to join with the so grouped duration data below for the complete data set}

```
select *, month(iritdate) mo, year(iritdate) ye
from vidtcrst
into temp inspect;
```

(By MY)

```
select
  iritvkey, mo, ye,
  sum(numcases) numcases, sum(hull_hr) hull_hr, sum(mach_hr) mach_hr,
  sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
  sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
  sum(other_hr) other_hr,
  sum(num_def) num_def,
  {Level II Dummies from Mike: Duration model on only Level II activities
  Here only II.A activities since only U.S. flag MI activities}
  sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
  {CRST types of inspections: indicators}
  sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
  sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
  sum(crstconstr) crstconstr, sum(crstcert) crstcert,
  sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
  sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, mo, ye
into temp inspect_MY;
```

(By Y)

```
select
  iritvkey, ye,
  sum(numcases) numcases, sum(hull_hr) hull_hr, sum(mach_hr) mach_hr,
  sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
  sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
  sum(other_hr) other_hr,
  sum(num_def) num_def,
  {Level II Dummies from Mike: Duration model on only Level II activities
  Here only II.A activities since only U.S. flag MI activities}
  sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
  {CRST types of inspections: indicators}
  sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
  sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
  sum(crstconstr) crstconstr, sum(crstcert) crstcert,
  sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
  sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, ye
into temp inspect_Y;
```

(Make a table grouped Just by iritvkey for vessel characteristics)

```
select iritvkey
from vidtcrst
group by iritvkey
into temp justvkey;
select count(*) num_justvkey from justvkey;
```

```
select justvkey.iritvkey,
  vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
  year(vidt.bld_dt) yearbld, vidt.route route,
  {These have many nulls and are used only for model of inspection if adequate}
  vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from justvkey, vidt
where
```

```

justvkey.iritvkey=vidt.vkey and
(
  vidd.service="FREIGHT SHIP" or vidd.service="PUB. TANKSHIP/BARGE" or
  vidd.service="TANK SHIP" or ((vidt.service="PASSENGER" or
  vidd.service="PASSENGER SHIP") and vidd.reg_gt>=100)
) and
vidt.flag="US"
into temp vesschar;
select count(*) num_vesschar from vesschar;

```

{II. Here we compute Duration, and get rid of duplicate values.
 We Group by Month/Year of IRIT inspection. This is since several Level II activities may be grouped in a bunch but on several different days. We would like to count this bunch only once. There is still an approximation since bunch may overlap between two months. Can't prevent this in SQL
 Hence we do two data sets:
 (i) Group by Month/Year, as described above, and
 (ii) Group by just Year. This is a smaller data set, and is the correct one for Level II activities that are performed over 1 or 2 years}

(Note: for inspections with no casualty, duration=(1/1/95 - iritdate))

```

(Data set 1: Group by Month/Year)
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
  (cirtdate-iritdate) dur_cas, ("1/1/95"-iritdate) dur_nocas
from pollinsp
into temp dur1;

```

```

select iritvkey,mo,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
group by iritvkey, mo,ye
order by iritvkey,ye,mo
into temp dur2;
select count(*) all_rows_MY_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_1 from junk1;
drop table junk1;

```

```

(Join duration and inspection tables)
select      inspect_MY.*, mindur_cas, dur_nocas,
  service , flag, reg_gt, yearbld, route,
  dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_MY, dur2, vesschar
where      inspect_MY.iritvkey=dur2.iritvkey and
  inspect_MY.iritvkey=vesschar.iritvkey and
  inspect_MY.mo=dur2.mo and
  inspect_MY.ye=dur2.ye
order by iritvkey,ye,mo
into temp dur3;
select count(*) all_rows_MY_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_2 from junk1;
drop table junk1;

```

```

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a1_my.pollall" delimiter ","
select *
from dur3;

```

```

(Check the aggregation)
select      count(*) numrows,      sum(hull_hr) tot_hull_hr,      sum(mach_hr)

```

```

tot_mach_hr,
    sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1, sum(numd2a2) numd2a2,
    sum(numd2a3) numd2a3
from dur3;

drop table dur1;
drop table dur2;
drop table dur3;

{Data set 2: Group by just Year}
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
    (cirtdate-iritdate) dur_cas, ('1/1/95'-iritdate) dur_nocas
from pollinsp
into temp dur1;

select iritvkey, ye, min(dur_cas) mindur_cas, max(dur_nocas) dur_nocas
from dur1
group by iritvkey, ye
order by iritvkey, ye
into temp dur2;
select count(*) all_rows_Y_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_1 from junk1;
drop table junk1;

{Join duration and inspection tables}
select      inspect_Y.*, mindur_cas, dur_nocas,
    service , flag, reg_gt, yearbld, route,
    dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_Y, dur2, vesschar
where      inspect_Y.iritvkey=dur2.iritvkey and
    inspect_Y.iritvkey=vesschar.iritvkey and
    inspect_Y.ye=dur2.ye
order by iritvkey, ye
into temp dur3;
select count(*) all_rows_Y_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_2 from junk1;
drop table junk1;

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a1_y.pollall" delimiter ","
select *
from dur3;

select      count(*)    numrows,    sum(hull_hr)    tot_hull_hr,    sum(mach_hr)
tot_mach_hr,
    sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1, sum(numd2a2) numd2a2,
    sum(numd2a3) numd2a3
from dur3;

{print this out for var names to an output file since need also to print for
pollution data set}
output to /users/gawande/dur_a1_poll.out
select *
from dur3
where reg_gt>100000;

```


DUR_A2.SQL

(MI Cases)

(After conversation with Wyman Briggs on 18 July, 1994: Use IRIT indicators for inspection types for Level II.A.1-3 activities, and use Peggy Thurber's mapping (grouped by Mike into d31-d39 indicators) for Level III activities)

- (1. Change inspection from IRIT appropriately: cert_inspect for COI, reinspect for Reinspection, and hull for hull exam.
2. Change the Unload to file else WILL WRITE OVER)

(Only post 1991 (incl) inspections since duration since last inspection to casualty, and first casualty in Minmod is 02/91)

{
Duration data: The idea is as follows.
The lhs variable is duration from the Last inspection till date of casualty.
Analysis will be by Level II activities: (i) 3 MI activities: COI, Annual Vessel Reinspection, Hull Exam, and (ii) 3 PS activities: Annual Foreign Freight Exam, Annual Foreign Tanker Vessel Exam, Annual Foreign Passenger.
The same vessel inspected (using same activity) twice is treated as two different vessels, and as two observations (i.e. Hence large data set.)
If the vessel has no casualty after an activity, the lhs takes the value of duration till the next activity of the same type. The problem is that
(a) casualty may not have anything to do with that activity. For, example pri_nature in CIRT may possess such info. This can (should?) be incorporated by attributing only those casualties to that activity. This requires that pri_nature should be mapped into Level II activities. This mapping will probably be one(pri_nature) to many(Level II activities).
(b) should we be taking duration till next activity of the same type, or any activity. If we take into consideration pri_nature and ascribe only the "casualties connected with that activity" in computing the lhs variable, then we take duration till next activity of the Same type if no casualty in the meantime. Else not so easy, since casualty may be of a nature attributable to another kind of activity. Even if pri_nature used, probably not too easy, since mapping is probably one(pri_nature) to many or all(Level II activity).
So problem still unanswered.
Solution: We take the simple road. All casualties, not just those attributable directly to the Level II activity is considered. This is OK since anyway a large range of inspections map into a Level II activity, and Many pri_natures map into this set of inspections. Also since some vessels are subject to a Level II activity sooner than others, rather than take the duration between two inspections, in the event of No casualty we take the duration between the inspection date and 1/1/1995. The problem is that the closer the inspection to that date, the shorter the duration recorded. But mainly, it is convenient, the duration so computed does not exceed the duration where there Are casualties, and since the last inspection was in 12/1993, this simplification is not expected to qualitatively change any results.

rhs variable is still number of hours devoted to that activity etc. The main difference is the age of the vessel, which is to be computed at the time of casualty, or at the time of next inspection if no casualty.
}

(For the hours of inspection equation have (i) num_def from IRIT and
(ii) indicators for inspection types for other CRST inspections)

(*****HOURS of INSPECTIONS*****)

select
irit.vkey iritvkey, irit.dt iritdate,


```

count(*) numcases,sum(hr_hull) hull_hr,sum(hr_mach) mach_hr,
sum(hr_train) train_hr, sum(hr_extra) extra_hr,sum(hr_textra) textra_hr,
sum(hr_admin) admin_hr, sum(hr_travel) travel_hr,sum(hr_ttravel) ttravel_hr,
sum(hr_other) other_hr,
sum(irit.num_def) num_def,
{Sum of Mike's dummies (based on Peggy's mapping) gives the total of
sub-inspections for that Level II activity on that date}
sum(d2a1) numd2a1,sum(d2a2) numd2a2,sum(d2a3) numd2a3,
{CRST types of inspections: indicators}
sum(crst.dannual) crstannual, sum(crst.dreinsp) crstreinsp,
sum(crst.dadmin) crstadmin,sum(crst.dhull) crsthull,sum(crst.dcoc) crstcoc,
sum(crst.dconstr) crstconstr,sum(crst.dcert) crstcert,
sum(crst.dinit) crstinit,sum(crst.dmach) crstmach,sum(crst.ddeficit) crstdef,
sum(crst.dother) crstother,sum(crst.drest) crstrest
from crst, irit

```

{Since first casualty case is 02/91 and duration is from last inspection, only inspections after 1991 are considered. This is unlike the Poisson stuff where inspections after 1989 are considered}

where

```

{activity II.A.2=Reinspection}
irit.reinspect="X" and

irit.micase[1,2]="MI" and
irit.vkey[1,2]="VN" and
crst.case[1,2]="MI" and
{since first casualty case is 02/91 and duration is from last inspec}
crst.case[3,4]>="91" and
crst.case=irit.micase

```

```

group by irit.vkey, irit.dt
into temp crst_temp0;

```

```

select count(*) countcrst_temp0
from crst_temp0;

```

{This file joins CRST_TEMP0 (agg hours by vkey) to VIDT to identify the foll: service, flag, reg_gt, bld_yr, route.}

```

{drop table vidtcrst;}

```

```

select
  crst_temp0.*,
  vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
  year(vidt.bld_dt) yearbld, vidt.route route,
{These have many nulls and are used only for model of inspection if adequate}
  vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from crst_temp0, vidt
where
  crst_temp0.iritvkey=vidt.vkey and
  (
    vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
    vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
    vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)
  ) and
  vidt.flag="US"
into temp vidtcrst;

```

```
select count(*)
from vidtcrst;
```

{*****Personnel Casualties*****}

{ Here, casualty data is assembled from CIVT and CIRT. CIRT, and CIVT are joined by (unique) Mccase and select out only deep-draft vessels (hence a little use of VIDT). Personnel casualties are constructed from CIRT (which has no vkey) and joined to CIVT to associate them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821 records, 13,548 have unique Vkey), so we need to choose only unique records)

```
{
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
}
```

```
select
    civt.vkey civtvkey,deaths,missing,injured,cirt.incident_dt cirtdate
```

```
from cirt, civt, vidt
```

(Note that in CIVT, the vkey is not unique (in VIDT vkey is unique). Hence first get temp table civt_dups (with duplicates). Then check for number of duplicates before grouping by vkey)

where

```
    cirt.mccase=civt.mccase and
    civt.vkey=vidt.vkey and
```

(Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case.)

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and
```

```
(cirt.deaths>0 or cirt.missing>0 or cirt.injured>0) and
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
vidt.reg_gt>=100) )
```

```
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

(This set of statements selects non-duplicate rows in civt_dup. If group by just civtvkey,incident_dt, get almost same rows as this)

```
select * from civt_dups
group by civtvkey,cirtdate, deaths,missing,injured
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;
```

(group by vkey to attach to the inspections file. Note that numdates now gives the number of unique incident dates associated with that vessel)

```

select      civtvkey, cirtdate,
            sum(deaths) deaths,sum(missing) missing,sum(injured) injured
from civt_nodups
group by civtvkey,cirtdate
order by deaths desc, injured desc
into temp cirt_civt0;

```

```

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)

```

{Here we do the last part: join inspection and casualty tables, and Unload
2 Personnel casualty files (one for M/Y and one for just Y)}

```

{
drop table persinsp;
drop table inspect;
drop table inspect_MY;
drop table inspect_Y;
drop table justvkey;
drop table vesschar;
drop table dur1;
drop table dur2;
drop table dur3;
}

```

{I. Join hours and casualties.

vidtcrst sorted by iritvkey,iritdate, and cirt_civt0 is sorted by civtvkey,
cirtdate. Hence there are duplicate vkeys in both and the next join
statement produces a small cartesian explosion, but this is ok since we Need
this explosion because

- (i) we need to match only where cirtdate>iritdate, and
- (ii) we need to compute MIN duration among the cartesian matches)

{This first set of statements for making persinsp and checking}

```

select unique vidtcrst.*, cirt_civt0.*
from vidtcrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtcrst.iritvkey and
      cirt_civt0.cirtdate>=vidtcrst.iritdate
into temp persinsp;
select count(*) num_persinsp from persinsp;
{Count number of unique (iritvkey,iritdate) in persinsp}
select unique iritvkey,iritdate from persinsp into temp junk0;
select count(*) numuniq_persinsp from junk0;
drop table junk0;
{Count number of casualty vkeys that Are in vidtcrst}
select count(*) vidtcrst_keep from persinsp
where civtvkey is not null;

```

{This is to make the inspections by M/Y and also by just Y to join with
the so grouped duration data below for the complete data set}

```

select *, month(iritdate) mo,year(iritdate) ye
from vidtcrst
into temp inspect;

```

{By MY}

```

select
    iritvkey, mo, ye,
    sum(numcases) numcases,sum(hull_hr) hull_hr,sum(mach_hr) mach_hr,

```

```

sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
sum(other_hr) other_hr,
sum(num_def) num_def,
(Level II Dummies from Mike: Duration model on only Level II activities
Here only II.A activities since only U.S. flag MI activities)
sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
(CRST types of inspections: indicators)
sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
sum(crstconstr) crstconstr, sum(crstcert) crstcert,
sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, mo, ye
into temp inspect_MY;

(By Y)
select
    iritvkey, ye,
    sum(numcases) numcases, sum(hull_hr) hull_hr, sum(mach_hr) mach_hr,
    sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
    sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
    sum(other_hr) other_hr,
    sum(num_def) num_def,
    (Level II Dummies from Mike: Duration model on only Level II activities
    Here only II.A activities since only U.S. flag MI activities)
    sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
    (CRST types of inspections: indicators)
    sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
    sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
    sum(crstconstr) crstconstr, sum(crstcert) crstcert,
    sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
    sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, ye
into temp inspect_Y;

(Make a table grouped Just by iritvkey for vessel characteristics)
select iritvkey
from vidtcrst
group by iritvkey
into temp justvkey;
select count(*) num_justvkey from justvkey;

select justvkey.iritvkey,
    vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
    year(vidt.bld_dt) yearbld, vidt.route route,
    (These have many nulls and are used only for model of inspection if adequate)
    vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from justvkey, vidt
where
    justvkey.iritvkey=vidt.vkey and
    (
        vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
        vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
        vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)
    ) and
    vidt.flag="US"
into temp vesschar;

```

```
select count(*) num_vesschar from vesschar;
```

{The following comments apply to when I was using Peggy's mapping for Level II activities. But since we are now using IRIT indicators are these comments still applicable? We'll find out, if there is a big difference between the M/Y and the just Y file size}

{II. Here we compute Duration, and get rid of duplicate values.

We Group by Month/Year of IRIT inspection. This is since several Level II activities may be grouped in a bunch but on several different days. We would like to count this bunch only once. There is still an approximation since bunch may overlap between two months. Can't prevent this in SQL Hence we do two data sets:

- (i) Group by Month/Year, as described above, and
- (ii) Group by just Year. This is a smaller data set, and is the correct one for Level II activities that are performed over 1 or 2 years}

{Note: for inspections with no casualty, duration=(1/1/95 - iritdate)}

{Data set 1: Group by Month/Year}

```
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
            (cirtdate-iritdate) dur_cas, ("1/1/95"-iritdate) dur_nocas
from persinsp
into temp dur1;
```

```
select iritvkey,mo,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
```

```
group by iritvkey, mo,ye
order by iritvkey,ye,mo
into temp dur2;
```

```
select count(*) all_rows_MY_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_1 from junk1;
drop table junk1;
```

{Join duration and inspection tables}

```
select      inspect_MY.*, mindur_cas, dur_nocas,
            service , flag, reg_gt, yearbld, route,
            dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_MY, dur2, vesschar
where      inspect_MY.iritvkey=dur2.iritvkey and
            inspect_MY.iritvkey=vesschar.iritvkey and
            inspect_MY.mo=dur2.mo and
            inspect_MY.ye=dur2.ye
```

```
order by iritvkey,ye,mo
into temp dur3;
```

```
select count(*) all_rows_MY_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_2 from junk1;
drop table junk1;
```

```
unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a2_my.pers" delimiter ","
select *
from dur3;
```

{Check the aggregation}

```
select      count(*) numrows,      sum(hull_hr) tot_hull_hr,      sum(mach_hr)
            tot_mach_hr,
            sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1,sum(numd2a2) numd2a2,
            sum(numd2a3) numd2a3
```

```

from dur3;

drop table dur1;
drop table dur2;
drop table dur3;

(Data set 2: Group by just Year)
select      iritykey, month(iritdate) mo, year(iritdate) ye,
            (cirtdate-iritdate) dur_cas, ("1/1/95"-iritdate) dur_nocas
from persinsp
into temp dur1;

select iritykey, ye, min(dur_cas) mindur_cas, max(dur_nocas) dur_nocas
from dur1
group by iritykey, ye
order by iritykey, ye
into temp dur2;
select count(*) all_rows_Y_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_1 from junk1;
drop table junk1;

(Join duration and inspection tables)
select      inspect_Y.*, mindur_cas, dur_nocas,
            service , flag, reg_gt, yearbld, route,
            dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_Y, dur2, vesschar
where      inspect_Y.irtykey=dur2.irtykey and
            inspect_Y.irtykey=vesschar.irtykey and
            inspect_Y.ye=dur2.ye
order by iritykey, ye
into temp dur3;
select count(*) all_rows_Y_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_2 from junk1;
drop table junk1;

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a2_y.pers" delimiter ","
select *
from dur3;

select      count(*)    numrows,      sum(hull_hr)    tot_hull_hr,      sum(mach_hr)
tot_mach_hr,
            sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1, sum(numd2a2) numd2a2,
            sum(numd2a3) numd2a3
from dur3;

(print this out for var names to an output file since need also to print for
pollution data set)
output to /users/gawande/dur_a2_pers.out
select *
from dur3
where reg_gt>100000;

(*****Pollution Casualties*****)

```

{Be sure to run MIDUR1 and MIDUR2 before these two progs}

{ Here, pollution casualty data is assembled from CIVT and CIRT. CIRT, and CIVT are joined by (unique) Mccase and select out only deep-draft vessels (hence a little use of VIDT). Pollution incidents are constructed from CIRT (which has no vkey) and joined to CIVT to associate them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821 records, 13,548 have unique Vkey), so we need to choose only unique records}

```
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
```

```
select
    civt.vkey civtvkey, cirt.incident_dt cirtdate
```

```
from cirt, civt, vidt
```

{Note that using VIDT for the reg_gt>100 info and hence need Unique in select statement since in CIVT, the vkey is not unique (in VIDT vkey is unique)}

where

```
    cirt.mccase=civt.mccase and
    civt.vkey=vidt.vkey and
```

{Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case. }

{Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case. }

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and
```

```
cirt.mcpd_ind>=1 and
(cirt.pol_ind="X" or pri_nature="POLLUTION") and
```

{To select Only BAD cases, unblock this statement}
{severity in ("MAJOR","POTENT","MEDIUM") and}

```
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
vidt.reg_gt>=100) )
```

```
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

{This set of statements selects non-duplicate rows in civt_dup. Although this is an approximation of duplicates, its not a bad one. Can't really


```

    check for the pollution cases since mostly number of cases is 1)
select * from civt_dups
group by civtvkey,cirtdate
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;

```

(group by vkey to attach to the inspections file. Note that poll_incids now gives the number of unique incident dates associated with that vessel on a cirtdate, and hence is probably always equal to 1. Actually poll_incids is superfluous and never used in the duration file anyway)

```

select civtvkey, cirtdate, count(*) poll_incids
from civt_nodups
group by civtvkey, cirtdate
order by poll_incids desc
into temp cirt_civt0;

```

```

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)

```

(Here we do the last part: join inspection and casualty tables, and Unload 2 Pollution casualty files (one for M/Y and one for just Y))

```

drop table inspect;
drop table inspect_MY;
drop table inspect_Y;
drop table justvkey;
drop table vesschar;
drop table durl;
drop table dur2;
drop table dur3;

```

(I. Join hours and casualties.
vidtcrst sorted by iritvkey,iritdate, and cirt_civt0 is sorted by civtvkey, cirtdate. Hence there are duplicate vkeys in both and the next join statement produces a small cartesian explosion, but this is ok since we Need this explosion because
(i) we need to match only where cirtdate>iritdate, and
(ii) we need to compute MIN duration among the cartesian matches)

```

(This first set of statements for making pollinsp and checking)
select unique vidtcrst.*, cirt_civt0.*
from vidtcrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtcrst.iritvkey and
      cirt_civt0.cirtdate>=vidtcrst.iritdate
into temp pollinsp;
select count(*) num_pollinsp from pollinsp;
{Count number of unique (iritvkey,iritdate) in pollinsp}
select unique iritvkey,iritdate from pollinsp into temp junk0;
select count(*) numuniq_pollinsp from junk0;
drop table junk0;
{Count number of casualty vkeys that Are in vidtcrst}
select count(*) vidtcrst_keep from pollinsp
where civtvkey is not null;

```

(This is to make the inspections by M/Y and also by just Y to join with the so grouped duration data below for the complete data set)


```

select *, month(iritdate) mo, year(iritdate) ye
from vidtcrst
into temp inspect;

{By MY}
select
    iritvkey, mo, ye,
    sum(numcases) numcases, sum(hull_hr) hull_hr, sum(mach_hr) mach_hr,
    sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
    sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
    sum(other_hr) other_hr,
    sum(num_def) num_def,
    {Level II Dummies from Mike: Duration model on only Level II activities
    Here only II.A activities since only U.S. flag MI activities}
    sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
    {CRST types of inspections: indicators}
    sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
    sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
    sum(crstconstr) crstconstr, sum(crstcert) crstcert,
    sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
    sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, mo, ye
into temp inspect_MY;

{By Y}
select
    iritvkey, ye,
    sum(numcases) numcases, sum(hull_hr) hull_hr, sum(mach_hr) mach_hr,
    sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
    sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
    sum(other_hr) other_hr,
    sum(num_def) num_def,
    {Level II Dummies from Mike: Duration model on only Level II activities
    Here only II.A activities since only U.S. flag MI activities}
    sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
    {CRST types of inspections: indicators}
    sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
    sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
    sum(crstconstr) crstconstr, sum(crstcert) crstcert,
    sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
    sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, ye
into temp inspect_Y;

{Make a table grouped Just by iritvkey for vessel characteristics}
select iritvkey
from vidtcrst
group by iritvkey
into temp justvkey;
select count(*) num_justvkey from justvkey;

select justvkey.iritvkey,
    vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
    year(vidt.bld_dt) yearbld, vidt.route route,
    {These have many nulls and are used only for model of inspection if adequate}
    vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from justvkey, vidt
where

```

```

justvkey.iritvkey=vidt.vkey and
(
  viddt.service="FREIGHT SHIP" or viddt.service="PUB. TANKSHIP/BARGE" or
  viddt.service="TANK SHIP" or ((viddt.service="PASSENGER" or
  viddt.service="PASSENGER SHIP") and viddt.reg_gt>=100)
) and
viddt.flag="US"
into temp vesschar;
select count(*) num_vesschar from vesschar;

```

{II. Here we compute Duration, and get rid of duplicate values.

We Group by Month/Year of IRIT inspection. This is since several Level II activities may be grouped in a bunch but on several different days. We would like to count this bunch only once. There is still an approximation since bunch may overlap between two months. Can't prevent this in SQL Hence we do two data sets:

- (i) Group by Month/Year, as described above, and
- (ii) Group by just Year. This is a smaller data set, and is the correct one for Level II activities that are performed over 1 or 2 years)

(Note: for inspections with no casualty, duration=(1/1/95 - iritdate))

{Data set 1: Group by Month/Year}

```

select      iritvkey, month(iritdate) mo, year(iritdate) ye,
            (cirtdate-iritdate) dur_cas, ("1/1/95"-iritdate) dur_nocas
from pollinsp
into temp dur1;

```

```

select iritvkey,mo,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
group by iritvkey, mo,ye
order by iritvkey,ye,mo
into temp dur2;
select count(*) all_rows_MY_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_1 from junk1;
drop table junk1;

```

{Join duration and inspection tables}

```

select      inspect_MY.*, mindur_cas, dur_nocas,
            service , flag, reg_gt, yearbld, route,
            dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_MY, dur2, vesschar
where       inspect_MY.iritvkey=dur2.iritvkey and
            inspect_MY.iritvkey=vesschar.iritvkey and
            inspect_MY.mo=dur2.mo and
            inspect_MY.ye=dur2.ye
order by iritvkey,ye,mo
into temp dur3;
select count(*) all_rows_MY_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_2 from junk1;
drop table junk1;

```

```

unload to */nfs/ttd32/optical/50b/trix.dat/dur_2a2_my.pollall" delimiter ","
select *
from dur3;

```

{Check the aggregation}

```

select      count(*)      numrows,      sum(hull_hr)      tot_hull_hr,      sum(mach_hr)

```

```

tot_mach_hr,
    sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1, sum(numd2a2) numd2a2,
    sum(numd2a3) numd2a3
from dur3;

drop table dur1;
drop table dur2;
drop table dur3;

{Data set 2: Group by just Year}
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
    (cirtdate-iritdate) dur_cas, ("1/1/95"-iritdate) dur_nocas
from pollinsp
into temp dur1;

select iritvkey, ye, min(dur_cas) mindur_cas, max(dur_nocas) dur_nocas
from dur1
group by iritvkey, ye
order by iritvkey, ye
into temp dur2;
select count(*) all_rows_Y_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_1 from junk1;
drop table junk1;

{Join duration and inspection tables}
select      inspect_Y.*, mindur_cas, dur_nocas,
    service , flag, reg_gt, yearbld, route,
    dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_Y, dur2, vesschar
where      inspect_Y.iritvkey=dur2.iritvkey and
    inspect_Y.iritvkey=vesschar.iritvkey and
    inspect_Y.ye=dur2.ye
order by iritvkey, ye
into temp dur3;
select count(*) all_rows_Y_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_2 from junk1;
drop table junk1;

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a2_y.pollall" delimiter ","
select *
from dur3;

select      count(*)    numrows,    sum(hull_hr)    tot_hull_hr,    sum(mach_hr)
tot_mach_hr,
    sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1, sum(numd2a2) numd2a2,
    sum(numd2a3) numd2a3
from dur3;

{print this out for var names to an output file since need also to print for
pollution data set}
output to /users/gawande/dur_a2_poll.out
select *
from dur3
where reg_gt>100000;

```


DUR_A3.SQL

{MI Cases}

{After conversation with Wyman Briggs on 18 July, 1994: Use IRIT indicators for inspection types for Level II.A.1-3 activities, and use Peggy Thurber's mapping (grouped by Mike into d31-d39 indicators) for Level III activities}

- {1. Change inspection from IRIT appropriately: cert_inspect for COI, reinspect for Reinspection, and hull for hull exam.
2. Change the Unload to file else WILL WRITE OVER}

{Only post 1991 (incl) inspections since duration since last inspection to casualty, and first casualty in Minmod is 02/91}

{

Duration data: The idea is as follows.

The lhs variable is duration from the Last inspection till date of casualty.

Analysis will be by Level II activities: (i) 3 MI activities: COI, Annual Vessel Reinspection, Hull Exam, and (ii) 3 PS activities: Annual Foreign Freight Exam, Annual Foreign Tanker Vessel Exam, Annual Foreign Passenger.

The same vessel inspected (using same activity) twice is treated as two different vessels, and as two observations (i.e. Hence large data set.)

If the vessel has no casualty after an activity, the lhs takes the value of duration till the next activity of the same type. The problem is that

(a) casualty may not have anything to do with that activity. For, example pri_nature in CIRT may possess such info. This can (should?) be incorporated by attributing only those casualties to that activity. This requires that pri_nature should be mapped into Level II activities. This mapping will probably be one(pri_nature) to many(Level II activities).

(b) should we be taking duration till next activity of the same type, or any activity. If we take into consideration pri_nature and ascribe only the "casualties connected with that activity" in computing the lhs variable, then we take duration till next activity of the same type if no casualty in the meantime. Else not so easy, since casualty may be of a nature attributable to another kind of activity. Even if pri_nature used, probably not too easy, since mapping is probably one(pri_nature) to many or all(Level II activity). So problem still unanswered.

Solution: We take the simple road. All casualties, not just those attributable directly to the Level II activity is considered. This is OK since anyway a large range of inspections map into a Level II activity, and Many pri_natures map into this set of inspections. Also since some vessels are subject to a Level II activity sooner than others, rather than take the duration between two inspections, in the event of No casualty we take the duration between the inspection date and 1/1/1995. The problem is that the closer the inspection to that date, the shorter the duration recorded. But mainly, it is convenient, the duration so computed does not exceed the duration where there are casualties, and since the last inspection was in 12/1993, this simplification is not expected to qualitatively change any results.

rhs variable is still number of hours devoted to that activity etc. The main difference is the age of the vessel, which is to be computed at the time of casualty, or at the time of next inspection if no casualty.

}

{For the hours of inspection equation have (i) num_def from IRIT and (ii) indicators for inspection types for other CRST inspections}

{*****HOURS of INSPECTIONS*****}

select

irit.vkey iritvkey, irit.dt iritdate,

```

count(*) numcases, sum(hr_hull) hull_hr, sum(hr_mach) mach_hr,
sum(hr_train) train_hr, sum(hr_extra) extra_hr, sum(hr_textra) textra_hr,
sum(hr_admin) admin_hr, sum(hr_travel) travel_hr, sum(hr_ttravel) ttravel_hr,
sum(hr_other) other_hr,
sum(irit.num_def) num_def,
(Sum of Mike's dummies (based on Peggy's mapping) gives the total of
sub-inspections for that Level II activity on that date)
sum(d2a1) numd2a1, sum(d2a2) numd2a2, sum(d2a3) numd2a3,
(CRST types of inspections: indicators)
sum(crst.dannual) crstannual, sum(crst.dreinsp) crstreinsp,
sum(crst.dadmin) crstadmin, sum(crst.dhull) crsthull, sum(crst.dcoc) crstcoc,
sum(crst.dconstr) crstconstr, sum(crst.dcert) crstcert,
sum(crst.dinit) crstinit, sum(crst.dmach) crstmach, sum(crst.ddeficit) crstdef,
sum(crst.dother) crstother, sum(crst.drest) crstrest
from crst, irit

```

(Since first casualty case is 02/91 and duration is from last inspection, only inspections after 1991 are considered. This is unlike the Poisson stuff where inspections after 1989 are considered)

where

```

(activity II.A.3=Hull Exam)
irit.hull_inspect="X" and

irit.micase[1,2]="MI" and
irit.vkey[1,2]="VN" and
crst.case[1,2]="MI" and
(since first casualty case is 02/91 and duration is from last inspec)
crst.case[3,4]>="91" and
crst.case=irit.micase

```

```

group by irit.vkey, irit.dt
into temp crst_temp0;

```

```

select count(*) countcrst_temp0
from crst_temp0;

```

(This file joins CRST_TEMP0 (agg hours by vkey) to VIDT to identify the foll: service, flag, reg_gt, bld_yr, route.)

```

(drop table vidtcrst;)

```

```

select
  crst_temp0.*,
  vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
  year(vidt.bld_dt) yearbld, vidt.route route,
  (These have many nulls and are used only for model of inspection if adequate)
  vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from crst_temp0, vidt
where
  crst_temp0.iritvkey=vidt.vkey and
  (
    vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
    vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
    vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)
  ) and
  vidt.flag="US"
into temp vidtcrst;

```

```
select count(*)
from vidtcrst;
```

```
(*****Personnel Casualties*****)
```

```
{ Here, casualty data is assembled from CIVT and CIRT.
CIRT, and CIVT are joined by (unique) Mccase and select out only
deep-draft vessels (hence a little use of VIDT). Personnel casualties are
constructed from CIRT (which has no vkey) and joined to CIVT to associate
them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821
records, 13,548 have unique Vkey), so we need to choose only unique records)
```

```
{
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
}
select
    civt.vkey civtvkey,deaths,missing,injured,cirt.incident_dt cirtdate
```

```
from cirt, civt, vidt
(Note that in CIVT, the vkey is not unique (in VIDT vkey is unique). Hence
first get temp table civt_dups (with duplicates). Then check for number
of duplicates before grouping by vkey)
where
    cirt.mccase=civt.mccase and
    civt.vkey=vidt.vkey and
```

```
{Jim Law: conversion on July 14, 1994. The following query contracts
CIRT to cases that are correct (drop mystery and inconsequential
casualties). ctf_ind=X are inconsequential cases. command_endorse and
command_cls are mutually exclusive. command_endorse=X implies that
case has been reviewed and fwd to dt/HQ for review. command_cls=X means that
case is done and does not require review at dt/HQ. command_endorse=X are
legit cases and all should be considered. Of the command_cls=X cases, only
those with ctf_ind=null should be considered since ctf_ind=X implies an
inconsequential case. }
```

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and

(cirt.deaths>0 or cirt.missing>0 or cirt.injured>0) and
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
vidt.reg_gt>=100) )
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

```
{This set of statements selects non-duplicate rows in civt_dup. If group
by just civtvkey,incident_dt, get almost same rows as this}
select * from civt_dups
group by civtvkey,cirtdate, deaths,missing,injured
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;
```

```
{group by vkey to attach to the inspections file. Note that numdates now
gives the number of unique incident dates associated with that vessel}
```

```

select      civtvkey, cirtdate,
            sum(deaths) deaths,sum(missing) missing,sum(injured) injured
from civt_nodups
group by civtvkey,cirtdate
order by deaths desc, injured desc
into temp cirt_civt0;

```

```

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)

```

{Here we do the last part: join inspection and casualty tables, and Unload
2 Personnel casualty files (one for M/Y and one for just Y)}

```

{
drop table persinsp;
drop table inspect;
drop table inspect_MY;
drop table inspect_Y;
drop table justvkey;
drop table vesschar;
drop table durl;
drop table dur2;
drop table dur3;
}

```

{I. Join hours and casualties.
vidtcrst sorted by iritvkey,iritdate, and cirt_civt0 is sorted by civtvkey,
cirtdate. Hence there are duplicate vkeys in both and the next join
statement produces a small cartesian explosion, but this is ok since we Need
this explosion because
(i) we need to match only where cirtdate>iritdate, and
(ii) we need to compute MIN duration among the cartesian matches}

{This first set of statements for making persinsp and checking}

```

select unique vidtcrst.*, cirt_civt0.*
from vidtcrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtcrst.iritvkey and
      cirt_civt0.cirtdate>=vidtcrst.iritdate
into temp persinsp;
select count(*) num_persinsp from persinsp;
{Count number of unique (iritvkey,iritdate) in persinsp}
select unique iritvkey,iritdate from persinsp into temp junk0;
select count(*) numuniq_persinsp from junk0;
drop table junk0;
{Count number of casualty vkeys that Are in vidtcrst}
select count(*) vidtcrst_keep from persinsp
where civtvkey is not null;

```

{This is to make the inspections by M/Y and also by just Y to join with
the so grouped duration data below for the complete data set}

```

select *, month(iritdate) mo,year(iritdate) ye
from vidtcrst
into temp inspect;

```

{By MY}

```

select
      iritvkey, mo, ye,
      sum(numcases) numcases,sum(hull_hr) hull_hr,sum(mach_hr) mach_hr,

```



```

sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
sum(other_hr) other_hr,
sum(num_def) num_def,
{Level II Dummies from Mike: Duration model on only Level II activities
Here only II.A activities since only U.S. flag MI activities}
sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
{CRST types of inspections: indicators}
sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
sum(crstconstr) crstconstr, sum(crstcert) crstcert,
sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, mo, ye
into temp inspect_MY;

```

```

{By Y}
select
  iritvkey, ye,
  sum(numcases) numcases, sum(hull_hr) hull_hr, sum(mach_hr) mach_hr,
  sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
  sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
  sum(other_hr) other_hr,
  sum(num_def) num_def,
{Level II Dummies from Mike: Duration model on only Level II activities
Here only II.A activities since only U.S. flag MI activities}
sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
{CRST types of inspections: indicators}
sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
sum(crstconstr) crstconstr, sum(crstcert) crstcert,
sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, ye
into temp inspect_Y;

```

```

{Make a table grouped Just by iritvkey for vessel characteristics}
select iritvkey
from vidtcrst
group by iritvkey
into temp justvkey;
select count(*) num_justvkey from justvkey;

select justvkey.iritvkey,
  vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
  year(vidt.bld_dt) yearbld, vidt.route route,
{These have many nulls and are used only for model of inspection if adequate}
  vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from justvkey, vidt
where
  justvkey.iritvkey=vidt.vkey and
  (
    vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
    vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
    vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)
  ) and
  vidt.flag="US"
into temp vesschar;

```

```
select count(*) num_vesschar from vesschar;
```

{The following comments apply to when I was using Peggy's mapping for Level II activities. But since we are now using IRIT indicators are these comments still applicable? We'll find out, if there is a big difference between the M/Y and the just Y file size}

{II. Here we compute Duration, and get rid of duplicate values.

We Group by Month/Year of IRIT inspection. This is since several Level II activities may be grouped in a bunch but on several different days. We would like to count this bunch only once. There is still an approximation since bunch may overlap between two months. Can't prevent this in SQL Hence we do two data sets:

- (i) Group by Month/Year, as described above, and
- (ii) Group by just Year. This is a smaller data set, and is the correct one for Level II activities that are performed over 1 or 2 years)

{Note: for inspections with no casualty, duration=(1/1/95 - iritdate)}

{Data set 1: Group by Month/Year}

```
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
            (cirtdate-iritdate) dur_cas, ("1/1/95"-iritdate) dur_nocas
from persinsp
into temp dur1;
```

```
select iritvkey,mo,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
```

```
group by iritvkey, mo,ye
order by iritvkey,ye,mo
into temp dur2;
```

```
select count(*) all_rows_MY_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_1 from junk1;
drop table junk1;
```

{Join duration and inspection tables}

```
select      inspect_MY.*, mindur_cas, dur_nocas,
            service , flag, reg_gt, yearbld, route,
            dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_MY, dur2, vesschar
where      inspect_MY.iritvkey=dur2.iritvkey and
            inspect_MY.iritvkey=vesschar.iritvkey and
            inspect_MY.mo=dur2.mo and
            inspect_MY.ye=dur2.ye
order by iritvkey,ye,mo
into temp dur3;
select count(*) all_rows_MY_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_2 from junk1;
drop table junk1;
```

```
unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a3_my.pers" delimiter ","
select *
from dur3;
```

{Check the aggregation}

```
select      count(*) numrows, sum(hull_hr) tot_hull_hr, sum(mach_hr)
tot_mach_hr,
            sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1,sum(numd2a2) numd2a2,
            sum(numd2a3) numd2a3
```

```

from dur3;

drop table dur1;
drop table dur2;
drop table dur3;

(Data set 2: Group by just Year)
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
            (cirtdate-iritdate) dur_cas, (*1/1/95"-iritdate) dur_nocas
from persinsp
into temp dur1;

select iritvkey, ye, min(dur_cas) mindur_cas, max(dur_nocas) dur_nocas
from dur1
group by iritvkey, ye
order by iritvkey, ye
into temp dur2;
select count(*) all_rows_Y_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_1 from junk1;
drop table junk1;

(Join duration and inspection tables)
select      inspect_Y.*, mindur_cas, dur_nocas,
            service , flag, reg_gt, yearbld, route,
            dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_Y, dur2, vesschar
where      inspect_Y.iritvkey=dur2.iritvkey and
            inspect_Y.iritvkey=vesschar.iritvkey and
            inspect_Y.ye=dur2.ye
order by iritvkey, ye
into temp dur3;
select count(*) all_rows_Y_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_2 from junk1;
drop table junk1;

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a3_y.pers" delimiter ","
select *
from dur3;

select      count(*)    numrows,    sum(hull_hr)    tot_hull_hr,    sum(mach_hr)
tot_mach_hr,
            sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1, sum(numd2a2) numd2a2,
            sum(numd2a3) numd2a3
from dur3;

(print this out for var names to an output file since need also to print for
pollution data set)
output to /users/gawande/dur_a3_pers.out
select *
from dur3
where reg_gt>100000;

{*****Pollution Casualties*****}

```

(Be sure to run MIDUR1 and MIDUR2 before these two progs)

{ Here, pollution casualty data is assembled from CIVT and CIRT. CIRT, and CIVT are joined by (unique) Mccase and select out only deep-draft vessels (hence a little use of VIDT). Pollution incidents are constructed from CIRT (which has no vkey) and joined to CIVT to associate them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821 records, 13,548 have unique Vkey), so we need to choose only unique records)

```
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
```

```
select
  civt.vkey civtvkey, cirt.incident_dt cirtdate
```

```
from cirt, civt, vidt
```

{Note that using VIDT for the reg_gt>100 info and hence need Unique in select statement since in CIVT, the vkey is not unique (in VIDT vkey is unique)}

```
where
  cirt.mccase=civt.mccase and
  civt.vkey=vidt.vkey and
```

{Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case. }

{Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case. }

```
(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and
```

```
cirt.mcpd_ind>=1 and
(cirt.pol_ind="X" or pri_nature="POLLUTION") and
```

{To select Only BAD cases, unblock this statement}
{severity in ("MAJOR","POTENT","MEDIUM") and}

```
( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
  vidt.reg_gt>=100) )
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

{This set of statements selects non-duplicate rows in civt_dup. Although this is an approximation of duplicates, its not a bad one. Can't really

```

    check for the pollution cases since mostly number of cases is 1)
select * from civt_dups
group by civtvkey, cirtdate
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;

```

{group by vkey to attach to the inspections file. Note that poll_incids now gives the number of unique incident dates associated with that vessel on a cirtdate, and hence is probably always equal to 1. Actually poll_incids is superfluous and never used in the duration file anyway}

```

select civtvkey, cirtdate, count(*) poll_incids
from civt_nodups
group by civtvkey, cirtdate
order by poll_incids desc
into temp cirt_civt0;

```

```

select count(*) num_cirtcivt0
from cirt_civt0;
(drop table cirt_civt0;)

```

{Here we do the last part: join inspection and casualty tables, and Unload 2 Pollution casualty files (one for M/Y and one for just Y)}

```

drop table inspect;
drop table inspect_MY;
drop table inspect_Y;
drop table justvkey;
drop table vesschar;
drop table durl;
drop table dur2;
drop table dur3;

```

{I. Join hours and casualties.
vidtcrst sorted by iritvkey, iritdate, and cirt_civt0 is sorted by civtvkey, cirtdate. Hence there are duplicate vkeys in both and the next join statement produces a small cartesian explosion, but this is ok since we Need this explosion because
(i) we need to match only where cirtdate>iritdate, and
(ii) we need to compute MIN duration among the cartesian matches}

```

(This first set of statements for making pollinsp and checking)
select unique vidtcrst.*, cirt_civt0.*
from vidtcrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtcrst.iritvkey and
      cirt_civt0.cirtdate>=vidtcrst.iritdate
into temp pollinsp;
select count(*) num_pollinsp from pollinsp;
{Count number of unique (iritvkey, iritdate) in pollinsp}
select unique iritvkey, iritdate from pollinsp into temp junk0;
select count(*) numuniq_pollinsp from junk0;
drop table junk0;
{Count number of casualty vkeys that Are in vidtcrst}
select count(*) vidtcrst_keep from pollinsp
where civtvkey is not null;

```

{This is to make the inspections by M/Y and also by just Y to join with the so grouped duration data below for the complete data set}

```
select *, month(iritdate) mo, year(iritdate) ye
from vidtcrst
into temp inspect;
```

(By MY)

```
select
  iritvkey, mo, ye,
  sum(numcases) numcases, sum(hull_hr) hull_hr, sum(mach_hr) mach_hr,
  sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
  sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
  sum(other_hr) other_hr,
  sum(num_def) num_def,
  (Level II Dummies from Mike: Duration model on only Level II activities
  Here only II.A activities since only U.S. flag MI activities)
  sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
  (CRST types of inspections: indicators)
  sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
  sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
  sum(crstconstr) crstconstr, sum(crstcert) crstcert,
  sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
  sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, mo, ye
into temp inspect_MY;
```

(By Y)

```
select
  iritvkey, ye,
  sum(numcases) numcases, sum(hull_hr) hull_hr, sum(mach_hr) mach_hr,
  sum(train_hr) train_hr, sum(extra_hr) extra_hr, sum(textra_hr) textra_hr,
  sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(ttravel_hr) ttravel_hr,
  sum(other_hr) other_hr,
  sum(num_def) num_def,
  (Level II Dummies from Mike: Duration model on only Level II activities
  Here only II.A activities since only U.S. flag MI activities)
  sum(numd2a1) numd2a1, sum(numd2a2) numd2a2, sum(numd2a3) numd2a3,
  (CRST types of inspections: indicators)
  sum(crstannual) crstannual, sum(crstreinsp) crstreinsp,
  sum(crstadmin) crstadmin, sum(crsthull) crsthull, sum(crstcoc) crstcoc,
  sum(crstconstr) crstconstr, sum(crstcert) crstcert,
  sum(crstinit) crstinit, sum(crstmach) crstmach, sum(crstdef) crstdef,
  sum(crstother) crstother, sum(crstrest) crstrest
from inspect
group by iritvkey, ye
into temp inspect_Y;
```

(Make a table grouped Just by iritvkey for vessel characteristics)

```
select iritvkey
from vidtcrst
group by iritvkey
into temp justvkey;
select count(*) num_justvkey from justvkey;
```

```
select justvkey.iritvkey,
  vidt.service service, vidt.flag flag, vidt.reg_gt reg_gt,
  year(vidt.bld_dt) yearbld, vidt.route route,
  (These have many nulls and are used only for model of inspection if adequate)
  vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from justvkey, vidt
where
```

```

justvkey.iritvkey=vidt.vkey and
(
  vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
  vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
  vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100)
) and
vidt.flag="US"
into temp vesschar;
select count(*) num_vesschar from vesschar;

```

(II. Here we compute Duration, and get rid of duplicate values. We Group by Month/Year of IRIT inspection. This is since several Level II activities may be grouped in a bunch but on several different days. We would like to count this bunch only once. There is still an approximation since bunch may overlap between two months. Can't prevent this in SQL Hence we do two data sets:

- (i) Group by Month/Year, as described above, and
- (ii) Group by just Year. This is a smaller data set, and is the correct one for Level II activities that are performed over 1 or 2 years)

(Note: for inspections with no casualty, duration=(1/1/95 - iritdate))

```

(Data set 1: Group by Month/Year)
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
            (cirtdate-iritdate) dur_cas, ("1/1/95"-iritdate) dur_nocas
from pollinsp
into temp dur1;

```

```

select iritvkey,mo,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
group by iritvkey, mo,ye
order by iritvkey,ye,mo
into temp dur2;
select count(*) all_rows_MY_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_1 from junk1;
drop table junk1;

```

```

(Join duration and inspection tables)
select      inspect_MY.*, mindur_cas, dur_nocas,
            service , flag, reg_gt, yearbld, route,
            dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_MY, dur2, vesschar
where       inspect_MY.iritvkey=dur2.iritvkey and
            inspect_MY.iritvkey=vesschar.iritvkey and
            inspect_MY.mo=dur2.mo and
            inspect_MY.ye=dur2.ye
order by iritvkey,ye,mo
into temp dur3;
select count(*) all_rows_MY_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_2 from junk1;
drop table junk1;

```

```

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a3_my.pollall" delimiter ","
select *
from dur3;

```

```

(Check the aggregation)
select      count(*)    numrows,      sum(hull_hr)    tot_hull_hr,      sum(mach_hr)

```

```

tot_mach_hr,
    sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1, sum(numd2a2) numd2a2,
    sum(numd2a3) numd2a3
from dur3;

drop table dur1;
drop table dur2;
drop table dur3;

{Data set 2: Group by just Year}
select      iritvkey, month(iritdate) mo, year(iritdate) ye,
    (cirtdate-iritdate) dur_cas, ('1/1/95'-iritdate) dur_nocas
from pollinsp
into temp dur1;

select iritvkey, ye, min(dur_cas) mindur_cas, max(dur_nocas) dur_nocas
from dur1
group by iritvkey, ye
order by iritvkey, ye
into temp dur2;
select count(*) all_rows_Y_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_1 from junk1;
drop table junk1;

{Join duration and inspection tables}
select      inspect_Y.*, mindur_cas, dur_nocas,
    service , flag, reg_gt, yearbld, route,
    dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_Y, dur2, vesschar
where      inspect_Y.iritvkey=dur2.iritvkey and
    inspect_Y.iritvkey=vesschar.iritvkey and
    inspect_Y.ye=dur2.ye
order by iritvkey, ye
into temp dur3;
select count(*) all_rows_Y_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_2 from junk1;
drop table junk1;

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2a3_y.pollall" delimiter ","
select *
from dur3;

select      count(*)    numrows,    sum(hull_hr)    tot_hull_hr,    sum(mach_hr)
tot_mach_hr,
    sum(admin_hr) tot_admin_hr
from dur3;
select count(*) numrows, sum(numd2a1) numd2a1, sum(numd2a2) numd2a2,
    sum(numd2a3) numd2a3
from dur3;

{print this out for var names to an output file since need also to print for
pollution data set}
output to /users/gawande/dur_a3_poll.out
select *
from dur3
where reg_gt>100000;

```


DUR_B.SQL

{PS Cases}

{Use Peggy Thurber's mapping for Both Level II and Level III data sets. This is different from the MI case, where IRIT's major activity indicators were used to select Level II.A activities. Since II.B activities are differentiated only by service, we use Peggy's mapping since the data sets will be disaggregated by service. We need to construct JUST ONE data set for Level II activities, and then select out the B1, B2, and B3 data sets in Gauss.}

- {1. Change the Unload to file else WILL WRITE OVER
2. Change the Output To files else WILL WRITE OVER }

{Only post 1991 (incl) inspections since duration since last inspection to casualty, and first casualty in Minmod is 02/91}

{ Duration data: The idea is as follows: See the MI duration programs dur_a1 for this }

{*****HOURS of INSPECTIONS*****}

select

avst.vkey avstvkey, brit.act_dt britdate,
count(*) numcases,sum(hr_reg) reg_hr,sum(hr_res) res_hr,
sum(hr_boat) boat_hr, sum(hr_air) air_hr,
sum(hr_regadmin) admin_hr,sum(hr_regtv1) travel_hr,
sum(hr_other) other_hr,
sum(num_def) avst_def,sum(num_act) avst_act,
(Level II and III Dummies from Mike based on Peggy Thurber's mapping
Here only II.B activities since only PS activities)
sum(d2b1) numd2b1,sum(d2b2) numd2b2,sum(d2b3) numd2b3,
(Note that 35, 36, and 38 for US Flag only needed, but am including it here)
sum(d31) numd31, sum(d32) numd32, sum(d33) numd33, sum(d34) numd34,
sum(d35) numd35, sum(d36) numd36, sum(d37) numd37, sum(d38) numd38,
sum(d39) numd39
from brst, avst, brit

where

(Level II.B activities are all in one data set. Will disagg by service
in Gauss later)

(brst.d2b1=1 or brst.d2b2=1 or brst.d2b3=1) and

(since first casualty case is 02/91 and duration is from last inspec)
brst.pscase[3,4]>="91" and
brst.pscase=avst.pscase and
brst.pscase=brit.pscase

group by avst.vkey, brit.act_dt
into temp brst_temp0;

select count(*) countbrst_temp0
from brst_temp0;

{This file joins BRST_TEMP0 (agg hours by vkey) to VIDT to identify the foll:
service, flag, reg_gt, bld_yr, route.}

{drop table vidtbrst;}

select

```

brst_temp0.*,
vidt.service vidtservice, vidd.flag viddflag, vidd.reg_gt reg_gt,
year(vidt.bld_dt) yearbld, vidd.route route,
{These have many nulls and are used only for model of inspection if adequate}
vidt.dblside_typ, vidd.dblbott_typ, vidd.prop_typ, vidd.design, vidd.hull_mat
from brst_temp0, vidd
where
brst_temp0.avstvkey=vidt.vkey and
(
(vidt.flag="US" and (
vidt.service="FREIGHT SHIP" or vidd.service="PUB. TANKSHIP/BARGE" or
vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
vidt.service="PASSENGER SHIP") and vidd.reg_gt>=100) ) )
or
(vidt.flag not in ("US") and (
vidt.service="FREIGHT SHIP" or vidd.service="PUB. TANKSHIP/BARGE" or
vidt.service="TANK SHIP" or vidd.service="PASSENGER" or
vidt.service="PASSENGER SHIP" ) )
)
into temp viddbrst;

select count(*)
from viddbrst;

{*****Personnel Casualties*****}

{ Here, casualty data is assembled from CIVT and CIRT.
CIRT, and CIVT are joined by (unique) Mccase and select out only
deep-draft vessels (hence a little use of VIDT). Personnel casualties are
constructed from CIRT (which has no vkey) and joined to CIVT to associate
them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821
records, 13,548 have unique Vkey), so we need to choose only unique records}
{
drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;
}
select
civt.vkey civtvkey,deaths,missing,injured,cirt.incident_dt cirtdate

from cirt, civt, vidd
{Note that in CIVT, the vkey is not unique (in VIDT vkey is unique). Hence
first get temp table civt_dups (with duplicates). Then check for number
of duplicates before grouping by vkey}
where
cirt.mccase=civt.mccase and
civt.vkey=vidt.vkey and

{Jim Law: conversion on July 14, 1994. The following query contracts
CIRT to cases that are correct (drop mystery and inconsequential
casualties). ctf_ind=X are inconsequential cases. command_endorse and
command_cls are mutually exclusive. command_endorse=X implies that
case has been reviewed and fwd to dt/HQ for review. command_cls=X means that
case is done and does not require review at dt/HQ. command_endorse=X are
legit cases and all should be considered. Of the command_cls=X cases, only
those with ctf_ind=null should be considered since ctf_ind=X implies an
inconsequential case. }

(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and

```

{Since inspections program selects correctly, here select larger subset so that don't miss out anything when merge. Passenger<100 also selected}

```
(cirt.deaths>0 or cirt.missing>0 or cirt.injured>0)    and
( cirt.service="FREIGHT SHIP" or cirt.service="PUB. TANKSHIP/BARGE"
  or cirt.service="TANK SHIP" or
  cirt.service="PASSENGER" or cirt.service="PASSENGER SHIP")
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;
```

{This set of statements selects non-duplicate rows in civt_dup. If group by just civtvkey,incident_dt, get almost same rows as this}

```
select * from civt_dups
group by civtvkey,cirtdate, deaths,missing,injured
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;
```

{group by vkey to attach to the inspections file. Note that numdates now gives the number of unique incident dates associated with that vessel}

```
select      civtvkey, cirtdate,
            sum(deaths) deaths,sum(missing) missing,sum(injured) injured
from civt_nodups
group by civtvkey,cirtdate
order by deaths desc, injured desc
into temp cirt_civt0;
```

```
select count(*) num_cirtcivt0
from cirt_civt0;
{drop table cirt_civt0;}
```

{Here we do the last part: join inspection and casualty tables, and Unload 2 Personnel casualty files (one for M/Y and one for just Y)}

```
{
drop table persinsp;
drop table inspect;
drop table inspect_MY;
drop table inspect_Y;
drop table justvkey;
drop table vesschar;
drop table dur1;
drop table dur2;
drop table dur3;
}
```

{I. Join hours and casualties.

vidtbrst sorted by avstvkey,britdate, and cirt_civt0 is sorted by civtvkey, cirtdate. Hence there are duplicate vkeys in both and the next join statement produces a small cartesian explosion, but this is ok since we Need this explosion because

- (i) we need to match only where cirtdate>britdate, and
- (ii) we need to compute MIN duration among the cartesian matches}

{This first set of statements for making persinsp and checking}

```
select unique vidthrst.*, cirt_civt0.*
from vidthrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtbrst.avstvkey and
      cirt_civt0.cirtdate>=vidtbrst.britdate
into temp persinsp;
```

```

select count(*) num_persinsp from persinsp;
{Count number of unique (avstvkey,britdate) in persinsp}
select unique avstvkey,britdate from persinsp into temp junk0;
select count(*) numuniq_persinsp from junk0;
drop table junk0;
{Count number of casualty vkeys that Are in vidtbrst}
select count(*) vidtbrst_keep from persinsp
where civtvkey is not null;

```

{This is to make the inspections by M/Y and also by just Y to join with the so grouped duration data below for the complete data set}

```

select *, month(britdate) mo,year(britdate) ye
from vidtbrst
into temp inspect;

```

{By MY}

```

select
    avstvkey, mo, ye,
    sum(numcases) numcases, sum(reg_hr) reg_hr, sum(res_hr) res_hr,
    sum(boat_hr) boat_hr, sum(air_hr) air_hr,
    sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(other_hr) other_hr,
    sum(avst_def) avst_def, sum(avst_act) avst_act,
    {Level II and III Dummies from Mike based on Peggy Thurber's mapping
    Here only II.B activities since only PS activities}
    sum(numd2b1) numd2b1, sum(numd2b2) numd2b2, sum(numd2b3) numd2b3,
    {Note that 35, 36, and 38 for US Flag only needed, but am including it here}
    sum(numd31) numd31, sum(numd32) numd32, sum(numd33) numd33, sum(numd34) numd34,
    sum(numd35) numd35, sum(numd36) numd36, sum(numd37) numd37, sum(numd38) numd38,
    sum(numd39) numd39
from inspect
group by avstvkey, mo, ye
into temp inspect_MY;

```

{By Y}

```

select
    avstvkey, ye,
    sum(numcases) numcases, sum(reg_hr) reg_hr, sum(res_hr) res_hr,
    sum(boat_hr) boat_hr, sum(air_hr) air_hr,
    sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(other_hr) other_hr,
    sum(avst_def) avst_def, sum(avst_act) avst_act,
    {Level II and III Dummies from Mike based on Peggy Thurber's mapping
    Here only II.B activities since only PS activities}
    sum(numd2b1) numd2b1, sum(numd2b2) numd2b2, sum(numd2b3) numd2b3,
    {Note that 35, 36, and 38 for US Flag only needed, but am including it here}
    sum(numd31) numd31, sum(numd32) numd32, sum(numd33) numd33, sum(numd34) numd34,
    sum(numd35) numd35, sum(numd36) numd36, sum(numd37) numd37, sum(numd38) numd38,
    sum(numd39) numd39
from inspect
group by avstvkey, ye
into temp inspect_Y;

```

{Make a table grouped Just by avstvkey for vessel characteristics}

```

select avstvkey
from vidtbrst
group by avstvkey
into temp justvkey;
select count(*) num_justvkey from justvkey;

```

```

select
  justvkey.avstvkey,
  vidt.service vidtservice, vidt.flag vidtflag, vidt.reg_gt reg_gt,
  year(vidt.bld_dt) yearbld, vidt.route route,
  (These have many nulls and are used only for model of inspection if adequate)
  vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from justvkey, vidt
where
  justvkey.avstvkey=vidt.vkey and
  (
    (vidt.flag="US" and (
      vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
      vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
      vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100) ) )
    or
    (vidt.flag not in ("US") and (
      vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
      vidt.service="TANK SHIP" or vidt.service="PASSENGER" or
      vidt.service="PASSENGER SHIP" ) )
  )
into temp vesschar;
select count(*) num_vesschar from vesschar;

```

{The following comments apply to Peggy's mapping for Level II activities.
We'll find out, if there is a big difference
between the M/Y and the just Y file size}

{II. Here we compute Duration, and get rid of duplicate values.
We Group by Month/Year of BRIT inspection. This is since several Level II
activities may be grouped in a bunch but on several different days. We
would like to count this bunch only once. There is still an approximation
since bunch may overlap between two months. Can't prevent this in SQL
Hence we do two data sets:
(i) Group by Month/Year, as described above, and
(ii) Group by just Year. This is a smaller data set, and is the correct one
for Level II activities that are performed over 1 or 2 years}

{Note: for inspections with no casualty, duration=(1/1/95 - britdate)}

```

{Data set 1: Group by Month/Year}
select      avstvkey, month(britdate) mo, year(britdate) ye,
            (cirtdate-britdate) dur_cas, ("1/1/95"-britdate) dur_nocas
from persinsp
into temp dur1;

select avstvkey,mo,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
group by avstvkey, mo,ye
order by avstvkey,ye,mo
into temp dur2;
select count(*) all_rows_MY_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_1 from junk1;
drop table junk1;

```

```

{Join duration and inspection tables}
select      inspect_MY.*, mindur_cas, dur_nocas,
            vidtservice, vidtflag, reg_gt, yearbld, route,
            dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_MY, dur2, vesschar
where      inspect_MY.avstvkey=dur2.avstvkey and

```

```

        inspect_MY.avstvkey=vesschar.avstvkey and
        inspect_MY.mo=dur2.mo and
        inspect_MY.ye=dur2.ye
order by avstvkey,ye,mo
into temp dur3;
select count(*) all_rows_MY_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_2 from junk1;
drop table junk1;

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2b_my.pers" delimiter ","
select *
from dur3;

select      sum(numcases) numcases,sum(reg_hr) tot_reg,sum(res_hr) tot_res,
            sum(admin_hr) tot_admin
from dur3;
select count(*) numrows, sum(numd2b1) numd2b1,sum(numd2b2) numd2b2,
            sum(numd2b3) numd2b3
from dur3;

drop table dur1;
drop table dur2;
drop table dur3;

{Data set 2: Group by just Year}
select      avstvkey, month(britdate) mo,year(britdate) ye,
            (cirtdate-britdate) dur_cas, ("1/1/95"-britdate) dur_nocas
from persinsp
into temp dur1;

select avstvkey,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
group by avstvkey,ye
order by avstvkey,ye
into temp dur2;
select count(*) all_rows_Y_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_1 from junk1;
drop table junk1;

{Join duration and inspection tables}
select      inspect_Y.*, mindur_cas, dur_nocas,
            vidtservice, vidtflag, reg_gt, yearbld, route,
            dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_Y, dur2, vesschar
where      inspect_Y.avstvkey=dur2.avstvkey and
            inspect_Y.avstvkey=vesschar.avstvkey and
            inspect_Y.ye=dur2.ye
order by avstvkey,ye
into temp dur3;
select count(*) all_rows_Y_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_2 from junk1;
drop table junk1;

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2b_y.pers" delimiter ","
select *
from dur3;

```

```

select      sum(numcases) numcases, sum(reg_hr) tot_reg, sum(res_hr) tot_res,
            sum(admin_hr) tot_admin
from dur3;
select count(*) numrows, sum(numd2b1) numd2b1, sum(numd2b2) numd2b2,
            sum(numd2b3) numd2b3
from dur3;

```

```

(print this out for var names to an output file since need also to print for
pollution data set)
output to /users/gawande/dur_b_pers.out
select *
from dur3
where reg_gt>100000;

```

{*****Pollution Casualties*****}

(Be sure to run MIDUR1 and MIDUR2 before these two progs)

{ Here, pollution casualty data is assembled from CIVT and CIRT. CIRT, and CIVT are joined by (unique) Mccase and select out only deep-draft vessels (hence a little use of VIDT). Pollution incidents are constructed from CIRT (which has no vkey) and joined to CIVT to associate them with a Vkey. There are duplicate Vkey records in CIVT (of the 28,821 records, 13,548 have unique Vkey), so we need to choose only unique records}

```

drop table civt_dups;
drop table civt_nodups;
drop table cirt_civt0;

```

```

select
    civt.vkey civtvkey, cirt.incident_dt cirtdate

```

```

from cirt, civt, vidt
(Note that using VIDT for the reg_gt>100 info and hence need Unique in select
statement since in CIVT, the vkey is not unique (in VIDT vkey is unique))
where
    cirt.mccase=civt.mccase and
    civt.vkey=vidt.vkey and

```

{Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case. }

{Jim Law: conversion on July 14, 1994. The following query contracts CIRT to cases that are correct (drop mystery and inconsequential casualties). ctf_ind=X are inconsequential cases. command_endorse and command_cls are mutually exclusive. command_endorse=X implies that case has been reviewed and fwd to dt/HQ for review. command_cls=X means that case is done and does not require review at dt/HQ. command_endorse=X are legit cases and all should be considered. Of the command_cls=X cases, only those with ctf_ind=null should be considered since ctf_ind=X implies an inconsequential case. }


```

(cirt.command_endorse="X"
or (cirt.command_cls="X" and cirt.ctf_ind is null)) and

cirt.mcpd_ind>=1 and
(cirt.pol_ind="X" or pri_nature="POLLUTION") and

{To select Only BAD cases, unblock this statement}
{severity in ("MAJOR","POTENT","MEDIUM") and}

( civt.service="FREIGHT SHIP" or civt.service="PUB. TANKSHIP/BARGE"
or civt.service="TANK SHIP" or
((civt.service="PASSENGER" or civt.service="PASSENGER SHIP") and
vidt.reg_gt>=100) )
into temp civt_dups;
select count(*) num_civtdups
from civt_dups;

{This set of statements selects non-duplicate rows in civt_dup. Although
this is an approximation of duplicates, its not a bad one. Can't really
check for the pollution cases since mostly number of cases is 1}
select * from civt_dups
group by civtvkey,cirtdate
into temp civt_nodups;
select count(*) num_civtnodups
from civt_nodups;

{group by vkey to attach to the inspections file. Note that poll_incids now
gives the number of unique incident dates associated with that vessel on
a cirtdate, and hence is probably always equal to 1.
Actually poll_incids is superfluous and never used in the duration file anyway}

select civtvkey, cirtdate, count(*) poll_incids
from civt_nodups
group by civtvkey, cirtdate
order by poll_incids desc
into temp cirt_civt0;

select count(*) num_cirtcivt0
from cirt_civt0;
{drop table cirt_civt0;}

{Here we do the last part: join inspection and casualty tables, and Unload
2 Pollution casualty files (one for M/Y and one for just Y)}

drop table inspect;
drop table inspect_MY;
drop table inspect_Y;
drop table justvkey;
drop table vesschar;
drop table durl;
drop table dur2;
drop table dur3;

{I. Join hours and casualties.
vidtbrst sorted by avstvkey,britdate, and cirt_civt0 is sorted by civtvkey,
cirtdate. Hence there are duplicate vkeys in both and the next join
statement produces a small cartesian explosion, but this is ok since we Need
this explosion because
(i) we need to match only where cirtdate>britdate, and
(ii) we need to compute MIN duration among the cartesian matches}

```

```

(This first set of statements for making pollinsp and checking)
select unique vidtbrst.*, cirt_civt0.*
from vidtbrst, outer cirt_civt0
where cirt_civt0.civtvkey=vidtbrst.avstvkey and
      cirt_civt0.cirtdate>=vidtbrst.britdate
into temp pollinsp;
select count(*) num_pollinsp from pollinsp;
(Count number of unique (avstvkey,britdate) in pollinsp)
select unique avstvkey,britdate from pollinsp into temp junk0;
select count(*) numuniq_pollinsp from junk0;
drop table junk0;
(Count number of casualty vkeys that Are in vidtbrst)
select count(*) vidtbrst_keep from pollinsp
where civtvkey is not null;

```

{This is to make the inspections by M/Y and also by just Y to join with the so grouped duration data below for the complete data set}

```

select *, month(britdate) mo,year(britdate) ye
from vidtbrst
into temp inspect;

```

{By MY}

```

select
  avstvkey, mo, ye,
  sum(numcases) numcases, sum(reg_hr) reg_hr, sum(res_hr) res_hr,
  sum(boat_hr) boat_hr, sum(air_hr) air_hr,
  sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(other_hr) other_hr,
  sum(avst_def) avst_def, sum(avst_act) avst_act,
  (Level II and III Dummies from Mike based on Peggy Thurber's mapping
   Here only II.B activities since only PS activities)
  sum(numd2b1) numd2b1, sum(numd2b2) numd2b2, sum(numd2b3) numd2b3,
  (Note that 35, 36, and 38 for US Flag only needed, but am including it here)
  sum(numd31) numd31, sum(numd32) numd32, sum(numd33) numd33, sum(numd34) numd34,
  sum(numd35) numd35, sum(numd36) numd36, sum(numd37) numd37, sum(numd38) numd38,
  sum(numd39) numd39
from inspect
group by avstvkey, mo, ye
into temp inspect_MY;

```

{By Y}

```

select
  avstvkey, ye,
  sum(numcases) numcases, sum(reg_hr) reg_hr, sum(res_hr) res_hr,
  sum(boat_hr) boat_hr, sum(air_hr) air_hr,
  sum(admin_hr) admin_hr, sum(travel_hr) travel_hr, sum(other_hr) other_hr,
  sum(avst_def) avst_def, sum(avst_act) avst_act,
  (Level II and III Dummies from Mike based on Peggy Thurber's mapping
   Here only II.B activities since only PS activities)
  sum(numd2b1) numd2b1, sum(numd2b2) numd2b2, sum(numd2b3) numd2b3,
  (Note that 35, 36, and 38 for US Flag only needed, but am including it here)
  sum(numd31) numd31, sum(numd32) numd32, sum(numd33) numd33, sum(numd34) numd34,
  sum(numd35) numd35, sum(numd36) numd36, sum(numd37) numd37, sum(numd38) numd38,
  sum(numd39) numd39
from inspect
group by avstvkey, ye
into temp inspect_Y;

```

{Make a table grouped Just by avstvkey for vessel characteristics}

```

select avstvkey
from vidtbrst
group by avstvkey
into temp justvkey;
select count(*) num_justvkey from justvkey;

select
    justvkey.avstvkey,
    vidt.service vidtservice, vidt.flag vidtflag, vidt.reg_gt reg_gt,
    year(vidt.bld_dt) yearbld, vidt.route route,
    (These have many nulls and are used only for model of inspection if adequate)
    vidt.dblside_typ, vidt.dblbott_typ, vidt.prop_typ, vidt.design, vidt.hull_mat
from justvkey, vidt
where
    justvkey.avstvkey=vidt.vkey and
    (
        (vidt.flag="US" and (
            vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
            vidt.service="TANK SHIP" or ((vidt.service="PASSENGER" or
            vidt.service="PASSENGER SHIP") and vidt.reg_gt>=100) ) )
        or
        (vidt.flag not in ("US") and (
            vidt.service="FREIGHT SHIP" or vidt.service="PUB. TANKSHIP/BARGE" or
            vidt.service="TANK SHIP" or vidt.service="PASSENGER" or
            vidt.service="PASSENGER SHIP" ) )
    )
into temp vesschar;
select count(*) num_vesschar from vesschar;

```

{II. Here we compute Duration, and get rid of duplicate values.
 We Group by Month/Year of BRIT inspection. This is since several Level II activities may be grouped in a bunch but on several different days. We would like to count this bunch only once. There is still an approximation since bunch may overlap between two months. Can't prevent this in SQL
 Hence we do two data sets:
 (i) Group by Month/Year, as described above, and
 (ii) Group by just Year. This is a smaller dataset, and is the correct one for Level II activities that are performed over 1 or 2 years}

{Note: for inspections with no casualty, duration=(1/1/95 - britdate)}

```

{Data set 1: Group by Month/Year}
select      avstvkey, month(britdate) mo, year(britdate) ye,
            (cirtdate-britdate) dur_cas, ("1/1/95"-britdate) dur_nocas
from pollinsp
into temp dur1;

select avstvkey,mo,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
group by avstvkey, mo,ye
order by avstvkey,ye,mo
into temp dur2;
select count(*) all_rows_MY_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_1 from junk1;
drop table junk1;

```

```

{Join duration and inspection tables}
select      inspect_MY.*, mindur_cas, dur_nocas,
            vidtservice, vidtflag, reg_gt, yearbld, route,

```

```

    dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_MY, dur2, vesschar
where      inspect_MY.avstvkey=dur2.avstvkey and
          inspect_MY.avstvkey=vesschar.avstvkey and
          inspect_MY.mo=dur2.mo and
          inspect_MY.ye=dur2.ye
order by avstvkey,ye,mo
into temp dur3;
select count(*) all_rows_MY_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_MY_2 from junk1;
drop table junk1;

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2b_my.pollall" delimiter ","
select *
from dur3;

{Check the aggregation}
select      sum(numcases) numcases,sum(reg_hr) tot_reg,sum(res_hr) tot_res,
          sum(admin_hr) tot_admin
from dur3;
select count(*) numrows, sum(numd2b1) numd2b1,sum(numd2b2) numd2b2,
          sum(numd2b3) numd2b3
from dur3;

drop table dur1;
drop table dur2;
drop table dur3;

{Data set 2: Group by just Year}
select      avstvkey, month(britdate) mo,year(britdate) ye,
          (cirtdate-britdate) dur_cas, ("1/1/95"-britdate) dur_nocas
from pollinsp
into temp dur1;

select avstvkey,ye,min(dur_cas) mindur_cas,max(dur_nocas) dur_nocas
from dur1
group by avstvkey,ye
order by avstvkey,ye
into temp dur2;
select count(*) all_rows_Y_1 from dur2;
select * from dur2 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_1 from junk1;
drop table junk1;

{Join duration and inspection tables}
select      inspect_Y.*, mindur_cas, dur_nocas,
          vidtservice, vidtflag, reg_gt, yearbld, route,
          dblside_typ, dblbott_typ, prop_typ, design, hull_mat
from inspect_Y, dur2, vesschar
where      inspect_Y.avstvkey=dur2.avstvkey and
          inspect_Y.avstvkey=vesschar.avstvkey and
          inspect_Y.ye=dur2.ye
order by avstvkey,ye
into temp dur3;
select count(*) all_rows_Y_2 from dur3;
select * from dur3 where mindur_cas is not null into temp junk1;
select count(*) with_casualty_Y_2 from junk1;
drop table junk1;

```

```

unload to "/nfs/ttd32/optical/50b/trix.dat/dur_2b_y.pollall" delimiter ","
select *
from dur3;

select      sum(numcases) numcases,sum(reg_hr) tot_reg,sum(res_hr) tot_res,
            sum(admin_hr) tot_admin
from dur3;
select count(*) numrows, sum(numd2b1) numd2b1,sum(numd2b2) numd2b2,
            sum(numd2b3) numd2b3
from dur3;

{print this out for var names to an output file since need also to print for
 pollution data set}
output to /users/gawande/dur_b_poll.out
select •
from dur3
where reg_gt>100000;

```

Appendix C: Mapping Of CASMAIN and MINMOD Casualty Casual Keywords to Level III Intervention Activities

Casualty casual information in the CASMAIN and MINMOD portions of MSMS are grouped by Level III Inspection and Boarding activities to provide a basis for calculating the importance of the Level III activities in the risk based ranking method for Level III MOEs. Discussions with USCG Marine Investigation personnel indicate that there is a substantial difference in the manner in which casualty casual information is recorded between CASMAIN and MSMS. CASMAIN contains 90 keywords under the element name **NATURE OF CASUALTY**. There are 108 keywords under the element name **CAUSE OF CASUALTY**. MINMOD has only 16 keywords under the element name **TYPE** that are analogous to the **NATURE** and **CAUSE** keywords of CASMAIN. Marine Investigation Personnel advised that the information stored in such tables as the Casualty Casual Factor Record (CCFT), Casualty Collision and Grounding Record Table, Casualty Fire and Explosion Record (CFET), Casualty Flood and Capsizing Record (CFCT), and the Casualty Structural Failure Record (CSFT) was not analogous to the **NATURE** and **CAUSE** data in CASMAIN.

The structure of CASMAIN is such that a **NATURE** keyword can have up to three **CAUSE** keywords linked to it. The information at both levels is useful in linking casualty data to specific Level III inspection activities. However, many of the keywords could not be linked to the Level III activities. Of the 90 keywords under **NATURE**, 58 could be identified as relevant to the Level III activities. For the **CAUSE** keywords, only 3 out of 108 could be identified as useful. The results for the CASMAIN keywords are summarized below.

Level III Inspection/Boarding Activity			Number Of Relevant CASMAIN NATURE and CAUSE Keywords
1)	Cargo/Poll.	Handling/Pollution Control	2
			6
2)	Steering/Navigation		1
3)	Document/Paperwork		2
4)	Drills/Human Factors		5
5)	Auxiliary Systems (U.S. Flag Only)		17
6)	Power Plant (U.S. Flag Only)		25
7)	Fire Fighting And Prevention		

8)	Hull (U.S. Flag Only)	2
9)	Life Saving	1

The MINMOD **TYPE** keywords in CERT where match to the Level III inspection activities as follows:

Level III Inspection/Boarding Activity		Casualty Event Record Table Type Keyword
1)	Cargo/Poll. Handling/Pollution Control	POLLUTION
2)	Steering/Navigation	ALLISION GROUNDING ACC LOSS VES CNTRL
3)	Document/Paperwork	No Keyword Identified
4)	Drills/Human Factors	PERSONNEL CAS
5)	Auxiliary Systems (U.S. Flag Only)	No Keyword Identified
6)	Power Plant (U.S. Flag Only)	LOSS ELEC POWER
7)	Fire Fighting And Prevention	FIRE
8)	Hull (U.S. Flag Only)	SINK FLOODING STRUCTURAL FAIL
9)	Life Saving	No Keyword Identified

As shown above, three Level III inspection/boarding activities are not matched to any of the CERT **TYPE** keywords. Three of the 16 keywords were not matched to any inspection/boarding activity; REMOVED, LEFT BLANK, and ABANDONMENT.

Appendix D: Mapping from CRST/BRST Inspection Types into Level II and Level III Activities

Note:

1. For many inspection types, the mapping is one-to-many.
2. A.x.y denotes that the inspection type maps into Level II activity A.x, and Level III activity y. Similarly for B.x.y. Where there is no Level III activity indicator, e.g. A.x, this implies that *all* 9 Level III activities map into that inspection type. In the absence of any other information, we attribute 1/9 of the total hours to each Level III activity. Hours are similarly equally proportioned wherever there is a one-to-many mapping into Level III activities. Inspection types for which there is no activity listed are not mapped at all. See Section I for definition of Level II and Level III activities.
3. Number in parenthesis indicates the number of records in CRST (both MI and PS cases) containing that inspection type.
4. This mapping is used for Duration analysis of Level II.B activities and the Poisson analysis of Level III activities (U.S. flag only). For Level II.A activities, indicators in IRIT are used to select relevant inspections.

<u>Inspection Type</u>	<u>Level II and III Activities</u>	
OTHER (81267)		
NAT. Cargo/Poll. BUREAU (2035)		
ANNUAL EXAMINATION (39232)		B.1, B.2, B.3
POLL PREV (50316)	A.1.1, A.2.1;	B.1.1, B.2.1, B.3.1
LOADLINE (17773)	A.1.8, A.2.8, A.3.8;	B.1.(3,8), B.2.(3,8), B.3.(3,8)
PASS FRGT (12733)		B.1
NAV SAFETY (46235)	A.1.2, A.2.2,	B.1.2, B.2.2, B.3.2
REINSPECTION (38653)	A.2	
MARPOL REQ (30123)	A.1.1, A.2.1;	B.1.y, B.2.y, B.3.y, y=1-4,7
Cargo/Poll. MON (34409)		
ADMIN (78209)	A.1, A.2, A.3;	B.1.y B.2.y, B.3.y, y=1-4,7,9
MONITOR Cargo/Poll. (52630)		
Cargo/Poll. VENT (12720)	A.1.1, A.2.1, A.3.8;	B.2.1
Cargo/Poll. SUP (2108)		
Cargo/Poll. HAND (139)		
MANNING (16424)	A.1.3, A.2.3	B.1.3, B.2.3, B.3.3
Cargo/Poll. PIPE (10915)	A.1.1, A.2.1,	B.1.1, B.2.1
FIRE PROT (31984)	A.1.7, A.2.7;	B.1.7, B.2.7, B.3.7
SIV BOARDING (4092)		
HULL EXAM (37023)	A.3	
TANK VESS (8062)		B.2
DISCREPANCY FOLLOWUP (8939)		B.1.y, B.2.y, B.3.y, y=1-4,7,9
DD EXTEND (2821)	A.3.8	
COC (9379)		B.2
Cargo/Poll. SUPERVISION (2712)		
CONTROL VERIF (1448)		B.3

SOL TRANS (1630)		
PERM-PROCEED (891)		
BREAK BULK (1682)		
DEFICIENCY CK (33238)	A.1, A.2, A.3.(3,8)	
MOVE CONT (711)		
OCEAN DUMP (78)		
CERTIFICATION (44631)	A.1	
LIQ TRANS (92)		
LIFERAFT SVC (21374)	A.1.9, A.2.9	
UNINSP OTHER (266)		
UNINSP VES (3409)		
INVESTIGATION (7106)		
IGS (1111)	A.1.1, A.2.1	B.2.1
MARPOL EQU (164)	A.1.1, A.2.1,	B.1.(1,3), B.2.(1,3), B.3.(1,3)
MARPOLII SURV (2164)	A.1.1, A.2.1	B.2.1
REPAIRS (6443)		
MARPOL (573)		B.2
MARPOL DIS (394)		B.1.1, B.2.1, B.3.1
REC BOAT SAF (9648)		
(42364)		
DAMAGE SURVEY (5470)	A.3.8	
INITIAL CERT (3003)	A.1	
L/S SVC OTHER (2823)	A.1.9, A.2.9	
MACHINERY (617)	A.1.y, A.2.y, A.3.5, y=1,2,5-7	
PERS-IN-ADD (19)		
CONSTRUCTION (1063)	A.1.8, A.3.8	
EXCURS PERMIT (529)		
WELDER QUAL (847)		
UNINSP FISHG (6654)		
PLANREV TBOAT (1595)		
OVERSIGHT (239)	A.1	
POLLUTION INVEST (41763)		
CASUALTY INVEST (41763)		
TRAVEL (45258)		
TRAINING (45258)		
MARPOLII TEST (18)	A.2.1;	B.1.1, B.2.1, B.3.1
MON BARGE OIL (8354)		
DRY BULK INSP (587)		
ANNUAL (9240)		
PUMP ROOM (722)	A.1.(1,5), A.2.(1,5), A.3.8	
CONSTRUCT O/S (50)	A.1.8	
OP MAN REVIEW (4531)	A.1.1, A.2.1;	B.1.1, B.2.1
ANNUAL CONTAI (436)		B.1
MARPOL II (193)		B.1.(1,3), B.2.(1,3), B.3.(1,3)
ANNUAL FREIGH (9031)		B.1
UNINSP TOWING (44)		
NLS SURVEY (171)	A.1, A.2;	B.2
MARPOL V (9215)	A.A.1, A.2.1;	B.1.(1-3), B.2.(1-3), B.3.(1-3)
HARBOR N-TARG (6562)		
OTHER GOVT (26)		

HARBOR TARGET (14045)		
EQUIP MAINTEN (7679)		
MSIS DATA ENT (15684)		
REQD CG TRAIN (4394)		
INCL EXP (511)	A.1.8	
LIFE JACKET (15)	A.1.9, A.2.9;	B.1.9, B.2.9, B.3.9
ENFORCE L & T (528)		
SECURITY BOARDING (30)		
INV NEC (5545)		
HOT WORKS ANN (1463)		
HOTLINE (7)		
SPOT CHECK (460)		
LIQ BULK INSP (5860)		
MARPOL GEN (3762)		B.1.(1-3), B.2.(1-3), B.3.(1-3)
REFLAGGING (37)	A.1	
MARPOLII PR (6)		
VSL MOVE CTRL (4505)		
PROG SUPPORT (3964)		
ORG. PROJECTS (3910)		
UNIT ADMIN (15039)		
PROG TRAINING (3847)		
DOCUMENT CHEC (8565)		B.1.3, B.2.3, B.3.3
FIREFIGHTING (1997)	A.1.7, A.2.7;	B.1.7, B.2.7, B.3.7
COW (204)	A.1.1, A.2.1;	B.2.1
PERS EVALS (3405)		
PUBLIC RELATE (4012)		
OCC SAFETY (2253)		
INDUST COORD (2892)		
PUBLIC MEET (2047)		
GENERAL CORR (5052)		
WS SYS MAINTEN (3505)		
SEM/CONF (1998)		
WATCH-OFFICE (9887)		
WATCH ON CALL (10388)		
MON PK HAZMAT (1286)		
CG VESSEL/EQP (2)		
TRN FORMAL (5076)		
ANNUAL SHIP (1662)		
LIAISON (3054)		
MON BARGE DC (2466)		
TRAIN ON JOB (8010)		
MON SHIP OIL (2961)		
MILITARY EXPL (471)		
POL PREV EQP (7057)	A.1.1, A.2.1;	B.1.1, B.2.1, B.3.1
SANITARY INSP (32)	A.1.5, A.2.5	
DWT SURVEY (95)	A.1.8	
INV UNUSUAL (1289)		
MON HAZ GAS (657)		
REGATTA/PARAD (566)		
D Cargo/Poll. PERMI (263)		

DISCREP FLWUP (3989)	B.1.y, B.2.y, B.3.y, y=1-4,7,9
MON NEC GPS (8142)	
SAR ACTIVITY (246)	
LESSON PREP (2618)	
FIRE PROTECTN (10)	A.1.7, A.2.7, A.3.7;B.1.7, B.2.7, B.3.7
ANNUAL FREIGH ON (7)	B.1
SURVEILLANCE (353)	
CONTIN DRILL (1021)	
DISCREP FLWUP OWUP (1)	
PERS ACTIONS (3263)	
AUX SUPPORT (997)	
FOIA REQUESTS (1755)	
AMVER (4120)	
AIDS TO NAV (325)	
SAFETY EQ MAI (1343)	
COTP ORDERS (1385)	
FIELD REGS (1019)	
COMMERCI EXPL (1118)	
SIV SURVEIL (54)	
RESPONSE PLAN (1180)	
OCEAN DUMPING (94)	
SAFETY ZONE (1175)	
REC BOAT SAFE (1187)	
MON SHIP DC (724)	
BRIDGE ADMIN (280)	
FIRE ASSISTAN (64)	
OTH CG VSL HR (664)	
HOT WORKS TEM (425)	
EST SAFETY ZO (947)	
MARPOL I (1212)	B.1.(1,3),B.2.(1,3),B.3.(1,3)
LIQ BULK SURV (560)	
ADMIN ORDER (398)	
CONTIN PLAN (2954)	
MOBILIZ EXER (293)	
MOBILIZ PLAN (606)	
ANNUAL PASSEN (109)	B.3
VSL ESCORTS (225)	
CREW LIC. CHK (3629)	A.1.3, A.2.3, B.1.3, B.2.3, B.3.3
CONTAIN INSP (1054)	
COA MARPOL I (713)	
COA MARPOL V (779)	
PACK HAZMAT (572)	
DRY BULK SURV (135)	
HOT WORKS DAY (292)	
MON OFFSHOR L (20)	
PORT SEC CARD (54)	
EST SEC ZONE (186)	
MON BLAST/OX (130)	
SECURITY ZONE (340)	
MON INSHORE L (45)	

INV BARGE (61)
RESEARCH (3495)
HEARING (3495)
PK HAZMAT SUR (40)
COA MARPOL II (102)
ANNUAL BARGE (22)
RADIOACTIVE (12)
PASSENGER SUR (19)
COMPLAINT BRG (1)
BLST WTR EXAM (14)

APPENDIX E: A Goal Programming Formulation for Resource Allocation Using MOEs

Let X_{ijk} be person hours of resource type $i \in I$ for MSO_j in time period k , then constraints on resource at MSO_j are

$$\sum_i \sum_j \sum_k X_{ijk} \leq M, \text{ total available resources}$$

$$\sum_j \sum_k X_{jk} \leq N^I, \text{ total available resources of type } I, \text{ and}$$

$$S_u^j \geq \sum_i \sum_k X_{ijk} \geq S_L^j, \text{ where}$$

S_u^j, S_L^j are the upper and lower bounds on resources at MSO_j .

The foregoing formalizes the "supply" or resources.

Let D_{jk}^T be the demand for activities (e.g., inspectors) type T at MSO_j in time period k (based upon traffic, USCG regulations and recommended procedures), and can be converted into number of persons for type i resources. We now need to bundle X_{ijk} in type T activities to meet demand by MSO and time period (for example, winter on the East Coast may require different resources than the other seasons) as follows.

$$D_{jk}^T \geq \sum_i X_{ijk}^T \text{ where } X_{ijk}^T \text{ is the bundle of person hours of resource } i \text{'s needed for an activity } T$$

(such as a hull inspector) at MSO_j for time period k . Note that this formulation assumes X_{ijk}^T are continuous variables ≥ 0 ; appropriate integer (0,1) variables may be needed for precision.

In this formulation, we consider the multiple objective case, where for example, our criterion would be expected number of deaths, injuries, and pollution incidents. We further assume that the objectives can be expressed as goals or targets for a specified time period, e.g., one budget cycle, or 5-year planning horizon. Measuring achievement of the objective are the measures of effectiveness.

Let $Y_{jk}^n = f(\sum_i X_{ijk})$ where Y_{jk}^n is the effectiveness measure for the n th objective (if deaths,

injuries and pollution incidents were the criterion, $n = 1, 2, 3$) for MSO_j for time period k , and A_j^n be the goal or target for this planning period for objective n and MSO_j .

We would like $\sum_k Y_{jk}^n = A_j^n$ but realize that this result, i.e., everything matching perfectly, is at best a goal in and of itself. Therefore, we let A_j^n be a goal and permit over and underachievement of the goal by employing deviation variables and using the general formulation

$$\min Z = \sum_{n=1}^m W_i Y_i ,$$

where $Y_i = f(d_i^+, d_i^-)$, d_i^+ , d_i^- are the deviations above and below a particular goal, in our case, A_j^n , and W_i provide the capability to weight over and under deviation from the goal differently, as well as, the use of preemptive weights to ensure achievement of specified goals.

The formulation can make use of existing linear programming codes (assuming X_{ijk}^r are continuous variables and $f(d_i^+, d_i^-)$ is piece-wise linear). This capability permits human judgement and experience to be used in examining effectiveness measures and the establishment of activity levels at MSOs. Appropriate tradeoffs can be made at two levels: (1) among the set of effectiveness measures; and (2) within effectiveness measures while allowing for the multiobjective nature of the resource allocation process. This permits a flexible determination of weights. A starting point would be to use risk rankings by port, as determined in Section 3.

APPENDIX F: Mathematical Discussion of Resource Allocation

From the econometric models, we can estimate

$f(p, t) =$ expected number of casualties resulting from inspection resources p invested in inspecting traffic mix $\bar{t} = (t_1, \dots, t_m)$ [where t_i are number of vessels of characteristic i]

Note $f(p, t)$ is convex in p ; i.e.

$\frac{\partial f}{\partial p}$ is monotonically decreasing.

Given an annual traffic forecast for vessels arriving at MSO k , T_k , the expected number of casualties, if p_k inspectors are assigned, will be

$$c_k(p_k) = f(p_k, T_k).$$

Assume we have inspection resources P to allocate across MSOs. Follow the procedure:

1. From P , allocate one unit to MSO x , where x is the MSO with maximum marginal benefit; i.e.

$$\left. \frac{\partial c_x}{\partial p} \right|_{p_x} = \text{Max}_y \left. \frac{\partial c_y}{\partial p} \right|_{p_y}$$

2. Update p_x with this additional unit.

This will result in a decline in $\left. \frac{\partial c_x}{\partial p} \right|_{p_x}$.

3. Return to step 1 until P is exhausted; i.e. $\sum_i p_i = P$.

If certain MSOs have more fragile environmental harbors, a weight W_k can be assigned so that

$$W_k \left. \frac{\partial c_k}{\partial p} \right|_{p_k} \text{ is compared, rather than } \left. \frac{\partial c_k}{\partial p} \right|_{p_k}.$$

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