

## Errata

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To: Recipients of MG-520-CTRMP, Maritime Terrorism: Risk and Liability

From: RAND Corporation Publications Department

Date: January 2007

Re: Corrected pages (pp. vii, xxi–xxiii, 104–109, 129, 134, 140–141, and 149–150)

The authors identified errors in the originally published document in Tables A.5 and A.6 on pp. 149 and 150. In each of these tables, the column associated with level 4 should have the values 1, 2, 3, 4, and 4, instead of 1, 2, 2, 3, and 4. The posted document has been corrected.

This correction affects two of the scenario risk assessments conducted in the case studies. In the assessment of scenarios involving passenger ferries, the threat score for a scenario associated with an improvised explosive device (IED) attack on a ferry should be scored as 4 instead of 3 (Figure 6.2), and, as a result, the scenario should also receive a likelihood score of 4 instead of 2 in Figures 6.3 and 6.4. The correction suggests that an IED attack on ferries presents a risk comparable to other, smaller attacks on ferries that were identified in the book already as high risk.

The second scenario affected is that of a conventional bomb in a container. This should have received a threat score of 3 instead of 2 in Figure 7.2. This change does not affect the likelihood or risk assessment of this scenario.

This error does not affect any other assessments. It also does not affect the primary conclusions of the qualitative risk assessments that scenarios involving ferries and cruise ships present large risks relative to many scenarios involving container shipping.

## Preface

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Intelligence analysts, law enforcement officials, and policymakers have become increasingly concerned about the possibility of future maritime terrorist attacks. The maritime environment possesses some unique characteristics that, in principle, could make it attractive to terrorist operations, including the extraterritoriality of the high seas and poor or inconsistent security measures that apply in coastal areas and facilities in many parts of the world. Maritime attacks have the potential to inflict significant harms on persons and property and, in at least some instances, could be highly disruptive to U.S. commerce.

This book focuses on the study of terrorism risk and liability issues in connection with two general types of maritime terrorism scenarios: attacks that target passenger vessels and attacks that target (or leverage) containerized shipping. With regard to analyzing risk, this book explores underlying threats, vulnerabilities, and potential consequences, and then combines this information to construct a picture of the relative risks posed by different terrorism scenarios. With regard to analyzing liability, this book outlines key concepts, legal authorities, and ambiguities that would apply in determining civil liability for acts of maritime terrorism, focusing particularly on third-party (commercial) defendants. By combining the investigation of risk and liability into a single study, this book offers insights both into the nature of maritime terrorism risk, as well as the ways in which government might respond to that risk through the instrumentality of the civil justice system. This book would be of interest to anyone who is concerned with understanding and managing maritime terrorist risks.

wake of September 11, the standard of foreseeability as applied to terrorist attacks is far from clear, and conceivably could be expansive. As a result, current tort liability risks associated with maritime terrorism are fundamentally ill-defined, but potentially quite large.

### **Key Observations and Recommendations**

Based on the findings of our investigations into maritime terrorism risk and liability, we offer the following set of conclusions and recommendations for policymakers:

- The greatest risks involving container shipping stem from scenarios involving radiological or nuclear detonation, or the extended disruption of operations at a port. *For radiological or nuclear detonation, effective risk management approaches must include securing nuclear materials at their points of origin.* Checking cargo containers moving through the container shipping system is impractical and imperfect because of the large number of containers and the inherent errors (both false positives and false negatives) of inspection technologies. The risks from extended disruption of ports are largely economic. *These risks are most effectively reduced through planning to facilitate the restart of ports and container shipping systems in the wake of a terrorist attack or natural disaster.*
- The greatest risks involving cruise ships and passenger ferries stem from cruise ship scenarios involving on-board bombs or food or water supply contamination and passenger ferry scenarios involving on-board bombs and USS *Cole*-style improvised explosive device attacks. Because it is essential that people be allowed to move freely on these types of vessels, it would be difficult to eliminate the risks completely. *The most effective approach for minimizing the risks, however, involves reducing the vulnerabilities of ferries and cruise ships, by auditing the soundness of vessel and facility security practices, by improving security measures at ports for passengers and luggage, and by implementing rigorous procedures for documenting crew and staff.*
- Many perceptions of maritime terrorism risks do not align with the reality of threats and vulnerabilities. First, there is little evi-

dence that terrorists and piracy syndicates are collaborating. The economic motivations for piracy (which depend for fulfillment on the stability of maritime trade) may be in direct conflict with the motivations of terrorists (i.e., in achieving maximum disruptive effects in connection with attacks). Second, some plausible forms of maritime terrorism (e.g., sinking a cargo ship in order to block a strategic lane of commerce) actually present relatively low risk, in large part because the targeting of such attacks is inconsistent with the primary motivation for most terrorist groups (i.e., achieving maximum public attention through inflicted loss of life). Third, any effort to sink a freight or cruise ship would need to overcome engineering designs intended to prevent catastrophic failure of a ship's hull. Experts believe that improvised explosive devices would have limited capability to cause such failure. *Maritime terrorism policy should not be motivated by these perceived threats.*

- Civil liability is a key aspect of the government's institutional response to maritime terrorism. Liability operates to redistribute some of the harms associated with an attack from victims to other parties who bear legal responsibility for those harms. Because terrorist perpetrators are often a poor prospect for recovery in civil suits seeking compensation for victims, third-party firms and property owners are likely to be targeted in postattack tort litigation. *As a result, firms engaged in maritime commerce need to recognize that they operate at risk and should investigate the extent of their own tort liability.*
- Civil liability standards in maritime terrorist attacks against the United States will likely draw on specialized rules in admiralty, particularly with regard to attacks on ferries and cruise ships. Related rules include liability standards for personal injury and death, regulatory requirements pertaining to vessel security, and statutory limits on liability for vessel owners. *Admiralty jurisdiction over these sorts of claims may preempt competing legal rules that would otherwise apply on land and may limit the compensation that can be sought by victims in some circumstances. Policymakers should*

*review these rules to confirm their appropriateness in application to future terrorist attacks.*

- Maritime attacks that leverage cargo containers could target port facilities or inland locations, and subsequent supply chain disruptions could implicate a host of contractual and tort disputes. *To the extent not already standard practice, parties to commercial contracts should specifically consider and address terrorism risks in connection with those contracts.*
- A key issue in tort liability for future maritime attacks will involve the extent to which third-party defendants (i.e., firms and property owners) can be held liable for the independent actions of terrorists. The same fundamental issue could arise in connection with a host of statutory and common law rules. The traditional criterion of foreseeability in negligence provides little guidance, in the wake of the September 11 attacks, regarding the scope of related responsibilities for potential defendants. *Policymakers should carefully review the scope and rationale of third-party liability for terrorist attacks, both in regard to providing reasonable compensation to victims and in setting appropriate incentives for prevention and mitigation efforts by private firms. More broadly, policymakers should consider the pros and cons of liability as a method for dealing with terrorism risks and injuries.*

## Risks of Terrorist Attacks on Passenger Ferries

We used the qualitative risk analysis methodology described in the appendix to assess the risks of terrorist attacks on cruise ships in terms of the threats, vulnerabilities, and consequences of these attack scenarios.

Threat of terrorist attack on passenger ferries is determined by both terrorists' intent and capability. As discussed previously, passenger vessels do not represent symbolic targets for terrorist attack. However, the scenarios considered are all ones that could capture media attention and result in both loss of life and economic damage. Thus, attack scenarios involving passenger ferries seem moderately aligned with terrorist intentions discussed in Chapter Two.

At the same time, some attack scenarios are more easily completed than others. While a suicide bombing would require only basic skills typical of volunteers, parasitic bombs would necessitate far more specialized maritime combat techniques and expertise. Capabilities required for other attack types would fall between these two extremes. Ramming a ship with an IED would require the military skill required to assemble a more sophisticated IED and firing and aiming a mortar (or other similar device) would require expert military skills associated with targeting weapons. As seen in Figure 6.1, this results in a matrix of passenger ferry attack scenarios that are moderate in terms of intent, spanning a broad range of capabilities.

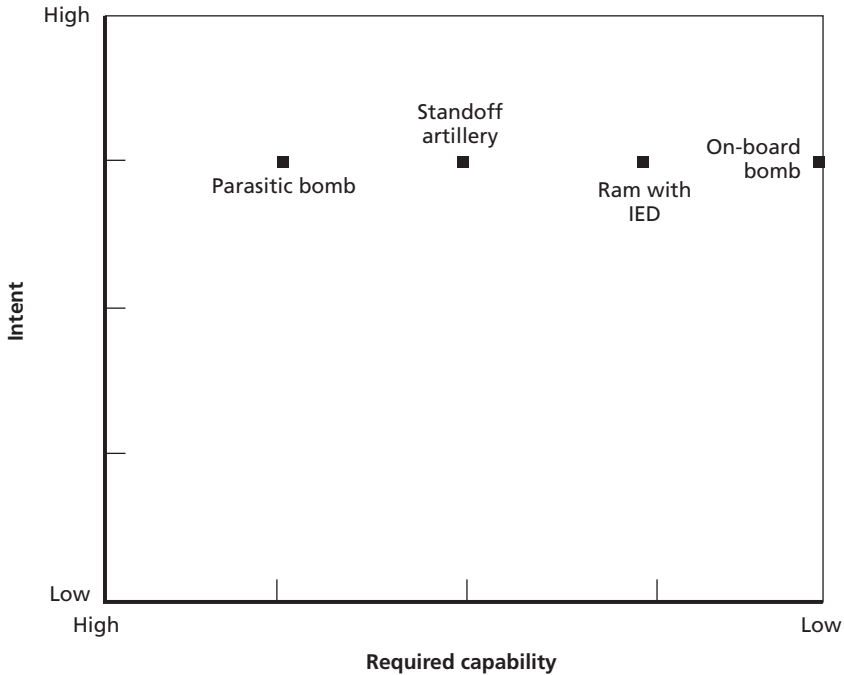
The estimated likelihood of attack depends on both the threat posed by terrorists and the vulnerability of the chosen targets. As shown in Figure 6.2, threats to passenger ferries range from relatively high for on-board bomb and USS *Cole*-style IED attacks to relatively low for scenarios like those involving parasitic bombs, which require more advanced capabilities.<sup>10</sup>

The vulnerability of ferries to the attack scenarios considered falls into two categories. As discussed above, ferries must necessarily be

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<sup>10</sup> The assessment of threat is based on the normalized, multiplicative combination of intent and capability assessments, as discussed in the appendix.

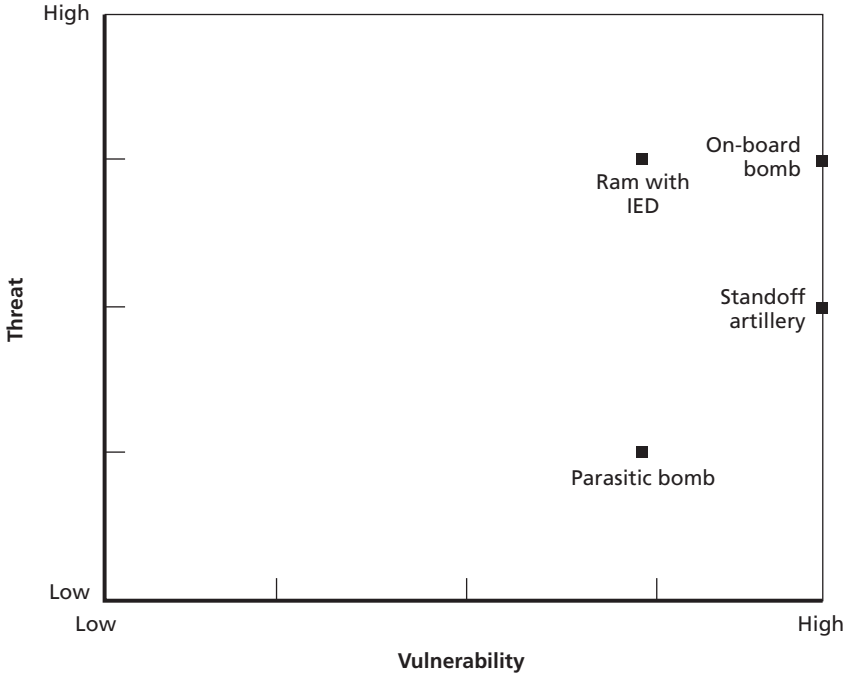
**Figure 6.1**  
**Assessment of the Capability Required in Scenarios Involving Terrorist Attacks on Passenger Ferries and Extent to Which the Scenario Aligns with Terrorist Groups' Intentions**



RAND MG520-6.1

operated on a predictable schedule and in a manner that allows free and uninhibited access to large numbers of people. This makes this mode of public transport particularly vulnerable to scenarios involving suicide bombings or standoff artillery. Though security around ferries can be monitored and controlled while they are at dock, these vessels remain vulnerable to IED and parasitic bombing attacks. The predictability of their schedules in terms of arrival and departure times contributes to this vulnerability. Also, unlike cruise ships, passenger ferries are not designed to be as robust to partial failures of their hulls and would be more likely to sink if attacked. As Figures 6.3 and 6.4 show, the most likely attacks on passenger ferries (taking into account both threat and

**Figure 6.2**  
**Assessment of the Threat of Terrorist Attacks on Passenger Ferries and the Vulnerability of Passenger Ferries to These Attack Scenarios**



RAND MG520-6.2

vulnerability) appear to manifest as on-board bombings and USS *Cole*-style attacks. The least likely appear to be those involving parasitic devices.

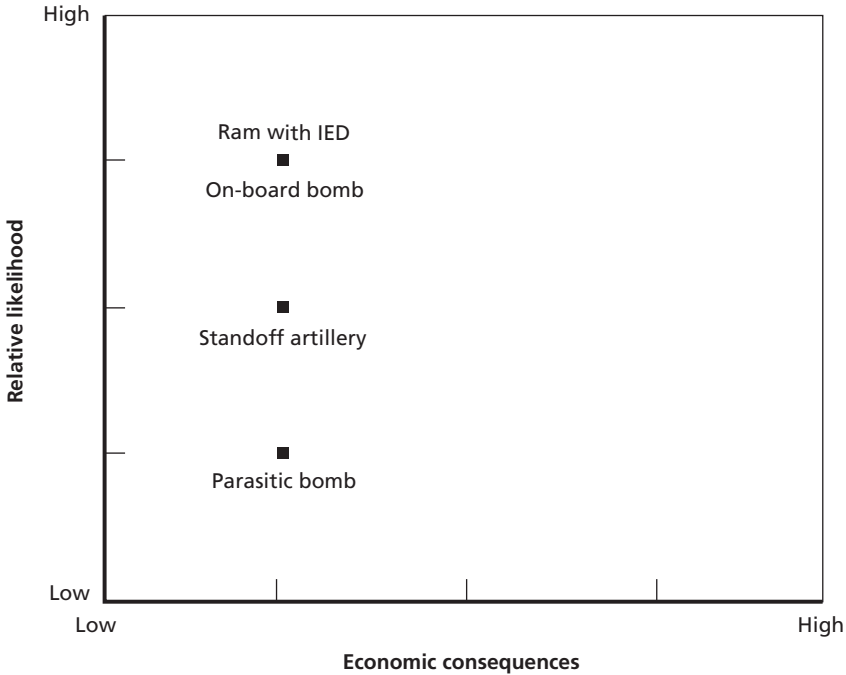
Finally, to determine the relative risk of various terrorist attacks on passenger ferries, one needs to consider both the likelihood of the assault in question and the potential consequences that might arise from it.<sup>11</sup>

Attack scenarios involving on-board bombs and USS *Cole*-style IED attacks on passenger ferries appear to be relatively high as compared to other maritime terrorism scenarios discussed in this book.

<sup>11</sup> The assessment of likelihood is based on the normalized, multiplicative combination of threat and vulnerability assessments, as discussed in the appendix.



**Figure 6.3**  
**Assessment of the Relative Likelihood of Terrorist Attacks on Passenger Ferries and Potential Economic Consequences of These Attack Scenarios**

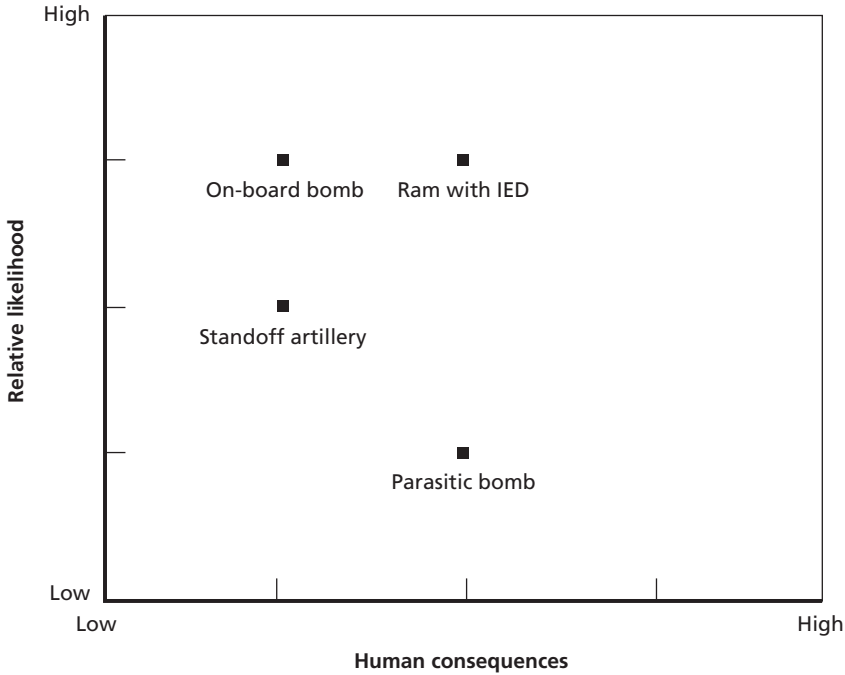


RAND MG520-6.3

They represent scenarios to which ferries are vulnerable and terrorists are seemingly motivated to conduct. The factor that most differentiates likelihood is capability. Scenarios involving on-board bombs would appear the easiest to conduct. On the other hand, there is much less variation on the range of expected consequences arising from each of the postulated contingencies assessed in this case study.

As discussed previously, the primary determinants of economic consequences of terrorist attacks on passenger ships are the costs of increased security that might be implemented following such assaults. Compared to other terrorist scenarios, in particular those involving container shipping, the economic effects of attacks on passenger

**Figure 6.4**  
**Assessment of the Relative Likelihood of Terrorist Attacks on Passenger Ferries and Potential Human Consequences of These Attack Scenarios**



RAND MG520-6.4

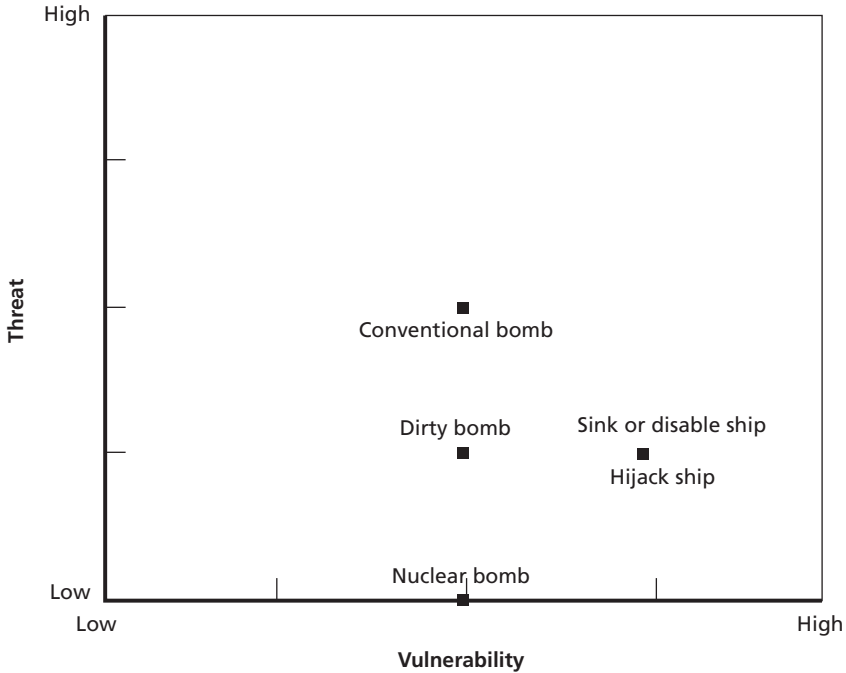
ferries can be expected to be relatively modest, though still in the order of hundreds of millions of dollars.

The potential human consequences are similarly consistent across scenarios and generally fall into two categories: (1) attacks involving small explosives or munitions and (2) attacks employing larger munitions, which could potentially sink the ship and kill hundreds of people.

Figures 6.3 and 6.4 summarize the risk to the passenger ferry scenarios covered in this chapter. They show that while the probability of attacks on passenger ferries is seemingly high, the potential consequences of the attacks are likely to be moderate. In this regard, assaults involving on-board bombing or standoff artillery are the most likely of

the scenarios considered. When considering economic consequences, they are accordingly the scenarios of greatest risk since economic consequences are not expected to vary dramatically across these scenarios. However, from the perspective of human consequences, attacks involving IEDs or parasitic devices present a risk more comparable to those from standoff artillery because they have the potential to kill more people than do the other scenarios.

**Figure 7.2**  
**Assessment of the Threat of Terrorist Attacks on Container Shipping and the Vulnerability of Container Shipping to These Attack Scenarios**



RAND MG520-7.2

these facilities are designed to facilitate commerce, the entry and exit controls are not too stringent. Therefore, using the qualitative risk assessment methodology in the appendix, we determined that the relatively likelihood of the attack scenarios that we consider is greatest for a hijacking or attempt at sinking or disabling a ship, in which the terrorists would approach a vessel from an open waterway. In contrast, container shipping is somewhat less vulnerable to scenarios involving placing a device in a container because of security procedures in place to restrict access to containers during stuffing, reviewing manifests, and inspecting containers.

combination, threat, vulnerability, and consequences can suggest the relative magnitude of the risks to U.S. interests associated with different attack scenarios. This is potentially very useful information, given the need to prioritize limited resources in detection, prevention, and interdiction efforts.

Drawing on this framework for examining the risks posed by maritime terrorism, we conclude that some types of attack scenarios present considerably greater risks than others. For example, with regard to scenarios involving cruise ships, attacks employing on-board bombs appear more probable and, on the whole, pose greater risk than do attacks involving scuba-diving terrorists with limpet mines (which would require greater technical expertise and better logistics capability to execute). Similarly, scenarios involving on-board explosives attacks or USS *Cole*-style IED attacks against ferries are among the highest-risk scenarios we considered, in particular because ferries are characterized by prominent structural vulnerabilities, weak security measures, and close proximity to mass media outlets. Many plausible attacks on container shipping pose comparatively low risk, owing to the fact that container ships, as opposed to passenger ships, are intrinsically less attractive as targets: The opportunity to inflict high-profile human casualties aboard cargo ships is simply lower. On the other hand, an attack involving the use of a compromised cargo container as a concealed-weapon platform poses a greater risk than do attacks on the vessels themselves, in part because such an attack would leverage the vulnerabilities inherent to the container shipping system. Even so, the risk of a CBRN attack using a compromised cargo container is somewhat offset by the difficulty of terrorists' obtaining an unconventional weapon capacity in the first place. Nevertheless, the prospect of severe commercial disruptions or catastrophic damage associated with a CBRN attack boosts the risks (in terms of human and economic consequences) associated with this kind of maritime scenario.

This sort of calculus regarding relative risks posed by maritime terrorism scenarios raises the question of absolute risk: What is the risk in absolute terms connected with a particular type of attack, as compared with the full spectrum of potential terrorism risks? This is a very difficult question to answer. One way to begin to address it would

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- Many perceptions of maritime terrorism risks do not align with the reality of threat and vulnerabilities. First, there is little evidence that terrorists and piracy syndicates are collaborating. The economic motivations for piracy (which depend for fulfillment on the stability of maritime trade) may be in direct conflict with the motivations of terrorists (i.e., in achieving maximum disruptive effects in connection with attacks). Second, some plausible forms of maritime terrorism (e.g., sinking a cargo ship in order to block a strategic lane of communication) actually present relatively low risk, in part because the targeting of such attacks is inconsistent with the primary motivation for most terrorist groups (i.e., achieving maximum public attention through inflicted loss of life). Third, any effort to sink a freight or cruise ship would need to overcome engineering designs intended to prevent catastrophic failure of a ship's hull. Experts agree that IEDs would have limited capability to cause such failure. *These perceived threats should not motivate maritime terrorism policy.*
- Civil liability is a key aspect of the government's institutional response to maritime terrorism. Liability operates to redistribute some of the harms associated with an attack from victims to other parties who bear legal responsibility for those harms. Because terrorists are often poor prospects for recovery in civil suits seeking compensation for victims, third-party firms and property owners are likely to be targeted in postattack tort litigation. *As a result,*

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**Table A.4**  
**Threat Score Rounding Guide**

| Normalized Threat | Rounded Score |
|-------------------|---------------|
| 0–1.0             | 1             |
| >1–2.0            | 2             |
| >2–3.0            | 3             |
| >3–4.0            | 4             |
| >4–5.0            | 5             |

This translation was adopted based on two intuitive observations that support a multiplicative relationship between intent and capability. First, threat only exists if both intent and capability are present. If either is absent, then no threat exists. Second, presence of high intent and high capability (i.e., a score of 5 on each scale) is intuitively *much worse* not just *worse* than a high intent (i.e., score of 5) and moderate capability (i.e., score of 3). A multiplicative relationship captures these observations more appropriately than does an additive or averaging relationship.

The resulting translation is shown in Table A.5.

**Table A.5**  
**Matrix Used to Translate Qualitative Assessments of Intent and Capability into an Assessment of Threat**

| Intent Score | Capability Score |   |   |   |   |
|--------------|------------------|---|---|---|---|
|              | 1                | 2 | 3 | 4 | 5 |
| 1            | 1                | 1 | 1 | 1 | 1 |
| 2            | 1                | 1 | 2 | 2 | 2 |
| 3            | 1                | 2 | 2 | 3 | 3 |
| 4            | 1                | 2 | 3 | 4 | 4 |
| 5            | 1                | 2 | 3 | 4 | 5 |



## Assessing Scenario Likelihood Based on Threat and Vulnerability Scores

Qualitative assessments of likelihood were made based on score scenarios received based on judgments of threat and vulnerability. The translation of these component scores into a judgment of likelihood is shown in Table A.6. This translation was derived using the same normalized, multiplicative relationship used to assess threat. The normalized multiplicative relationship was adopted for the same reasons.

## Assessing Consequences of Maritime Attack Scenarios

Chapters Five, Six, Seven present risk assessments based upon both human and economic consequences of terrorist attack scenarios. Tables A.7 and A.8 present the scales used to group consequences of maritime attack scenarios.

Low ends of these scales were selected to correspond with the size of attacks that have the smallest potential consequences. For human consequences, events expected to kill or injure fewer than 10 people were given a score of 1. For economic consequences, events resulting in up to tens of millions of dollars in economic damages were given a score of 1.

**Table A.6**  
Matrix Used to Translate Qualitative Assessments of Threat and Vulnerability into an Assessment of Likelihood

| Threat | Vulnerability |   |   |   |   |
|--------|---------------|---|---|---|---|
|        | 1             | 2 | 3 | 4 | 5 |
| 1      | 1             | 1 | 1 | 1 | 1 |
| 2      | 1             | 1 | 2 | 2 | 2 |
| 3      | 1             | 2 | 2 | 3 | 3 |
| 4      | 1             | 2 | 3 | 4 | 4 |
| 5      | 1             | 2 | 3 | 4 | 5 |