

# **Terrorism and Industrial Chemical Production: Contemporary Implications for Risk Communication**

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## **Terrorism and Industrial Chemical Production: Contemporary Implications for Risk Communication**

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*The increased threat of and heightened concern for terrorist attacks since 9/11 has reinvigorated the debate about industrial production security efforts, especially in the chemical manufacturing and refining industry. Through a telephone survey (n=400), researchers examined public perceptions of industry preparedness in the event of terrorism by featuring several risk communication variables. Results suggest that near-neighbor community residents who are more aware of recent industry terrorism security efforts demonstrate an increased sense of risk of living in an "at-risk" community. Residents who are aware of industry's efforts related to safety and terrorism express more trust for local industry and government officials, are more cognitively involved, and are more supportive of the local chemical industry.*

Safety and security have been a primary concern for the chemical industry prior to September 11, 2001. After the terrorist attacks of 2001, plant operators, regulatory agencies and community residents, among others, asked themselves whether they would be next: are industrial chemical facilities, as well as residents in those communities, first responders, law enforcement and intelligence agencies ready to anticipate, deter and respond to terrorist threats and acts?

Recent efforts of the Department of Homeland Security, such as the introduction of the Chemical Facilities Security Act of 2003, underscore the urgency of securing the chemical sector of the economy from terrorist attacks. In its planning to prevent and respond to such events, former U. S. Department of Homeland Security Secretary Thomas Ridge identified Houston as "one of seven cities most vulnerable to a terrorist attack, based on criteria that include population density and intelligence squeezed from al-Qaida detainees" (Masterson & Mack, 2003, p. A1). For this reason the Houston metropolitan area, home to one of the largest petrochemical complexes in the world, offers an exceptional opportunity to study terrorism preparations related to the chemical industry.

Since 9/11, U. S. congressional inquiries, such as Enhancing America's Energy Security oversight hearing, have addressed among other things whether the industry is being appropriately vigilant and responsive to community residents' concerns regarding terrorism, including limited disclosure of counter-terrorism plans. Given this industry's strategic and symbolic visibility, it is an ideal opportunity to examine a new era of terrorism alert, planning, response and risk communication.

This research note investigates established and new risk communication variables to explore community residents' risk perceptions, their perceptions of industry security preparedness, and their current level of support for the industry operating in their community. Featuring a multiple variable approach to risk communication study, Nathan, Heath and Douglas (1992) reasoned that if relationships can be determined among risk communication variables, "those relationships will give insights into strategies that risk communicators can use to solve the problems they confront" (p. 239). Building on numerous studies over nine years of longitudinal analysis (e.g., Heath & Abel, 1996; Palenchar & Heath, 2002), researchers can tap community residents' awareness of and sensibility toward terrorism that is likely to affect their willingness to support or oppose the presence of these facilities as their neighbors. In short, if the industry is not responsive to community needs regarding their awareness of facility security efforts, area residents are

likely to oppose rather than support these facilities, less likely to be aware of and understand proper security measurements required during an emergency, and less likely to behave accordingly.

## LITERATURE REVIEW

During the 1980s, iconic industrial chemical production crises such as Union Carbide India Limited's toxic methyl isocyanate gas spill in Bhopal, India, and the oil tanker *Exxon Valdez* running aground in the Bligh Reef in Prince William Sound, Alaska, tested the abilities of local, national, and industrial organizations to prepare for, and respond to, disasters of crisis magnitude. It also tested the role of risk communication as an integral part of strategic preparation and crisis response.

The lack of strategic risk management and communication caused many people to distrust and, therefore, to oppose industry (Chess, 2001). Specifically, worries that what happened in India would happen in the United States prompted federal legislators to create the Superfund Amendments and Reauthorization Acts of 1986 (SARA), which included community right-to-know provisions (SARA Title III). SARA Title III gives the Environmental Protection Agency (EPA) oversight of risk communication efforts related to the formation of local emergency planning committees (LEPC) in communities near high-risk facilities. LEPCs are designed to plan for manufacturing emergencies, but they are also designed to serve as community forums where nearby residents, government officials, industry representatives, health and safety officials, and any other concerned individuals and organizations could request information and voice concerns.

Responding to these federal and state initiatives, the American Chemistry Council (formerly the Chemical Manufacturers Association) developed and implemented Responsible Care, a program established to meet at a minimum the requirements of SARA Title III. The Responsible Care program includes the formation of community advisory panels (CAPs), which are designed to serve as forums for public dialogue related to manufacturing safety concerns and risks.

Developed in response to 9/11, the Responsible Care Security Code focuses on safeguarding against potential terrorist attacks, expanding industry relationships with law enforcement and the community, and providing a model for chemical site protection. The security code chapter in the *Responsible Care Practitioner's Site* states that chemical companies should constantly work to improve their security processes, and that companies should communicate as openly as possible without giving away information that would pose a threat in the wrong hands (American Chemistry Council, 2003). Thus, the industry as a concerted effort, as well as individual companies, have given attention to developing risk communication plans that include components sensitive to terrorism.

Positive impact of such measures is not a given. For instance, research has led to mixed reviews of LEPCs and CAP's ability to communicate environmental information to citizens. For example, Heath, Bradshaw and Lee (2002) found a lack of awareness of the existence of LEPCs and CACs and low use of such organizations, while at the same time more than two-thirds of the residents surveyed approved of their intended functions. Overall, their findings suggested, "a fully functioning communication infrastructure leads to a healthier community that responds to risks as manageable uncertainties" (p. 317).

At the core of these federal regulations and industry efforts is the role of risk communication within industrial responsiveness in an era of heightened risk perception, with

risk being the possibility that an event will occur and that it will be bearable or severe. Leiss (1996) defined risk communication as “the flow of information and risk evaluations back and forth between academic experts, regulatory practitioners, interest groups, and the general public” (p. 86). Heath and Abel (1996) and Palenchar and Heath (2002) demonstrated that the lay public wants to be a part of the risk communication process but often have difficulty understanding risk messages and participating in risk discourse, trusting information sources, and lack awareness of some risk communication protocols.

Risk communication has become focused on “understanding the quality of relationship construction, maintenance, and repair” (p. 130). To extend this literature, featuring community infrastructure, several established risk communication process variables seem relevant: sense of risk, trust, cognitive involvement and support.

*Sense of Risk:* Sense of risk arises from normal concerns about the probability that a risk could occur that causes varying amounts of damage to people or the environment. It is a subjective prediction for lay people who impose a variety of heuristics that became better understood after Three-Mile Island (Covello, 1992). Sandman (1986) has long advised industry and government that citizens have a right to feel outrage.

*Trust:* Trust can be defined as a person or organization that is competent, objective, fair, consistent, having no hidden agenda, and being genuinely concerned about the vulnerability of its stakeholders (Heath, Seshadri & Lee, 1998). Covello (1992) speculated that the public’s trust in the chemical industry will increase when chemical plants “have built up track records of dealing openly, fairly, and safely with their employees, customers, and neighboring communities” (p. 362). Heath and Abel (1996) noted that stakeholders may trust the industry more if it gives “proactive solutions to problems rather than attempt to downplay them by stressing the improbability that emergencies will occur” (p. 170). Community members desire knowledge of how to protect themselves against a risk.

People in each community where risks occur must be able to trust the efforts to achieve reasonable levels of security. Such levels need to withstand the “smell” test of the area residents that they could and should trust industry to exert reasonable amounts of security and communicate in ways that increase rather than decrease citizens’ security. People are vulnerable to the quality of planning by industry. Industry is vulnerable to the cleverness and treachery of terrorism. Employees, investors, customers and community members are vulnerable to terrorism to the extent that the relevant industry is vulnerable. Trust is a central factor in predicting whether members of a community accept and rely on the conclusions and recommendations of people who are trained in science, national security, business operations, engineering, emergency management, and public policy. Risk assessments require scientific and decision-making techniques that are often foreign to lay public. If expert risk estimates conflict with one another, the decision to be made becomes more complex and requires greater amounts of trust. For effective risk communication, the source of information and advice needs to have a satisfactory level of trust in the judgment of each public (Renn & Levine, 1991).

*Cognitive Involvement:* Cognitive involvement is the feeling that one’s interest is at stake. People become cognitively involved as they recognize that a problem relates to their self interest or to some altruistic interest, as explained by the seminal work of Petty and Cacioppo (1986). As Palmlund (1992) reasoned, people know that they may be risk bearers, the ones to suffer if some risk manifests itself. Cognitive involvement predicts whether people will become interested in receiving, even seeking information, to form attitudes which they believe are useful in advancing their self interests (e.g., Heath & Abel, 1996; Palenchar & Heath, 2002).

Persons who are frightened, angry and powerless resist information that implies that their risk is modest, whereas those who are optimistic and overconfident deny that their risk is substantial (Sandman, 1986). When people feel that the source of risk harms their financial well being they are likely to become more cognitively involved with the discussion of the risk and its abatement (Heath, Liao & Douglas, 1995).

Cognitive involvement and support/opposition exhibit a curvilinear relationship (Gay & Heath, 1995; Heath et al., 1995). That means that persons who strongly oppose or support a product, service, company or industry are likely to exhibit higher cognitive involvement than will persons who neither strongly support nor oppose those items or organizations. Overall, people are more willing to communicate about and to think about an issue that relates to their self-interest or to some altruistic interest (Heath & Douglas, 1991; Kunreuther, Easterling, Desvousges, & Slovic, 1990).

*Support:* One key dependent variable in risk communication studies is whether stakeholders support or oppose the source of a risk (Heath et al, 1998). Support consists of “positive feelings for an organization and the desire to have it operate in the community” (p. 45). Seeger, Sellnow and Ulmer (2001) stated that risk communication focuses on building relationships and achieving understanding and agreement with various stakeholders, which can increase support. Companies and governmental agencies can use dialogue and consensus-building to establish and maintain strong, positive relationships with stakeholders.

Given this brief literature foundation, this study examined “at-risk” community residents’ perspectives on whether less or more awareness of the chemical industry’s terrorism security efforts is needed in this post 9/11 era, and the relationship among awareness of terrorism security efforts and other established risk communication process variables. To explore this line of reasoning, the following hypotheses were advanced:

- H1:** Respondents who report higher levels of awareness of the local chemical industry’s *terrorism security efforts* post 9/11 will report higher levels of *sense of risk* and *cognitive involvement*.
- H2:** Respondents who report higher levels of awareness of the local chemical industry’s *terrorism security efforts* post 9/11 will report higher levels of *support* for the local chemical industry, *trust in the local chemical industry* and *trust in local government*.
- H3:** Respondents who report higher levels of awareness of *Responsible Care* will report higher levels of *support* for the local chemical industry.

## **METHODOLOGY**

As part of its ongoing risk communication research program, a major Southwest University conducted a survey of community residents in La Porte, Texas, located along the Houston Ship Channel, which has the largest concentration of petrochemical plants in the United States. The survey measured awareness of industry’s Responsible Care protocols, including efforts related to the Responsible Care Security Code, and to determine levels of residents’ awareness of and relationships among terrorism security efforts, sense of risk, trust (local industry and local government), cognitive involvement and industry support.

As commissioned by the La Porte LEPC, the data were gathered by a professional telephone survey company that used random digit dialing to survey residents (n = 400) who were ages 18 and older with an even distribution between male and female. The data were gathered in the last two weeks of May 2003. The survey consisted of a mix of 35 closed and open-ended questions. The instrument used a 4-point Likert scale for most

questions, with rating of 1 (*strongly disagree*), 2 (*disagree*), 3 (*agree*), and 4 (*strongly agree*). Questions measured awareness, knowledge, attitudes and behavioral intentions of specific organizations, risk communication efforts and events, as well as demographic information.

## RESULTS

Results indicate that in this post-9/11 era awareness of industry's preparedness had a positive relationship with residents' sense of risk, trust of local industry and local government, cognitive involvement, and support of the local chemical industry. With caution, the research results are offered though in general the hypotheses are supported.

Descriptive statistics indicate that approximately 80% of the respondents reported receiving information about the local Responsible Care initiatives. An even higher percentage believe local industry has taken measures to reduce the likelihood of a 9/11 attack in this community (strongly agree = 39.8; somewhat agree = 43.3; somewhat disagree = 11.3; and strongly disagree = 5.6). Eighty percent report that local industry has cooperated with government to increase citizen safety in the event of a terrorist attack (strongly agree = 40.5; somewhat agree = 39.5; somewhat disagree = 13.5; and strongly disagree = 6.5), while a lower percentage (73.3) believe that local industry works with local media to communicate the safety measures being taken (strongly agree = 31.8; somewhat agree = 41.5; somewhat disagree = 20.3; and strongly disagree = 6.4).

The survey also asked respondents to rate the degree to which they agreed or disagreed with statements regarding industrial chemical production. One new variable was added to this stream of study: residents' awareness of industry's *terrorism security efforts* post 9/11. Three survey items formed a coefficient alpha = .80.

Building upon previously identified risk communication process variables, the variable *support for the local chemical industry*, which combined two questions related to being a positive economic or community presence, formed a coefficient alpha = .81. In addition to estimating the respondents' sense of industry performance, a variable was formed to operationalize their *trust in local government*. Three items were combined to form this variable, which produced a coefficient alpha = .77. Four items were combined to operationalize their *trust in the local chemical industry*, which produced a coefficient alpha = .78. The survey also asked respondents to rate the degree to which they agreed or disagreed with statements regarding the likelihood of chemical releases from pipelines, tanker trucks and chemical plants. Combined into a single variable, three questionnaire items were used to create *sense of risk*, with a coefficient alpha = .72.

*Awareness of the Responsible Care* program was formed by combining responses to two questions about hearing and receiving information about this program, which formed a coefficient alpha = .66. *Cognitive involvement* was created by combining items that measured respondents' predictions that living in the community could affect their safety and long-term health. Combined into a single variable, these two survey items produced a coefficient alpha = .58. Worth noting is the use of some variables with low alphas. While indices with alpha coefficients as low as 0.70 are still useful measures of constructs (Broom & Dozier, 1990), these lower alpha coefficients are still functional for discussion based on strength of their relation, correlation or association with other items in the index, as well being comparable to those obtained in previous studies (see Heath & Abel, 1996; Heath & Palenchar, 2000).

The relationship among awareness of terrorism safety efforts, trust, cognitive involvement and support was explored by looking at their correlations. Residents who are

aware of the efforts of the chemical industry to increase community safety and work with the media and governmental organizations following the events of 9/11 and terrorism threats (*terrorism safety efforts*) had a positive relationship with *industry support* ( $r(400) = .42$ ;  $p < .01$ ), *trust in the chemical industry* ( $r(400) = .23$ ;  $p < .01$ ) and *trust in local government* ( $r(400) = .18$ ;  $p < .01$ ). In a similar manner, residents who are aware of local community safety initiatives (*Responsible Care*) had a positive relationship with *industry support* ( $r(400) = .13$ ,  $p < .01$ ) and are more likely to be *cognitively involved* ( $r(400) = .21$ ;  $p < .01$ ). Residents who are more aware of industry efforts related to safety, both from manufacturing and terrorism perspectives, are more likely to be supportive of the industry, more trustworthy of local industry and government officials and more cognitively involved.

Residents who reported a higher awareness of their *sense of risk* in living in an "at-risk" community are more likely to be aware of the local chemical industry's *terrorism security efforts* ( $r(400) = .22$ ;  $p < .01$ ). *Sense of risk* also had a positive correlation with *cognitive involvement* ( $r(400) = .29$ ;  $p < .01$ ) and *trust in the chemical industry* ( $r(400) = .13$ ;  $p < .01$ ). The data continue to show that people who have a stronger sense that they are at risk and experience high cognitive involvement are likely targets of communication and more aware of risk management protocols, and that those targets of communication, or at least the means to communicate, are becoming increasingly aware.

*Cognitive involvement* had a positive relationship with *support for the local chemical industry* ( $r(400) = .20$ ;  $p < .01$ ), *trust in local government* ( $r(400) = .12$ ;  $p < .05$ ), *trust in local industry* and *awareness of Responsible Care* ( $r(400) = .11$ ;  $p < .05$ ). As expected, the more cognitively involved residents are the more aware of terrorism and manufacturing safety efforts, more supportive of the industry, and more trusting of local government and industry.

Overall, residents who are aware of industry's efforts related to safety and terrorism are generally more supportive of the industry and more cognitively involved. They demonstrate more trust in local industry and government officials. It appears that while residents are aware of recent industry efforts in this area and supportive of the industry in relationship to these efforts, that doesn't necessarily translate into a reduced sense of risk, but rather risk communication campaigns are elevating awareness of the risks associated with living and working in a "high-risk" community.

## DISCUSSION AND CONCLUSIONS

After September 11, 2001, many lay people, news reports and surveys indicated that security against terrorism by the industrial chemical industry is a high priority, but research was needed to understand how awareness of counter-terrorism efforts post 9/11 relate to establish risk communication variables. Has the existing track record of effective risk communication in some communities built a solid community of trust and understanding, or will it erode that community? Research is needed to better understand how awareness of counter-terrorism efforts affects the resilience of people who live and work near high risk, targetable facilities such as those dedicated to petrochemical manufacturing and oil refining. For the oil and chemical industry – most notably refineries, chemical plants, storage terminals and pipelines – the tragic events of 9/11 continue to generate strategic and tactical adjustments to communicating about security. Conventional wisdom postulates that a resilient community can live with rather than in fear associated with terrorism.

The community survey reveals high levels of confidence that the industry is taking appropriate counter-terrorism measures and voices support for industry. The reason for this level of support may, at least in part, result from knowledge and support of previous Responsible Care initiatives. For this reason, industry is wise to demonstrate that its

counter-terrorism measures are connected with local emergency management protocols that are in keeping with Responsible Care initiatives.

The industrial chemical business doesn't want to be the "poster child" of a successful terrorist attack. Open and effective risk discourse, both federally required and industry initiated, can aide in the understanding and managing of risk perceptions related to terrorist attacks. Indeed confidence in open communication is vital, not only so that the community believes industry is doing "the right thing" but also so that the community residents are willing to know and comply with the emergency response protocols.

Immediately after the Union Carbide tragedy in Bhopal, India, Rosenblatt (1984) observed, "If the world felt especially close to Bhopal last week, it may be because the world is Bhopal, a place where the occupational hazard is modern life" (p. 20). Similar sentiments have been expressed about terrorist attacks. The historical realities of risk management as the essence of society have once again become front-page and top-of-the-hour news hooks. In a similar manner, the events of 9/11 have placed a renewed emphasis on the role of risk communication efforts related to industrial chemical production. In an era of terrorism, too much transparency can have negative consequences; information could fall into hands that might be able to use it against the industry and the people whose interests must be served. However, organizations should be concerned that this strategically dampened flow of information about counter-terrorism planning might harm their relationship with community residents.

This study is about terrorism, in the context of a highly visible and potentially dangerous industry. That context seems ideal for such studies to assist corporate and governmental planning as well as reinforce or alter the plans as they are implemented. In a time when critics caution against communication because it could aid terrorist planning, advocates of effective risk communication need reinforcement that their efforts can lead to an empowered rather than cowed community. To this end, communication has a value unto itself, apart from the utility of information it generates (Hadden, 1989). By making the information available, even in formats unsuited to making rational risk choices, it still addresses key concerns regarding the imposition of and discontent regarding terrorism security efforts. At a time of heightened concerns related to risk from terrorist attacks in the industrial chemical sector, open yet cautious discourse of site, cyber and transportation security may be even more important.



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