I. INTRODUCTION

The National Conversation on Public Health and Chemical Exposures is a collaborative project, supported by the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR). The National Conversation vision is for chemicals to be used and managed in ways that are safe and healthy for all people. The project’s goal is to develop an action agenda with clear, achievable recommendations that can help government agencies, tribes, and other organizations strengthen their efforts to protect the public from harmful chemical exposures. The National Conversation Leadership Council will author the action agenda, utilizing input from six project work groups, and members of the public who choose to participate in web dialogues and community conversations.

National Conversation work groups were formed to research and make recommendations on the following six, cross-cutting public health and chemical exposures issues: monitoring, scientific understanding, policies and practices, chemical emergencies, serving communities, and education and communication.

This report is the product of the Chemical Emergencies work group’s deliberations. While issued to the National Conversation Leadership Council, the work group hopes that this report will be of value to others in a position to act on the recommendations contained herein.

CDC and ATSDR worked with several groups to manage the National Conversation, including RESOLVE, a nonprofit organization dedicated to advancing the effective use of consensus building in public decision making, the American Public Health Association, the Association of State and Territorial Health Officials, and the National Association of County and City Health Officials. These organizations and others helped ensure that a broad range of groups and individuals were engaged throughout this collaborative process, including government agencies, professional organizations, American Indian/Alaska Native tribes (AI/AN), community and non-profit organizations, health professionals, business and industry leaders, and members of the public.

For more information on the National Conversation project, please visit www.atsdr.cdc.gov/nationalconversation.

a. Membership

Work groups were formed in 2009 following an open nomination process. Work group members were selected based on a three stage process designed to ensure that each work group would have the capacity to address and reflect different individual and organizational perspectives.¹

In selecting members of the Chemical Emergencies work group, the following additional criteria were considered: 1) relevant area of expertise, 2) depth of experience and reputation in the individual’s field, 3) an interest in serving on this work group, and 4) suitability for this work group as opposed to other work groups. In particular, the work group considered those who have been a voice for community and

¹For additional information on the work group member selection process, see http://www.atsdr.cdc.gov/nationalconversation/docs/membership_selection_process_report.pdf
environmental justice concerns. Furthermore, to achieve overall balance, the team sought to compose a
diverse work group in terms of work experience, perspective, gender, and geographic region.

Andrea Kidd Taylor, Assistant Professor, Morgan State University, served as chair of the Chemical
Emergencies work group, and was supported by RADM Scott Deitchman, USPHS, NCEH/ATSDR senior
liaison to the Chemical Emergencies work group and Incident Manager, CDC Response to the Deepwater
Horizon spill; Dana Goodson and Jennifer Peysen, Senior Mediators at RESOLVE; and Montrece
McNeill Ransom, Senior Public Health Analyst, NCEH/ATSDR.

A full list of members of the Chemical Emergencies work group can be found in Appendix A.

b. Charge

After much discussion, the work group members agreed to the following charge to guide their work:

Chemical Emergencies: preventing, preparing for, responding to, recovering from, and
mitigating chemical incidents.

Chemical emergencies can be devastating to human and animal populations, the environment,
and the economy. Safeguarding public health requires analyzing and eliminating vulnerabilities;
identifying and communicating information about hazards; and reducing risks through the
development and implementation of effective emergency prevention, preparedness, and response
plans. While many public and private agencies have roles in chemical emergency prevention,
preparedness and response, coordination among concerned parties has not been optimized.
Further, there remain shortcomings, gaps, and redundancies in the chemical emergency
preparedness system.

This group will make recommendations on issues including the prevention of chemical
emergencies, chemical infrastructure security, monitoring of chemical facilities and
events, and the preparedness and response capabilities of 1) emergency management
officials; 2) state and local public health agencies and their governing boards; 3)
responders, receivers, and providers on the local, state, tribal, and federal levels; 4) the
chemical industry; and 5) affected, or potentially affected communities.

c. Process and Methods Used

The full membership of the Chemical Emergencies work group convened nine meetings (six conference
calls and three in-person meetings) toward the development of this report. Two topical subgroups were
formed, and a series of subgroup meetings were held, as described below.

Caveats, Limitations, and Subgroup Formation

The themes and concepts discussed in this report do not represent the entire range of issues
related to chemical emergencies, nor do they reflect sufficiently each focus area of the charge of
the Chemical Emergencies work group. Work group members relied on research and professional
expertise. For example, while there are myriad issues concerning transportation related chemical
emergencies, chemical infrastructure security, monitoring of chemical facilities and events, and
the preparedness and response capabilities of the chemical industry, limited expertise and time
constraints did not allow for a comprehensive review of each of these subjects.
The membership of the work group decided to focus its considerations on the three themes which emerged from the Chemical Emergencies Break-out session held at the June 26, 2009 National Conversation Kick-Off Meeting: 1) training and capacity building; 2) systems and coordination, and 3) community preparedness and response.\(^2\) To this end, the work group divided itself into two subgroups to accomplish the tasks outlined in the charge: 1) Training and Capacity Building and 2) Systems and Coordination. Work Group membership considered developing a third subgroup which would focus specifically on community preparedness and response. However, given the cross-cutting nature of community issues related to chemical emergencies, members decided to ensure that both the Training and Capacity Building and the Systems and Coordination Subgroups closely consider community issues related to the focus area during their deliberations.

Subgroup Processes and Methods

Training and Capacity Building Subgroup


This subgroup convened eight subgroup calls and focused on reviewing current chemical response training of our nation’s emergency response and receiver communities to identify the gaps in and needs of current capacity. This subgroup’s determination of the current training status of selected response communities was based on several factors: 1) group consensus following discussion, 2) direct personal knowledge and involvement of subgroup members, 3) interviews and research performed independently by subgroup members and reported to the entire subgroup for review and discussion, 4) research and review of various existing standards and regulations from various government, regulatory and certification bodies, as well as 5) knowledge of professional and trade association literature and training curricula.

Recognizing that the subject of emergency response training and capacity building is immense, this subgroup made a concerted effort to focus its attention and recommendations on competencies and best practices of the response community. The subgroup members sought to use a common language and base that have been well established in the responder community. For purposes of its review, the subgroup focused on first responders who are most likely to arrive on scene and provide immediate response to a chemical incident. These include but are not limited to: Fire, Police, Emergency Medical Services (EMS), and skill-specific response personnel such as Hazardous Materials (HAZMAT) Response Teams, Public Works, and industrial response teams. Within the first responder community, the fire service usually assumes lead command at a chemical emergency scene with EMS and law enforcement providing patient care and scene security, respectively. While EMS and law enforcement may have national competencies and standards for responding to chemical emergencies, those standards and competencies are lacking in hazardous materials content to adequately prepare EMS and law enforcement personnel to respond to and identify chemical emergencies.

While all three disciplines, fire service, EMS, and law enforcement, participate in some form of HAZMAT training, the continuity of response training to a chemical emergency seems the least consistent among fire service personnel, due in part to the two types of firefighters within fire service: career (paid) and volunteer. The scope of the operations conducted by the fire service during chemical emergencies is broad, and providing public and responder protection is usually directed by fire service

\(^2\) To view the meeting notes from the Chemical Emergencies Break-out meeting at the National Conversation Kick-off Meeting, June 26, 2009, see [http://www.atsdr.cdc.gov/nationalconversation/meeting_june_26_09.html](http://www.atsdr.cdc.gov/nationalconversation/meeting_june_26_09.html).
personnel. Therefore, the subgroup identified the training and capability needs among the members of the fire service as a priority for protecting responders, receivers, and the public during chemical emergencies. The intent was not to select only one first responder group, but to utilize this group as a prototype to identify the training and capability needs of all of the groups within first responders.

**Systems and Coordination Subgroup**

The co-leaders of this subgroup were Darius Sivin and Fleming Fallon. Membership was comprised of the following: Bill Benerman, Kathy Curtis, Kim Jennings, Mark Kirk, Jacqueline McBride, Maureen Orr, Paul Orum, Derek Swick, and Connie Biemiller Thomas.

This subgroup convened four subgroup calls. Overall, the subgroup attempted to take a systems or ‘big picture’ approach to chemical emergencies. It attempted to look at the overall system, rather than specific parts, outcomes or events. The subgroup engaged in a number of activities that informed this report, even if specific pieces of information from those activities were not incorporated into the report. These included researching and reviewing various chemical emergency case studies and developing a matrix covering the roles of various public and private sector and civil society actors in various phases of emergency prevention and response. The matrix was used to identify unmet needs for the various phases and actors.3

In addition, the subgroup made recommendations to develop or improve systematic coordination of efforts by industry, local community organizations/groups, city, state, and federal agencies to prevent chemical incidents, reduce hazardous chemical use, and to provide communities with the appropriate education and skills necessary to gain access to chemical information and learn to respond effectively to chemical emergencies.

**Terms and Definitions**

For the purposes of this document, a chemical emergency was defined as any actual or imminent threat of a hazardous chemical release that has the potential for causing harm to people, property, or the environment. Chemical releases can be unintentional, such as an industrial accident, or deliberate, such as a terrorist attack, or actions that are non-compliant with laws and policies (CDC, 2010). Chemical releases associated with natural disasters were also considered within the definition of chemical emergencies.

The terms first responders and first receivers include persons involved in initial aspects of emergency response. Although both are critical in the initial stages of a response to a chemical emergency, there are differences in the types of response they provide and their training and experience. The Occupational Safety and Health Administration (OSHA) (OSHA, 2007) provides the following descriptors:

First responders are individuals who in the early stages of an incident are responsible for the protection and preservation of life, property, evidence, and the environment, including emergency response providers, as well as emergency management, public health, clinical care, public works and other skilled support personnel that provide immediate support services during prevention, protection, mitigation, response and/or recovery operations. (OSHA, 2007).

First receivers typically include personnel in the following roles: clinicians and other hospital staff who have a role in receiving and treating contaminated victims (e.g. triage, decontamination, medical

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3 The work product of the systems subgroup can be found under the Chemical Emergencies Work Group at:
http://www.atsdr.cdc.gov/nationalconversation/work_groups.html
treatment and their clothing or personal effects) (OSHA, 2007). First receivers often are the first to provide care to victims and those otherwise affected by a chemical emergency following initial field-based care that has been provided by the first responder personnel.  

OSHA has specific requirements under 1910.120(q)(4) for what the agency refers to as “skilled support personnel.” The agency defines this group as, personnel, not necessarily an employer’s own employees, who are skilled in the operation of certain equipment, such as mechanized earth moving or digging equipment or crane and hoisting equipment, and who are needed temporarily to perform immediate emergency support work that cannot reasonably be performed in a timely fashion by an employer’s own employees, and who will be or may be exposed to the hazards at an emergency response scene.

A system can be generally defined as a group of interacting, interrelated or independent elements that form a complex whole. For the purposes of the work of this subgroup, a chemical emergency system in general has parts spread across the federal, state and local sectors, depending upon the size and type of the emergency, and involves the environmental, emergency management, public safety, and public health agencies of the three levels of government. In addition, industry has a very important role to play in preparing for and responding to such emergencies (EPA, 2010). Such a system is composed of, but not limited to, the following elements:

- One or more identified chemicals with toxic or other undesirable properties
- A source of the chemical(s)
- Method(s) for transporting the chemical(s)
- Facilities for storing the chemical(s)
- Plan(s) for containing an accidental spill or discharge
- Appropriate equipment for cleaning up (containment and recovery) an accidental discharge
- Standards for certifying that an accidental discharge has been contained and recovered or removed
- Facilities for storing and disposing of contaminated items (environmental or man-made)
- Resources to control, coordinate and finance all emergency operations
- Health care
- Appropriate personnel

The term community, as defined by the work group, includes but is not limited to those groups that are typically formed by artificially imposed boundaries such as zip codes or political subdivisions. The term also includes communities of interest which may share a common interest or focus. When things go wrong, those impacted create an ad-hoc community. Their shared focus is the accidental chemical discharge; their common interest is protecting people’s health and returning (remediating) the affected region to the status quo that existed prior to the emergency.

For the purposes of this report, industry includes but is not limited to manufacturers, processors, transporters, and producers, and includes those industries involved in the production of petrochemicals, agrochemicals, pharmaceuticals, polymers, paints, oleochemicals, and other chemical products.

**Green chemistry** can be defined as chemical research and engineering that encourages the design of products and processes that minimize the use and generation of hazardous substances.

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4 Empirical observations in actual events, suggests that the majority of victims (especially in multiple casualty chemical emergencies and disasters) self-transport to the closest hospitals, without having received any care from first responders. See Auf de Heide & Duckett, 1989.
A vulnerable population, as discussed in this document, includes those with functional or developmental needs, disabilities, and activity limitations (FEMA, 2010). It also includes those who are made vulnerable by their financial circumstances or place of residence, health, age, personal characteristics, ability to communicate effectively, and presence of chronic illness (President’s Advisory Commission, 1998).

II. CURRENT STATUS OF ISSUES UNDER CONSIDERATION

a. Training and Capacity Building

All response agencies have one thing in common: they have dedicated men and women who answer the call when things go wrong. No matter if first responders are paid or volunteers, the drive to help those who are in need is a trait possessed by all. The desire and ability of first responders to be trained and learn the skills needed to recognize and respond to chemical emergencies exists in all agencies, and as the number of public health emergencies has increased, training has become very broad and not well integrated. The result is that there are critical first responders who are responding to chemical emergencies without adequate training.

Chemical Emergency Training

The lack of adequate first responder training within the emergency response service to respond to chemical emergencies involves three main areas: a) access to training, b) consistency of the types and levels of training and c) coherent local, state, tribal, and federal competency standards for responding to chemical emergencies.

There exists a discrepancy in access to training between the career fire service and the volunteer fire service, as well as between different law enforcement agencies and EMS departments. This is based upon the availability of time, money and access to training. Access to training is not equal across the board. Large metropolitan areas have greater resources and thus greater access to training compared to rural volunteer fire service forces, law enforcement agencies, and EMS departments. Fire service within rural areas and small towns primarily consist of volunteers. In addition, some law enforcement agencies and EMS departments may have personnel who are either volunteer or part time workers as well. The difference between the two is the ability to support training as well as time to train. Volunteer fire services, rural law enforcement agencies, and rural EMS departments do not always have the financial capability to support training and their volunteers or employees work other jobs and may not be able to take time off to do extensive training.

Response to a chemical emergency requires three levels of training dependent upon job functions: the awareness level, the operational level and the technician level.

Awareness Level: At a minimum, all first responders need to be trained to a HAZMAT awareness level. This would include all fire personnel, law enforcement and EMS. It would be better if they would be trained to the HAZMAT operational level so that they could deploy some actions that may reduce the impacts of a chemical emergency. International Fire Service Training Association (IFSTA) states in the “Hazardous Materials, Managing the Incident”, 3rd ed., that First Responders at the awareness level are those individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response notification process. The most common examples of first responder-awareness personnel include law enforcement and plant security personnel as well as some public works employees. Most fire department suppression personnel fall into the first responder-operations level and are those individuals who respond to releases or potential releases of hazardous substances as part of the initial response for the purpose of protecting nearby persons, property, or the environment from the effects of the release.
Operational Level: All firefighting personnel should be trained to the HAZMAT operational level. This training is for those personnel who have some protective equipment and other resources that would enable them to take further defensive actions at a hazardous materials scene.

Technician Level: Responders working on the scene in the contamination zone for the purpose of stopping the release need to be trained to the HAZMAT technician level which includes the basic knowledge and skills to take appropriate offensive or defensive action that would require level A or level B personal protective equipment at an incident. This training needs to include monitoring for the hazardous material involved and knowledge of action levels for materials.

Inconsistencies also exist between federal and state regulations and enforcement of training and capability requirements. The U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) have standards which cover employees with regard to chemical exposures and HAZWOPER training standards. HAZMAT teams receive training, but are not licensed. First responder training is provided by multiple agencies, organizations and programs; however, there is no set of consistent standards which addresses the core competencies for first responder response to chemical emergencies.

First responders do not have proper guidance as to what standards or protective levels to use during a response. OSHA standards and EPA environmental standards are not developed for responding to chemical emergencies.

There currently exists a need for consistent training and national competency standards for responding to chemical emergencies. In addition, there need to be more options for performance oriented training and competency development.

First responders may be involved in the incident before they realize a potential exposure hazard, and they may not have the proper training or resources to recognize and mitigate the presence of hazardous chemicals at a chemical emergency scene. When a chemical is not recognized or identified at the scene, contamination of responders, vehicles, equipment, and victims may carry through and contaminate the hospital emergency department, and in some cases major illness and injury, as well as death, can occur to exposed patients and responders. In areas where an incident overwhelms local support, variability of response exists based upon the capacity to respond. Coordination of HAZMAT team support may be dependent upon local funding as well as the support of regional HAZMAT teams. There is a need to continuously foster cooperation and coordination between response agencies, jurisdictions and support agencies.

Skilled support personnel may not be readily available to assist with the response and chemical emergencies may go on for hours before actions are taken to begin mitigating the emergency. Capacity building should also include training of first receivers and the community in HAZMAT awareness.

Hospitals currently plan and train for mass casualty events and need to be included in chemical emergency planning within their communities. Communication between first responders and health care providers needs to be strengthened so they receive adequate warning of chemical emergencies to prepare for the potential decontamination, triage, or treatment of incoming patients. Emergency Department staff as well as clinic and all hospital staff should have a level of chemical hazard awareness, with some key designated personnel receiving training to the operational level to facilitate safe and effective response and treatment.
The private sector should work with local emergency management agencies to help plan for response as well as to address inconsistencies in communication and messaging during an event. In addition, the general public needs to have an understanding of the type of response required during a chemical emergency, and the need for their compliance with instructions from law enforcement, emergency managers, and public health during such an event.

While the fire service generally abides by stringent standards established by the National Fire Protection Association (NFPA) and follow training guidelines set by organizations such as the International Fire Service Training Association (IFSTA) (Noll & Hildebrand, 2005), and Rural Domestic Preparedness Consortium (RDPC), the current training for firefighters is not regulated under any federal mandates for content, competency testing, or certification. The only OSHA stipulation with regard to training for response to chemical emergencies is that an individual involved in responding to a chemical emergency have HAZWOPER training to the awareness level (OSHA 29 CFR 1910.120). There are no uniform nationwide criteria to define the members required in Hazardous Material Response teams (HAZMAT Teams). Furthermore there is no national certification process or licensing entity that oversees these groups.

At the state level, individual states have differing guidelines that suggest different competency levels. Some states inconsistently use Emergency Management Agency (EMA) guidelines for training their personnel, but again there is no requirement that the responders meet these guidelines. Most municipal employees and other groups that receive federal funds are required to undergo the National Incident Management System (NIMS) training (at least levels 100, 700, 800). While this training is not incident specific, it does contribute to the overall management of incidents. The NIMS courses would qualify as an across the board type of required training that most responding firefighters would probably have.

Extensive training classes exist both on-line and in person throughout the country. The breadth and depth of these classes covers almost every eventuality that one could expect to see in a chemical incident. However, no single source for cataloguing or evaluating available courses currently exists. No measures exist to determine a courses ability to provide students a level of competency. Without a standardized curriculum or measurable target capabilities, training is unfocused. The quality of training varies and has resulted in inconsistent and inadequate training of the workforce.

An additional the weakness is that the level of training and experience can vary greatly from organization to organization (urban vs. rural, large vs. small, professional vs. volunteer). A national certification program should be developed that establishes minimum qualifications for responders focusing on hazardous materials response and offer that certification program to all first responders at no cost to the local entity. Currently, any attempt to require such training and certification as an unfunded mandate would only produce additional stress on already overextended public finances. As this will take some time and effort to develop, fund, and implement, it is recommended, in the interim, that emergency management ensure that training at the HAZWOPER awareness level is provided to all emergency responders. Key district or regional staff members should be required to receive training to the HAZWOPER Operations level.

b. Systems and Coordination

Barriers and Impediments

Specific, but widespread, impediments to success of the US chemical emergency system that must be overcome include organizations that are insular by nature, mission or past experience; interests and goals that are specific to particular organizations or types of groupings (i.e., not held in common or shared); channels of communication that are limited by custom, particular types or organizations and levels within
particular organizations; and personal factors such as ego, power, secrecy, and control that impede information sharing at times when speed is essential. Additional barriers include 1) limited funding; 2) inadequate coordination; 3) insufficient laws; 4) insufficient communications systems; and 5) insufficient data.

1) Limited funding:

In 1989, a phenomenon called The “Paper” Plan Syndrome was identified (EPA, 2008). This was described as the illusion of preparedness based on a system with written plans that are, among other things, not tied to funding and the resources necessary to carry them out. One of the realities of the current approach is that receivers and responders have to deal with is that acute chemical emergencies and disasters that cause injuries and illnesses are high-consequence but low-probability events. As such, they compete for attention with the priorities of daily business. Often getting the public, elected officials, and organizational leaders to support preparedness is just as difficult, if not more so, than developing the countermeasures themselves. One of factors that typically plague planning for low-probability events is that sufficient funding is often difficult to obtain and maintain.

Funding is clearly needed for preparedness, but one critical challenge is how to motivate policy makers to make sustainable funding available. Could chemical company insurance coverage, for example, be linked to prevention and preparedness standards? Could tax breaks be used to motivate preparedness? How can increased government funding of preparedness be accomplished when existing programs and budgets are being slashed due to the ongoing economic crisis this country faces. These are questions that should be answered, but were beyond the scope of the Chemical Emergencies work group. These questions are amenable to empirical study, and work group members support the premise that efforts should be directed that way.

2) Inadequate Coordination:

In 1984, in response to the Bhopal Disaster, there was a national effort to improve coordination of chemical responses. This resulted in the passage of SARA and the establishment of state and local emergency planning committees to improve coordination and response. However, a 2008 national survey of Local Emergency Planning Committees (LEPCs) revealed that only 9% of LEPC members were very familiar with the emergency response plan, only 60.2% of these plans integrated with other applicable state plans, and only 15.9% of LEPC members strongly agreed that their LEPC has had a positive impact on chemical safety in the community. In fact, of the 2,670 LEPCs sent survey questionnaires, only 39.8% even returned them (Auf de Heide & Duckett, 1989).

As this example demonstrates, several gaps exist regarding coordination of chemical emergency prevention, preparedness, and response. In addition to those mentioned above, significant gaps exist in jurisdictional responsibility and authority, real or perceived. Such gaps can be exacerbated by the complicated and confusing system of government agency responsibility for different aspects of a chemical emergency. In addition, local health departments (LHD), the general public, and many partners do not fully understand the LHD role in chemical emergencies. Further, poor funding of chemical emergency engagement contributes to a general lack of communication and lack of established capacity to communicate among LHDs and other relevant actors.

When preparing for and responding to a public health emergency, there are many different groups that state health agencies need to work with to ensure that the response and recovery efforts are most efficient. State health agencies feel that coordination should first be focused on collaboration with the local health agencies, and then the state environmental agencies. Since local health agencies are “on the ground”, better in touch with what is happening in a specific community, and often the first to respond to an
emergency, state agencies should first focus on better coordination and training with the local health
agencies in order to be more effective. Once this training and relationship is well established, the state
health agencies should then focus on bringing the state, tribal (where applicable), and local environmental
agencies into the partnership and strengthen collaboration with them. This will help build the network of
collaboration and communication needed to be effective. In cases where environmental health staff
members are located in the environmental agencies already, the relationship between the health and
environmental agencies should be strengthened.

3) Insufficient Laws:
Current major federal laws governing chemical emergencies generally cover cleanup, planning, response,
arisk management, but do not explicitly encourage or require facilities to assess or use alternatives that
could remove the danger of a sudden chemical release. As a result, many communities host chemical
hazards that may be simply unnecessary.

- The Comprehensive Environmental Response Compensation and Liability Act of 1980
  (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) address
cleaning up after chemical emergencies.

- The Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), a freestanding
title of Superfund Authorization and Reauthorization Act (SARA), addresses preparing for spills
or emergencies, primarily through Local Emergency Planning Committees (LEPC) and by
communicating chemical hazards to emergency responders and the public. The OSHA Hazard
Communication Standard also communicates chemical hazards, to workers where they work.

- The Clean Air Act of 1990 includes Risk Management Planning (RMP) requirements that address
managing the risks of emergencies, as do the Process Safety Management (PSM) standards of the
Occupational Safety and Health Administration.

- On April 9, 2007, the U.S. Department of Homeland Security issued the Chemical Facility Anti-
Terrorism Standards (CFATS). It requires high risk facilities to conduct a security vulnerability
assessment (SVA) and then develop and implement a site security plan (SSP), implementing site-
specific security measures that meet the Risk Based Performance Standards (RBPS) that the
Department identified in the interim final rule.

None of these laws regulate the vulnerability zones that chemical facilities present to surrounding
communities in terms of distance, chemical intensity, or population at risk. At this time, these laws do not
require companies to assess safer and more secure alternatives that can reduce or eliminate many existing
chemical hazards. However, the CFATS reauthorization currently pending approval has some language
requiring companies to document that they have considered Inherently Safer Technologies (IST). Should
this requirement be passed, it could have a positive impact on chemical safety; however, it is receiving a
lot of push back and may be stricken.

4) Insufficient Communication Systems and Strategies:

5 Some other laws have additional impact on chemical emergencies: The Resource Conservation and Recovery Act (RCRA)
includes limited requirements for hazardous waste sites to “prevent the unknowing entry, and minimize the possibility for the
unauthorized entry, of persons or livestock…”. 40 CFR 264.14, 265.14. The Toxic Substances Control Act (TSCA) Section 6
gives EPA broad power to control any chemical that poses an “unreasonable risk of injury to health or the environment.” This
standard is cumbersome and ineffective in practice. The Pollution Prevention Act (PPA) makes it the national policy of the
United States to reduce toxic waste at the source wherever feasible. 42 U.S.C. 13101 et seq. (Public Law 101-508) This law also
directs the EPA to consider how agency actions affect source reduction of toxic waste.
Communication, or the lack thereof, is also a significant barrier to effective chemical emergency preparedness and response. Improving communication would involve establishing formal channels as well as promoting informal channels of communications. Simultaneously, communications should not be restricted to organizational peers but involve individuals with knowledge or the experience needed to address particular problems. Formal channels are well defined but require time for messages to move through them. Informal channels are very efficient and move quickly, and often integrate professionals at all levels of organizations, although they sometimes ignore titles and roles.

5) **Insufficient Data:**

Successful planning depends on the incorporation of appropriate measures in national and regional development planning. Its effectiveness will also depend on the availability of information on hazards, emergency risks, and the countermeasures to be taken. Barriers to achieving the vision include:

- No one repository or clearinghouse of information for planners, first responders, first receivers, or the community,
- Little data for evidence-based planning,
- Less funding to do chemical emergency planning that other types of planning (e.g. infectious disease),
- Not all industries are covered by existing planning and hazard mitigation laws (RMP/PSM/CFATS),

It is impossible to be well-prepared for a chemical emergency or to avert one altogether, when there is a lack of data to determine the risks and best-practices. While EPA, the Department of Transportation (DOT), HHS, DHS, the Chemical Safety Board (CSB), and others do currently have some programs that attempt to collect these data, much more is needed. More importantly coordination among the agencies is needed. Disjointed activities serving each agency's own mission would much better serve the public if they were coordinated.

Specific data needs include:

- **Green Chemistry research** is needed and is currently gravely underfunded. A green chemistry approach to chemical emergencies should systematically generate solutions through the assessment and development of technological options that reduce or remove chemical hazards. This approach should not only promote expertise in government, industry, academia, and other communities of interest, but should also tap existing expertise through systematic review of and communication about safer alternatives.

- **A scientific field research program** to study actual chemical emergency hazards and responses and provide an evidence-base for best practices for prevention, planning, comprehensive training, and coordination is sorely needed. Also, while there are some steps in this direction such as the ATSDR Assessment of Chemical Exposure (ACE) program which draws on different expertise and tools within ATSDR and CDC to lend assistance when there is a chemical emergency affecting a large number of people, more is needed.

- **Incident data are** needed as it is impossible to even know what to prepare for when there is a lack of complete data on what chemical emergencies are occurring. There are disparate systems that are not working in a coordinated fashion. These include the National Response Center (NRC) Incident Reporting System, American Association of Poison Centers (AAPC) National Poison...
Data System (NPDS), ATSDR National Toxic Substance Incidents Program (NTSIP) state surveillance system (severely cutback in recent years), the NIOSH Sentinel Events Notification System for Occupational Risk (SENSOR), Department of Transportation Hazardous Materials Information System (HMIS), EPA Risk Management Plan 5 year accident history, EPA TRI data, and States spills reporting systems among others. There are many lessons to be learned from this data as well as situational awareness, yet these systems are not maximally interacting and coordinating. When it was created, the CSB was tasked with creating an incident database that may require reporting legislation. The CSB placed an advanced notice of proposed rulemaking in the Federal Register in 2009, soliciting feedback on a regulation requiring accidental chemical releases to be reported to the CSB or to the NRC. While this feedback closed August 4, 2009, to date any intentions to proceed have yet to be announced. NTSIP does make an attempt to reconcile the disparate spill data and to gather complete and accurate date on chemical incidents. Yet it has been severely cut in recent years and can only collect accurate data for the seven states funded by ATSDR. NTSIP attempts to estimate national data by forging data sharing arrangements with other agencies to produce national estimations. This estimating activity too is limited to those agencies wishing to share their data.

- **Commodity flow data** or materials accounting data on what is being stored or used or manufactured or transported for every locality is needed to fully understand what the risks are, what to plan for, and how to eliminate exposure risks, when feasible. For example, local emergency responders who would respond to a leak, spill, or fire, have limited knowledge of what is being transported by railroad companies through communities. Railroad authorities argue that providing this information is a matter of national security. The result is inadequate planning for potential hazardous materials derailments (Hunter 2010). While a community’s “Right to Know” is well established as a principle, it has, in many instances, effectively been rescinded under the guise of national security, confidential business information, or trade secrets. This issue is even more pronounced for vulnerable and overburdened populations.

Risk Assessment data can inform policy makers and planners regarding prioritization of funds, focus of training, research. Only by assuring a scientifically rigorously risk assessment process and education of policy and decision-makers regarding the use of risk assessments (making decisions with uncertainty) will risk assessments play an important role.

Toxicological data is still needed regarding health risks from acute exposure so we can better understand immediate protective actions, medical countermeasures, safe clean-up measures, accurate risk communication and potential long-term effects

**Status of Tribal Chemical Emergency Management**

Tribes, as sovereign nations, have the authority to develop emergency management systems. Tribes may use a variety of terminology such as; LEPC (Local Emergency Planning Committee), TERC (Tribal Emergency Response Commission) to describe their emergency management systems, however it should be noted that due to a lack of capacity some tribes have not yet been able to establish such systems. It is important to remember that each tribe is unique in its status of working with the federal government. There are federally-recognized tribes, state-recognized tribes, and tribal groups who are seeking federal recognition. For federally-recognized tribes with reservation boundaries, jurisdiction does not reside with state, county, or local entities, and tribes should not be considered public entities. There are also tribes without reservation boundaries that have federal-recognition status. Additionally, individual tribal infrastructure varies; some tribes have their own fire departments and police or other form of security, some tribes will require services from adjacent entities, and some will have tribal members who voluntarily serve as first responders. Regardless of status, and similar to other entities, tribes are
negatively affected by the impediments and barriers highlighted above, and necessarily need access to
training and funding to increase their capacity and expertise in the emergency management arena. As
carried out, opportunities to overcome system-wide impediments exist, and it is critical that any such
efforts consider tribal concerns. Clear communication and coordination with tribes early and often would
help to yield synergistic benefits, and more effective chemical emergency preparedness and response
efforts.

III. CEWG VISION OF A SUCCESSFUL SYSTEM

Four themes emerged from the work of the Chemical Emergencies work group, and these themes are
critical components of any emergency preparedness and response system. These four themes —
prevention, planning, comprehensive training, and coordination and integration — form the framework of
the Chemical Emergencies vision of a successful system, and the foundation for the recommendations
which appear in Section IV.

Prevention

The CEWG envisions a system where the focus is first on the prevention of chemical emergencies. As
such, a successful chemical emergencies response system includes the use of safer technologies, including
green technology, strategic outreach and communication, and enhanced training and coordination during
all phases of emergency management between government agencies, tribes, community residents,
academia, industry, NGOs, and VOADs, and adequate resources for all phases of implementation.

For many industries, safer technologies can remove the possibility, or significantly reduce the potential
scope, of a chemical emergency. Yet these possibilities frequently do not enter into the emergency
management conversation. As a result of a successful implementation of this system, government,
industry, tribes, and the public would be given the opportunity to suggest and be informed about
affordable and practical ways to remove or reduce chemical hazards, especially where the scope of the
hazard exceeds realistic forecasts of emergency response system capacity to effectively protect people,
property, and the environment. Agencies and organizations at all levels — federal, state, local, tribal,
workplace, community, industry, academic, and other non-governmental organizations — would have
reliable information and technical expertise about specific chemical hazards and alternative technologies
that can remove those hazards.

Prevention includes assessing the risk, prioritizing actions, securing dangerous chemicals and finding
safer alternatives to dangerous chemicals. Programs should assure the security of dangerous chemicals
during manufacturing, storage, transport and use, preventing accidental or intentional releases. The
legislation authorizes funds for implementation. It assigns authority over private sector facilities to DHS
under the existing Chemical Facility Anti-Terrorism Standard. Security programs must collaborate with
programs that support alternate technologies. These programs would be complimentary by changing what
can be changed and securing what cannot. Such collaboration would better identify the priority areas that
need focused research for safer alternatives.

In this system, all states would be covered by legislation similar to the Massachusetts Toxics Use
Reduction Act (TURA), a law passed in 1989 to encourage a reduction in the amount of toxics used in
Massachusetts and the amount of toxic byproducts generated (TURA, 1989). Toxics use reduction is the
best method for protecting public health and the environment from hazardous pollutants. This method has
decreased risk of major accidents from transportation and storage, protected workers from dangerous
workplace exposures and created products that are safer for the public’s use. In addition, in a successful
system, there would be a federal counterpart of Toxic Use Reduction Institute (TURI) that provides
training, services and grant programs to reduce toxic chemical use and advance energy and water
efficiency while enhancing the economic competitiveness of businesses. As a result of TURA and TURI, Texas Instruments Incorporated, Attleboro, Massachusetts reduced its reliance on trichloroethylene from 850 tons a year in 1985 to less than two tons. Other victories include eliminating over two million pounds of anhydrous ammonia, and cutting its use of cyanide compounds from 35,000 pounds in 1996 to just 5,000 in 2000, for which Texas Instruments received the Massachusetts Governor's Award for Excellence in Toxics Use Reduction (TURI, 2009).

In a successful system, hazardous chemical facilities would develop knowledge and awareness of the potential harm, feasibility, costs and savings, advantages and disadvantages of best available technology options, and the government would systematically compile and disseminate knowledge of these options and foster a culture of awareness of prevention options. The choice of technology determines the associated hazards. A robust examination of prevention options would come first — before management, control, or response options that all too often prove insufficient in an emergency. Facilities that can remove or reduce chemical hazards not only reduce their own regulatory burdens, but also reduce burdens on regulatory agencies and emergency response systems. Information on chemical hazards and alternatives would be effectively organized and managed to reduce burdens on data providers as well as data users. An outreach strategy would be developed and implemented in order to disseminate information and materials to vulnerable populations within our diverse communities.

Prevention must be implemented at the top of the hierarchy — before risk management, engineering or administrative controls, or cleanup. But aspects of prevention would be incorporated throughout the cycle of prevention, planning, preparedness, response, and recovery. For example, the CSB is an independent agency that arrives after major incidents and makes recommendations to prevent similar events in the future. The successful system could call for inspections of facilities and industries prior to an incident to identify potential problems that may lead to a chemical emergency. Localities and tribal governments would actively consider the use of zoning, fire codes, land use planning, and ordinances to mandate alternative assessments. However, planning, preparedness, response and recovery are especially needed where a hazard cannot be prevented. Ideally, local agencies and tribes would develop a working relationship with industry to foster a partnered inspection program in an attempt to prevent chemical emergencies by identifying potential problems or issues and bringing them to the attention of industry representatives. Funding for this partnership would be provided to local and tribal agencies by the federal government, demonstrating a commitment to the prevention of chemical emergencies. In addition, in order to prevent chemical emergencies, it is critical that all persons in all states have access to data which tracks chemical emergency incidents, and measures where preparedness and response efforts have been successful.

Planning

A successful system from the Chemical Emergencies work group perspective will ensure that all communities, including rural and tribal communities, have adequate resources and legal authority to complete thorough vulnerability analyses, promote chemical emergency hazard reduction, have effective plans in place, and take immediate steps to mitigate any hazardous effects of a chemical emergency. Planning forms the foundation for a community's long-term strategy to reduce chemical emergency losses and break the recurring cycle. The planning process creates a framework for risk-based decision making to reduce harm to lives, property, and the economy from future chemical emergencies. Hazard reduction is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards, thereby creating safer communities and reducing loss of life and property. Adopting zoning ordinances that steer chemical facility development away from populated areas, designing roads that carry traffic away from vulnerable areas, acquiring damaged homes or businesses in areas prone to chemical releases, requiring businesses to switch to safer available alternative substances or processes are all examples of hazard mitigation strategies.
Ideally, all federal agencies engaged in chemical emergency planning, other government, private and NGOs/VOADs would unite to create and promote a central clearinghouse for planning, i.e. databases, regulations, planning tools. A thorough review of all federal, state, and local statutes on chemical planning would also occur, followed by proposed model legislation that can be considered and enacted at the federal, state, and tribal levels. Lastly, in a successful system, the planning bodies that exist (e.g. LEPCs) will all have adequate resources, financial and informational, needed to perform their jobs properly.

Comprehensive Training

"Once we have good plans in place, we must invest far more in leadership training for first responders. We must make sure that they have all the resources and practice they need. After that, we must unleash them to attack a crisis with full force and authority. To paraphrase Winston Churchill in World War II, let us give them the tools they need so they can finish the job." (Gergen, 2010).

The Chemical Emergencies work group envisions a system where, in the event that preventative measures fail, and a chemical emergency takes place, the roles and responsibilities of those involved in chemical emergency management would be planned for and clearly defined, and those charged with response would be trained to a level that would support a successful response resulting in no deaths or injuries and completed with a successful mitigation of the hazards associated with the chemical emergency. Simply put, responders and receivers would have the “tools they need so they can finish the job.” Lines of communication and structures and procedures for collaboration among relevant local, state, tribal, and federal actors would be established prior to the chemical emergency. Effective coordination of chemical emergency engagement would be accomplished because of the increased amount of and better quality of training for relevant actors, especially emergency responders.

The 2010 Deep Water Horizon Gulf Oil Spill (Gulf oil spill) provides timely, salient examples of why training is the foundation of successful preparedness and response to chemical emergencies. One specific lesson learned from the Gulf oil spill response is that clear and repeated information and training must be provided to all contractors, clean-up workers and volunteers based on an analysis of job tasks and potential exposure to oil waste and weathered by-products. This is particularly true for first receivers who, as this report has indicated, are often inadequately trained. Risk protection messages are most effective when they are delivered often and in close proximity to the behaviors of interest.

Coordination and Integration

In the context both of federalism and ever-increasing global inter-connectivity, effective coordination is more crucial than ever (Kouzoukas, 2007). A successful system also would be a coordinated system, with little to no unnecessary fragmentation. This would improve coordination and integration among different governmental jurisdictions, as well as across multiple sectors and disciplines (Moulton, Gottfried, Goodman, Murphy & Rawson, 2003).

Government jurisdictions can be visualized as silos. Silos emerge as organizations expand in size, assume new responsibilities and become so focused on their own activities that they become inordinately impressed with their own importance. Silos promote exclusivity among members of various communities and allow their inhabitants to surround themselves with like-minded persons. This fosters familiarity but impedes progress in emergencies. Response efforts may require coordination across multiple levels and various silos, including local, state, tribal, and federal governments, and even with international organizations.
Silos create barriers to communication. Reducing or eliminating silos would change organizational channels of communication and speed up sharing information and addressing problems. As barriers are eliminated, new channels of communication should emerge. Communications should not be restricted to organizational peers but involve individuals with knowledge or experience that is needed to address particular problems. Integrating people at different levels in a variety of organizations enhances information exchange. The metaphor for the resulting product is a crystal lattice where energy (communications) can flow easily and without barriers (that exist in silos).

Coordination of legal responses to chemical emergencies also may involve a horizontal dimension comprising numerous and diverse sectors, such as public health, environmental protection, emergency management, public and private health care, education, law enforcement, and the chemical industry (Moulton, Gottfried, Goodman, Murphy & Rawson, 2003).

Lessons learned from the 2010 Gulf oil spill also underscore how critical coordination is to successful chemical emergency preparedness and response. Work group members active in the response noted that all state and federal health and safety agencies need access to all oil response areas on water and land to assure the safety of all response workers. In assuring safe operations while handling absorption booms and conducting skimming operations that take place on the water, the US Coast Guard must make sure that the right to entry to assure responder safety is not dependent on the responsible party and its contractors.

Successful coordination for chemical emergency preparedness and response also depends on solid and established public-private relationships. For example, another key lesson learned from the Gulf oil spill is that the responsible party should establish, in conjunction with the Incident Commander, a comprehensive injury and illness reporting system to ensure full reporting of ALL safety and health related issues experienced by clean-up workers. In this particular instance, British Petroleum (BP) and public health agencies should partner in establishing diagnostic criteria and population surveillance for all responders and not rely solely on the contractors and contractor diagnosis and reporting. In addition, collaborative processes should be established to share data among the responsible party and federal, state, and tribal health agencies. Together and openly, they should gather, tabulate and analyze information related to exposure of cleanup workers to oil, degreasers, and detergents. As part of the current Job Hazard Analysis (JHA) process, the Incident Commander should require representative individual exposure monitoring of critical job tasks during the time they are working on particular response tasks. Relaxing barriers (reducing silos) and encouraging open exchanges of information (sanctioning informal channels of communication) have the potential to speed up the recovery process.

IV. ACTION RECOMMENDATIONS

RECOMMENDATION #1: The federal government should establish an office or program whose goal would be to serve as a coordinating agency, unifying and integrating the efforts of federal, state, local, and tribal government agencies with responsibilities related to preventing, preparing for, responding to, recovering from, and mitigating chemical emergencies, and serving as a central program charged with creating consistency and avoiding redundancy of information on chemical emergencies on the national, state, local, and tribal levels.

Establishing an Office of the Chemical Emergencies Coordinator could accomplish a variety of goals. First, this office would exist to integrate the often disparate data developed by federal agencies before, during, and after a chemical emergency, and proactively disseminate it to planners, responders, and where appropriate, the general public via a National Clearinghouse for Chemical Emergencies. Secondly, the work group envisions this office as having a role in community outreach and volunteer training on...
personal and community responsibilities and roles in chemical emergency prevention, preparedness and response.

Ideally, this office would establish a National Clearinghouse for Chemical Emergencies. In part, the Office should collect, develop and disseminate toxicological informational tools. The Office would be charged with receiving reports of chemical emergencies and guiding timely response through referrals to agencies of jurisdiction (for instance through public health, first response, first receiver and poison center channels). In addition, this office would be responsible for ensuring that responders at all levels have access to real-time information on regional resources and response capabilities.

The recommended Clearinghouse could emulate the national Poison Control System, already partially funded by the Health Resources and Services Administration (HRSA). Advantages of using the existing hotline structure for access include:

- Immediate access to medical toxicologists
- Availability of specialists in poison information trained to collect exposure data
- Real-time response and staff trained in risk communications with professionals/public
- Alignment with academic resources
- Public and professional familiarity with the existing phone number and service
- Economies of scale
- Robust regional knowledge of response partners and public health agencies

A structure utilizing one or more regional poison control centers might form the backbone of the emergency reporting and response system under this Office. The availability of clinical toxicologists and other specialists may yield high quality interpretation of exposure data (often incomplete in the literature, or requiring collection from several esoteric sources), provide real-time treatment recommendations for first responders and first receivers, and direct access to the system for the public and other professionals. Poison control center personnel routinely capture, record and report emergency events, exercises and drills, and engage in related public health notifications and risk communications for the public.

Mechanisms for raising awareness of services already exist, and modest enhancement in function and dedicated funding of one or more poison control centers to adopt this important function would shorten turn-around time for the creation of this Office and to endow it with functionality. Re-branding of poison control centers should be advertised to the public, chemical industry and professionals. Moreover, contact data for the Office and for the Poison Control system (1-800-222-1222) should be included on all MSDS sheets and similar chemical datasheets. In addition, web searches of terms such as “chemical emergency,” should yield this site among the first listed. The website should be easy to navigate to find the needed information and, if additional assistance is needed, there should be the option to chat with a live operator.

Because there are many potential actors involved with preventing, preparing for, responding to, recovering from, and mitigating chemical emergencies, with varying skills, education and training, it will be difficult to develop such a clearinghouse without a unifying body. Thus this recommendation focuses first on the establishment of an Office of the Chemical Emergencies Coordinator whose goal would be to coordinate and integrate the efforts of all relevant federal government agencies.

In addition, there are multiple local, state, tribal, and federal agencies and NGOs at all levels, who have the resources and expertise to assist communities and industries during a chemical release. Another goal of this Office would be to establish outreach and volunteer training programs to promote and support individual and community preparedness (e.g., public education, training sessions, demonstrations), including preparedness of those with functional needs. This would allow agencies and NGOs at all levels to have a centralized location to report efforts so that duplication is avoided and stakeholders can follow
the process. A comprehensive, easily accessible website should also be established for this service, with an eye toward providing ongoing education with regard to chemical release and its prevention.

The Department of Health and Human Services, in coordination with the Department of Homeland Security, the National Response Center, and other appropriate agencies should be considered as key resources during the establishment of this office. The Office may draw upon other resources such as medical toxicologists, clinical toxicologists, or basic science toxicologists (available through organizations such as the American College of Medical Toxicologists, American Academy of Clinical Toxicology, American Association of Poison Control Centers, the Society of Toxicology and other organizations), the chemical industry, industrial hygienists, academia, ATSDR, OSHA, NIOSH, EPA and others.

Although establishment of the Office of the Chemical Emergencies Coordinator could be led by DHHS, it might be more effective if it is established as an independent entity, and not under the ownership or control of any one agency. In addition, the Office of the Chemical Emergencies Coordinator should work free from political persuasion, with major funding coming from a pool of contributions by all relevant federal agencies or funding triggered by a federal emergency declaration.

RECOMMENDATION #2: Federal government agencies with responsibilities for providing applied research funding and other funding to tribes and state and local government agencies on chemical emergencies should require that relevant funding announcements include language strongly encouraging the development of partnerships with non-governmental organizations (NGOs) and community-based organizations, academia, labor unions, and industry.

Partnerships are an important tool in preventing chemical exposure and in preparing for and responding to chemical exposures. “NGOs, such as community-based, faith-based, or national organizations play vital roles in emergency management and incident response activities. NGOs that have the capacity and desire to be involved should be fully integrated into a jurisdiction’s preparedness efforts, especially in planning, training, and exercises. Furthermore, a memorandum of agreement should be established with each NGO prior to an incident so that each organization is aware of the capabilities, expectations, and roles of others.” (Institute for Homeland Security Solutions, 2005).

Academia is a highly untapped resource in chemical emergency preparedness and response. The resources that academia brings to the table are highly trained people with expertise in chemistry, public health, environmental health, engineering, emergency management, biology, etc. Similarly, industry often has extensive knowledge of particular chemicals (either individual molecules or classes of compounds), employees with high levels of expertise and modern (state of the art and frequently expensive) equipment. Partnerships must be balanced; each partner must gain from any alliance; a win-win situation must be established.

Optimally, partnerships with industry will focus at least in part on encouraging the use of safer alternatives and green chemistry technologies toward the prevention of chemical emergencies. Ideally, these partnerships will lead to information sharing on processes and technologies that can remove major chemical hazards.

Where appropriate, proposals for funding that include representatives from industry, academia, and community organizations/NGOs as co-equal partners should be encouraged and incentivized, and should receive priority for acceptance and funding. Roles and responsibilities should be shared and clearly delineated to avoid enlisting and creating participants in name only. Proposals that include more than one institution or industry partner (again, as co-equal partners) should receive bonus points during the review process. External auditors (one each from the funding source and each recipient institution) should
annually review the structure, operating efficiency and results of any partnerships created as a result of grant-related activities. If recipients are found to be non-compliant with the terms of this recommendation, funding may be reduced or withheld.

RECOMMENDATION #3: A Presidential Executive Order or Homeland Security Presidential Directive should be established that calls for each federal agency to develop an agency strategy for preventing, preparing for, responding to, recovering from, and mitigating chemical emergencies, and in ensuring that preparedness momentum is maintained.

An executive order would be a legally binding order given by the President, acting as the head of the Executive Branch, to Federal Administrative Agencies. Homeland Security Presidential Directives are issued by the President on matters pertaining to Homeland Security.

Successful implementation of this recommendation will require a commitment by all federal agencies and will indicate a significant paradigm shift. Such a commitment affects all programs and activities involving chemicals. The outcomes created from its implementation should more than justify the investment of time and commitment to government preparedness and response to chemical emergencies across all agencies, and levels of government.

This executive order or directive would apply to all agencies, and would include the creation of an Interagency Working Group on Chemical Emergencies (Working Group). The Working Group should be formed within three months of the date of the order.

The Administrators of the EPA and DHHS or their designees shall convene the Working Group on Chemical Emergencies. The Working Group shall comprise the heads of the following executive agencies and offices, or their designees: Department of Defense; Department of Health and Human Services; Department of Housing and Urban Development; Department of Labor; Department of Agriculture; Department of Transportation; Department of Justice; Department of the Interior; Department of Commerce; Department of Energy; Environmental Protection Agency; Department of Homeland Security (to include FEMA, Coast Guard, Transit Security, Administration, Science and Technology; Infrastructure Protection, Office of Health Affairs); Office of Management and Budget; Office of Science and Technology Policy; Office of the Deputy Assistant to the President for Environmental Policy; and such other Government officials as the President may designate. The Working Group shall report to the President through the Deputy Assistant to the President for Environmental Policy.

Ideally, the Working Group will work in collaboration with the federal Office of Chemical Emergencies Coordinator, discussed in recommendation #1, to (1) coordinate with, provide guidance to, and serve as a clearinghouse for each Federal agency as it develops a chemical emergencies strategy in order to ensure that the administration, interpretation and enforcement of programs, activities and policies are undertaken in a consistent manner; (2) assist in coordinating research by and stimulating cooperation among the EPA, DHHS, the Department of Education, and other agencies conducting research or other activities related to chemical emergencies; (3) assist in developing sources of information on safer chemicals and coordinating data collection, (4) examine existing data and studies on chemical emergencies; (5) develop interagency model projects on chemical emergencies that evidence cooperation among Federal agencies.

This recommendation might also lead to the establishment of a National Chemical Emergencies Awareness Day.

RECOMMENDATION #4: ATSDR and its partner agencies should establish a collaborative program that promotes the capacity across government agencies, industry, and academia for the
development of technical and policy expertise in green technologies that remove or reduce the possibility of a significant chemical emergency.

The principles of eliminating or vastly reducing chemical hazards are inherent in the theories supporting green chemistry. Green chemistry is a broad term with many definitions. As defined by the USEPA, Green Chemistry, also known as sustainable chemistry, is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances, thus preventing a chemical emergency from occurring. Green Chemistry should be applied across the entire life cycle of a chemical product, including its design, manufacture, use and disposal. The Green chemistry movement seeks to align science, the environment, and economics to create more innovative, efficient and safer product and business designs. Industry should be provided regulatory incentives to assess, use, and develop such technologies.

EPA through its Green Chemistry Program should expand their funding program to provide research grants for resolving practical problems in the implementation of technologies that design out the potential for a chemical emergency. Federal agencies should develop program coordination for the promotion of green technologies, including dedicated expertise in engineering, policy, and alternatives assessment. The results of any related research should be made available through the Clearinghouse discussed in Recommendation #1.

RECOMMENDATION #5: ATSDR, in collaboration with other federal government agencies, should develop an ongoing national program to assess and improve the health care response to hazardous chemical releases, and to develop an evidence base for chemical emergency planning.

One of ATSDR’s missions is to prevent exposure and adverse health effects from unplanned releases of hazardous substances. In order to achieve this mission, ATSDR educates physicians and other health care providers and provides technical support and advice to other federal agencies, states, and local and tribal governments that respond to hazardous chemical releases. Hospital preparedness programs include preparedness planning for mass casualties and decontamination planning. In many communities, health care preparedness planning is ongoing with public health, EMS, local emergency management agencies, law enforcement, and other responders. An important component of hospital preparedness is the training and exercising of any hospital preparedness plans that are developed. Efforts toward preparing the health care sector for chemical and other emergencies stem from the federal level and, in theory, are funneled down to local public health and hospitals. As such, hospital preparedness programs should be specifically integrated with state, tribal, local planning and capacity building protocols for response to chemical emergency events.

The passage of SARA Title III and the Nunn-Lugar Anti-Terrorism Act reflect increasing concern in recent decades about this country’s preparedness to manage adverse health effects due to hazardous chemical incidents. Unfortunately, there is a lack of empirical studies that would allow for the evaluation of this country’s current levels of preparedness or guide the establishment of effective preparedness programs. Limited data suggest that the level of preparedness is not adequate. Since planning is only as good as the assumptions on which it is based, it is important that planning assumptions are correct.

To address this deficiency, ATSDR should work with its partners to develop an on-going national program that includes the following elements and the necessary sustainable funding:

1. Establishment of a regularly updated national collection of published and unpublished documents, reports, and research papers on the responses to chemical emergencies and the lessons learned

\(^6\)Note that these elements could be extrapolated to all-hazards preparedness as well.
from them that would be made available to planners, policy-makers, practitioners, and the public.

This closely relates to the clearinghouse mentioned in Recommendation #1.

2. Establishment of a standing national, rapid-response field chemical emergency research team that would mobilize quickly to gather data on the operational lessons learned and best practices from the responses to chemical emergencies. This can be in conjunction with the ATSDR ACE teams that collect data on chemical emergency exposures and outcomes, short and long-term. It is important to collect information from multiple events to identify common trends and patterns and to generate a large enough sampling to analyze.

3. Utilization of the data from 1 and 2, to establish evidence-based criteria for effective chemical emergency preparedness that can be housed in a clearinghouse such as the one proposed in recommendation #1.

4. Using the criteria from 3, carry out regular national randomized surveys of chemical response organizations and institutions to assess their levels of preparedness. (One might consider this a national “preparedness surveillance system.”)

5. Without an understanding of the chemical emergencies that are occurring and their effects, it is impossible to effectively plan for a chemical emergency. Surveillance data on chemical emergencies needs to be expanded. This can be done by providing funds to additional NTSIP states and by promoting the sharing of existing chemical emergency incident data.

6. Based on the information generated from the above elements, generate recommendations for chemical emergency/disaster preparedness that can be included in training materials for first responders and receivers.

Recommendation #6: Congress should pass a law requiring facilities to assess, and in certain cases to implement, safer and more secure alternatives that can reduce or eliminate the possibility of toxic gas releases. 7

In the body of this report, it was identified that there are laws addressing risk management preparedness and response, but no law addressing primary prevention of chemical emergencies. The House of Representatives has acted to fill this gap by passing H.R. 2868, The Chemical and Water Security Act of 2009. 8 The act would require facilities to assess, and in certain cases to implement, safer and more secure alternatives that can reduce or eliminate the possibility of acute release of toxic inhalable gases. The legislation authorizes funds for implementation. It assigns authority over private sector facilities to DHS under the existing Chemical Facility Anti-Terrorism Standard. It assigns authority over Drinking Water Facilities to EPA under the Safe Drinking Water Act and for wastewater facilities to EPA under the Clean Water Act. For this legislation to be implemented successfully, it will require cooperation between these agencies and other agencies with relevant expertise. While we do not take a position on this particular House bill, we believe the Senate should pass similar legislation and the President should sign it.

The only certain way to protect our communities is to remove the possibility of a toxic gas release by converting facilities to safer, more secure alternative technologies. There are many existing off-the-shelf remedies that can be used. Bleach plants can reduce danger to employees and surrounding populations by generating chlorine on-site without rail shipment and bulk storage. Water utilities could convert from chlorine and/or sulfur dioxide gas liquid bleach or ultraviolet light. Developing commercial scale solid acid catalyst alkylation methods could provide a new generation of refinery technology. The primary criterion for substitution should be to reduce the number of people potentially exposed to acutely toxic gases. Additional criteria should be to reduce the probability of release and/or to reduce the toxicity of the material that would potentially be released.

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7 Work Group Member Derek Swick of the American Petroleum Institute does not support recommendation #6.
8 As of the writing of this report, a law has been introduced but not passed.
Although primary prevention will not be possible in every case and some risks will always need to be
managed, prepared for and responded to, the above examples of existing, off-the-shelf technologies
indicate that there are many opportunities for primary prevention that have not yet been realized. A law
requiring assessing opportunities for, and in some cases, implementing safer technologies will lead to
much risk reduction.

**Recommendation #7: The EPA, OSHA, CPSC, DOT, and the US Coast Guard should be mandated
by law to follow the United Nation’s (UN) Globally Harmonized System of Classification and
Labeling of Chemicals (GHS) safety data sheet (SDS\(^9\)) format and content requirements for
providing information on chemicals.**

Requirements for providing information about the hazards of chemicals and their safe use and handling
are inconsistent among agencies both domestically and internationally. The diverse and sometimes
conflicting domestic and international requirements can create confusion among those who seek to use
hazard information. SDSs may include symbols and hazard statements that are unfamiliar to readers or
not well understood, and information may not be easy to find. In (chemical) emergencies, easy access to
information that is readily understandable is a critical response factor.

The GHS is a common and coherent approach to defining and classifying hazards and to communicating
information on labels and SDSs. To address the needs of the diverse audiences for SDSs, a standardized
format was seen as a way to make the information on SDSs easier for users to find, segregate technical
sections of the document from more basic elements, facilitate computerized data retrieval systems, and
simplify training for those who use SDSs. The GHS establishes a 16-section SDS format for presenting
information with standardized headings for the SDS sections. In the recommended GHS SDS format, the
information of greatest concern to emergency responders is featured at the beginning of the SDS,
including information on composition, fire-fighting, and accidental release measures.

The GHS is in the process of being implemented globally and domestically. The European Union has
adopted all of the GHS classifications, including ecotoxicity, and the United States should do the same.
DOT has essentially implemented the necessary changes to align with the GHS, and OSHA has published
the NPRM to align its current Hazard Communication Standard with the GHS. However, EPA and CPSC
are not making progress in implementing the GHS, and the Coast Guard’s support of the International
Maritime Organization (IMO) SDS format and content is not consistent with the harmonized UN-endorced GHS SDS. These Coast Guard activities will impede emergency response to affected cargoes
carried in international waters, i.e., MARPOL Annex I cargoes and marine fuel oils, because conflicting
and non-harmonized hazard communication information will be provided to SDS users, including
chemical emergency response personnel. Coordination among agencies in the adoption of GHS should be
improved. One agency should be designated the lead agency for this purpose.

In practice, collaboration is needed with the Canadian authorities: Health Canada (WHMIS/SDSs,
pesticides, and consumer products) and Transport Canada. Similar hazard communication/SDS systems
exist in Canada with conflicting requirements, and Canada is in the process of implementing the GHS.

A uniform domestic SDS format is needed to ensure emergency response personnel and community
members have complete and consistent access to information on chemical exposures and hazards. To
accomplish domestic harmonization of the SDS requirements:

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\(^9\) Safety Data Sheets (SDS) is the international designation, and the terminology used in the GHS field, for what is often referred
to as Material Safety Data Sheets (MSDS) in the US.
1. Agencies need to have adequate resources/funding to accomplish the consistent adoption of the GHS. Agencies also need adequate resources/funding to ensure industry compliance with SDS requirements.

2. Timeline: the implementation could be phased-in over a 3-5 year transition period. Either the GHS or domestic hazard communication/SDS requirements could be used during the transition period and then the GHS requirements would be mandated.

3. OSHA should work closely with other government agencies to ensure consistent and timely implementation of the GHS and alignment to the UN-endorsed version of the GHS.

4. Within three years, EPA should align the SDS requirements in Title III of the Superfund Amendments and Reauthorization Act (SARA, also known as the Emergency Response and Community Right-to-Know Act of 1986) with the OSHA/UN endorsed version of the GHS. This would harmonize SDSs made available to state emergency response commissions, local emergency planning committees, and fire departments in order to assist in planning and response to emergencies, as well as provide members of the general public with information about chemicals used in their communities.

5. Within three years, EPA should align the FIFRA hazard communication requirements with the UN endorsed version of the GHS as far as is feasible.

6. The recent International Maritime Organization (IMO)/Coast Guard activities related to SDSs do not promote global harmonization and a consistent SDS format. Within three years, the Coast Guard should align its SDS requirements for MARPOL Annex I cargoes and marine fuel oils with the OSHA/UN endorsed version of the GHS.

7. Within three years, CPSC should align its hazard communication requirements with the UN endorsed version of the GHS as far as is feasible.

**RECOMMENDATION #8:** All first responder and first receiver organizations should be provided with a core competency curriculum of training on basic chemical emergency response, communication and coordination of the prevention, planning, response and recovery phases to ensure that there is a common foundation on which all further training can be based.

All first responders, including but not limited to fire service (both career and volunteer), law enforcement and Emergency Medical Services personnel, and first receiver organizations should possess a basic core knowledge and competency in responding to chemical emergencies. Training should include HAZMAT response, terminology, communication and incident command structure to optimize both their response capability and responder/receiver safety.

The Department of Homeland Security (DHS) and the Department of Health and Human Services (DHHS) are best suited for this as both agencies already provide multiple trainings either directly or by funded/contracted third-parties to the target receiver and responder populations. We recommend a model similar to that used to train individuals on the concepts of Incident Command System (ICS) and the National Incident Management System (NIMS). The country needs a series of successive and interrelated trainings, delivered through existing training providers and funded by federal agencies including DHS and DHHS, that all build upon each other to strengthen capacity related to chemical emergency event planning, response and clean up. Existing training partners such as the International Fire Safety and Training Association (IFRTSA) and the Rural Domestic Preparedness Consortium (RDPC) are ideal resources for the development and delivery of training.

The Emergency Management Institute (EMI) coordinated by the Federal Emergency Management Agency (FEMA) already provides multiple self study courses and would be an ideal delivery method. The Chemical Emergencies work group strongly encourages FEMA to expand the community education offerings already a part of the EMI training to include chemical awareness and basic emergency response topics geared toward the community members and the general public. By having all training coordinated
and approved through DHS, the integrity of the topics and information is ensured as is the consistency of
a common curriculum. An additional benefit would be a seamless integration with the current NIMS and
ICS training already developed and offered.

Success of this program could be measured by the decreased number of responder and receiver injuries
and deaths, as well as by better controlled responses to chemical emergencies where the impact to the
general public is reduced due to fewer incidents, or through better management of the incidents and
increased protection of the public through various protective measures. Implementation of this program
should occur within one year.

RECOMMENDATION #9: Since all emergency responses occur at the local level, the Department
of Homeland Security should partner with the Department of Health and Human Services to
provide both funding and logistical support for hands-on, real-time training, including functional
drills, to support local interagency emergency response to chemical events.

One of the common concerns and barriers to competency raised by members of the responder and
receiver communities is the inability to have the opportunity to translate a book, seminar or web-based
training into real time and real life training scenarios. While hands on full scale drills are becoming more
accepted and used in the responder and receiver communities, they often focus on scenarios built around a
large scale, mass casualty event such as a bus or plane crash or pandemic viral outbreak (pan flu). We call
upon DHS and DHHS to provide both the financial and logistical support to enable communities and the
responders and receivers who service them to plan and execute training drills directly related to chemical
emergencies in their specific areas. The chemical scenarios drilled should be relevant and related to
specific threats or chemical related hazards present in the community such as a leak at a local
manufacturing plant, train derailment, etc. This process must involve not only the responders and
receivers but also members of the business community and industry. Tribes, communities, and the general
public should be considered when planning and performing a drill and the specific needs related to
notification, evacuation and awareness education should be considered and made part of the drill.

Members of the Chemical Emergencies work group are also very aware of the need to provide continued
training, including refresher training to address complacency, and resources for all first responders,
including volunteers, at hours and locations that are accessible. DHS and DHHS should look for ways to
partner with state and local resources to ensure the highest possible participation from all members of the
responder and receiver communities. This is particularly true in rural areas where many of the intended
training participants are volunteers and hold regular full time employment elsewhere. Night and weekend
trainings are necessary to allow these members an opportunity to attend training.

Success of this program should be measured by tracking total number of personnel trained, as well as
their performance during drills, exercises, and responses to events. Implementation should occur near-
term.

RECOMMENDATION #10: OSHA, EPA, and NIOSH, together with various other response
agencies, such as the CSB and state agencies, need to develop clear, easy-to-understand chemical
emergency exposure standards or guidance values which better represent real-life risks incurred by
first responders at chemical emergencies.

Current resources used to determine the potential risk of chemical specific exposures include OSHA
Permissible Exposure Limit (PEL) standards, NIOSH Recommended Exposure Limit (REL) and Short
Term Exposure Limit (STEL) guidance values, and current American Conference of Governmental
Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) guidance. For responder/receiver members,
there is a gap between the recognized legal exposure values provided by OSHA and the exposure values
provided by other entities such as NIOSH and the ACGIH. These values were developed for specific populations and circumstances. None of these values were developed for guiding response and limiting exposures during an emergency situation. As a result of this gap, there is great concern and debate in the responder and receiver community as well as the general public regarding which exposure value is applicable in an emergency. Further work needs to develop similar protective standards which are tied directly to the current research and knowledge regarding exposure levels for community exposures.

In order to make this possible, Congress should streamline or remove the impediments that make it harder for OSHA to do this. Congress should authorize and appropriate sufficient funds for the agencies to carry out this recommendation. Congress should examine and modify, and where appropriate, remove legislative and legal, and other impediments to fulfillment of this recommendation. The Office of Information and Regulatory Affairs in the Office of Management and Budget should do everything in its power to facilitate the swift fulfillment of this recommendation.

Success of this program could be measured by reduced exposure to responders, tribal communities, and the general public as reported to various state and federal agencies, including the military. Implementation may take one to three years. OSHA shall continue to regularly evaluate standards established by this program to ensure proper protection of responders and the general public and adjust those standards as the needs arise.

RECOMMENDATION #11: There is a need for a single, user-friendly, accessible planning tool for toxicological hazard and hazard vulnerability analysis (HVA) for local response to chemical emergencies.

This database must be a tool that is assessable to responders in the field by way of laptop, PDA, mobile smart phone, etc., as well as to receivers and members of the public via the internet.

The DHS should support the National Library of Medicine (NLM) and EPA to further develop, integrate, and disseminate modern response tools including training to all district and local emergency management agencies and first responders. Existing tools such as NLM’s Wireless Information Systems for Emergency Responders (WISER) and National Oceanic and Atmospheric Administration’s (NOAA) Computer Aided Management of Emergency Operations (CAMEO) provide partial data to support a response; however, they are lacking full functionality as a complete one-stop resource. Each program has been developed as a stand-alone function; however each contains information missing from others. WISER is the preferred tool for many in the responder and receiver community and has wide name recognition. We envision an expanded set of information within WISER to fully inform and educate responders and receivers on chemical emergency response steps and needs. The NLM is currently developing an internet based web portal to assist first responders, first receivers and emergency planners to prepare for and respond to chemical emergencies. The portal Chemical Emergency Medical Management (CHEMM) is under development and is similar to the popular internet site Radiation Emergency Medical Management (REMM). This portal will interact with WISER.

Ideally these products would be able to interact with tools such as CAMEO and MARPLOT that can help both indentify and pinpoint hazards and assist with evacuation and containment modeling.

This tool should be made available to everyone, potentially through the clearinghouse discussed in Recommendation #1. A public side of this program should also be developed that allows local citizens and tribal communities access to information on known chemical storage and use sites in the community and basic education on health effects and response procedures. Information such as Material Safety Data Sheets (MSDS), local response planning via a local emergency management agency could also be linked for public use.
Training should be provided at no cost to the response community on the use and function of the program. DHS should task NLM and EPA to continuously upgrade and update the program to meet the continuously changing needs of the response community. Success of this program could be measured by the number of response agencies that download versions of this program and continuously upgrade the programs as updates and upgrades are issued by NLM and EPA. Implementation should be planned to occur within two years.

Tracking program usage, updates, and upgrades will serve as an indicator of the value to responders and the success of the training. Implementation should be able to occur within two to three years.

RECOMMENDATION #12: The federal government should provide support in concept and through funding for the ongoing development of a cadre of trained and experienced Emergency Support Function 8 (ESF 8 Health and Medical) planners and responders who will improve emergency operational capabilities, critical decision making and better integrate the tiers of private sector and government responses to public health emergencies during chemical disasters/events.

Quoting Dr. Margaret Chan of the World Health Organization: “As the determinants and consequences of health emergencies become broader, so has the range of players with a stake in the security agenda." The new watchwords are diplomacy, cooperation, transparency and preparedness.” (WHO, 2007). Planners must be educated to these ends, and prepared to plan responses that integrate the capabilities and capacities of the many diverse agencies and organizations that may be called upon to respond to a chemical emergency at any geopolitical level. The strategic objectives of such a training program should be to:

1. Educate medical, public health, and emergency management professionals to serve as ESF #8 (Health and Medical response) planners and response coordinators and to become leaders in this field.
2. Provide an experienced and ready cadre of personnel that can coordinate or assist in ESF #8 planning and can augment ESF #8 response elements at the local, tribal, state and national levels.
3. Enhance effectiveness of ESF #8 regional planning and response partners at the Local, State, Tribal, and National levels by standardization of theory and methods.
4. Create a highly competent and dynamic faculty/staff that trains organizations by coordinating or assisting in multi-jurisdictional planning and responses, as well educating students participating in the program.

Such an ESF-8 program is currently under development, in pilot testing, and is demonstrating promising results. The Yale/Tulane ESF-8 Planning and Response Program is a collaborative program bringing in diverse partners from academia, public health, civilian, governmental and military sectors and rooted in extensive after-action analysis of large scale disasters impacting health. It is also a multi-disciplinary, multi-center, graduate-level, certificate program designed to produce ESF #8 planners and responders with standardized skill sets that are consistent with evolving public policy, technologies, and best practices (Yale New Haven Center for Emergency Preparedness and Disaster Response, 2010). The program is intended to be replicable on a large scale, accessible and sustainable. The education and training provided focus on a set of base competencies. In its current format, the training already addresses planning for chemical emergencies, and includes placement/internship for practical experience to improve translation from classroom theory to actual planning practice.

For more information on the Yale/Tulane ESF-8 (Public Health and Medical Services) Planning and Response Program see http://drlatulane.org/community/groups/haiti-recovery/resources/esf-8-haiti-updates.
Through prior planning and training, leaders at the federal, tribal, state, and local levels will be better prepared to help coordinate response planning involving all stakeholders. Planners trained to optimize information flow and facilitate decision analysis through emergency operations will help to provide response plans designed to lessen the impact of chemical emergencies on public health, continuity of operations, and local economies. Through more effective planning and training, as chemical emergencies evolve and outside resources and governmental agencies arrive on scene to support operations, local responders will possess improved skills and knowledge to properly place these resources in the most efficient area of need. Additionally, as federal, tribal, and state agencies arrive, local responders will have a clearer understanding of the capabilities, resources, and needs that accompany those federal, tribal, and state responders.

The success of this program might be measured through improved plan quality, and by increased collaboration between local, state, tribal, and federal agencies that may need to respond to chemical emergencies on scene or by transporting and/or treating victims. As planners and plans bring diverse response agencies together prior to a chemical emergency, an integrated response to an actual chemical emergency may be enhanced. Implementation of the training program should occur within 1-2 years and be sustained.

V. CONCLUSION

Several key themes are consistent throughout this report. When attempting to prevent, prepare for, respond to, recover from, or mitigate chemical incidents, there is a need for the following: (1) develop improved channels of communication and better coordination among federal, state, local, and tribal agencies; (2) improve better communication and outreach to community groups and residents, including the need for a single, centralized communications system that can serve as a portal for chemical safety information that is more easily accessible, sometimes technical in nature, but available and in language that is understandable by the “lay-person”; and (3) develop improved and more extensive training and education for responders, receivers, and providers, particularly those at the local level. Realizing and recognizing the need for more resources may not always mean or translate into increased funding for agencies at the federal, state, and/or local levels. Consideration should be given to re-evaluating the distribution of current expenditures and resources available for chemical emergency prevention to determine where there is redundancy and duplication, identify priorities, and make any necessary adjustments to ensure that our citizens and communities across this country are prepared and more adequately protected from major chemical incidents. Lastly, this nation and its people will benefit most as the vast resources and energies required now and in the past for the reclamation of the environment and the care of people injured by chemical emergencies can be re-directed by our leaders toward the future protection of all by a consummate intent and a deliberate design that strives to prevent chemical emergencies, reduces their frequency and, when all else fails, responds immediately and cohesively to minimize their impact.

VI. APPENDICES

a. Full membership list

b. Acknowledgments
References


Appendix A
Full Membership List

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