

1 ***National Conversation on Public Health and Chemical Exposures***  
2 **Chemical Emergencies MASTER COPY Work Group Report**  
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5 **I. INTRODUCTION**  
6

7 The *National Conversation on Public Health and Chemical Exposures* is a collaborative project,  
8 supported by the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances  
9 and Disease Registry (ATSDR). The *National Conversation* vision is for chemicals to be used and  
10 managed in ways that are safe and healthy for all people. The project's goal is to develop an action  
11 agenda with clear, achievable recommendations that can help government agencies, tribes, and other  
12 organizations strengthen their efforts to protect the public from harmful chemical exposures. The *National*  
13 *Conversation* Leadership Council will author the action agenda, utilizing input from six project work  
14 groups, and members of the public who choose to participate in web dialogues and community  
15 conversations.  
16

17 *National Conversation* work groups were formed to research and make recommendations on the  
18 following six, cross-cutting public health and chemical exposures issues: monitoring, scientific  
19 understanding, policies and practices, chemical emergencies, serving communities, and education and  
20 communication.  
21

22 This report is the product of the **Chemical Emergencies** work group's deliberations. While issued to the  
23 *National Conversation* Leadership Council, the work group hopes that this report will be of value to  
24 others in a position to act on the recommendations contained herein.  
25

26 CDC and ATSDR worked with several groups to manage the *National Conversation*, including  
27 [RESOLVE](#), a nonprofit organization dedicated to advancing the effective use of consensus building in  
28 public decision making, the [American Public Health Association](#), the [Association of State and Territorial](#)  
29 [Health Officials](#), and the [National Association of County and City Health](#) Officials. These organizations  
30 and others helped ensure that a broad range of groups and individuals were engaged throughout this  
31 collaborative process, including government agencies, professional organizations, American  
32 Indian/Alaska Native tribes (AI/AN), community and non-profit organizations, health professionals,  
33 business and industry leaders, and members of the public.  
34

35 For more information on the *National Conversation* project, please visit  
36 [www.atsdr.cdc.gov/nationalconversation](http://www.atsdr.cdc.gov/nationalconversation).  
37

38 **a. Membership**  
39

40 Work groups were formed in 2009 following an open nomination process. Work group members were  
41 selected based on a three stage process designed to ensure that each work group would have the capacity  
42 to address and reflect different individual and organizational perspectives.<sup>1</sup>  
43

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

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<sup>1</sup>For additional information on the work group member selection process, see  
[http://www.atsdr.cdc.gov/nationalconversation/docs/membership\\_selection\\_process\\_report.pdf](http://www.atsdr.cdc.gov/nationalconversation/docs/membership_selection_process_report.pdf)

48 environmental justice concerns. Furthermore, to achieve overall balance, the team sought to compose a  
49 diverse work group in terms of work experience, perspective, gender, and geographic region.  
50

51 Andrea Kidd Taylor, Assistant Professor, Morgan State University, served as chair of the Chemical  
52 Emergencies work group, and was supported by RADM Scott Deitchman, USPHS, NCEH/ATSDR senior  
53 liaison to the Chemical Emergencies work group and Incident Manager, CDC Response to the Deepwater  
54 Horizon spill; Dana Goodson and Jennifer Peyser, Senior Mediators at RESOLVE; and Montrece  
55 McNeill Ransom, Senior Public Health Analyst, NCEH/ATSDR.  
56

57 A full list of members of the Chemical Emergencies work group can be found in Appendix A.  
58

### 59 **b. Charge**

61 After much discussion, the work group members agreed to the following charge to guide their work:  
62

63 *Chemical Emergencies: preventing, preparing for, responding to, recovering from, and*  
64 *mitigating chemical incidents.*  
65

66 *Chemical emergencies can be devastating to human and animal populations, the environment,*  
67 *and the economy. Safeguarding public health requires analyzing and eliminating vulnerabilities;*  
68 *identifying and communicating information about hazards; and reducing risks through the*  
69 *development and implementation of effective emergency prevention, preparedness, and response*  
70 *plans. While many public and private agencies have roles in chemical emergency prevention,*  
71 *preparedness and response, coordination among concerned parties has not been optimized.*  
72 *Further, there remain shortcomings, gaps, and redundancies in the chemical emergency*  
73 *preparedness system.*  
74

75 *This group will make recommendations on issues including the prevention of chemical*  
76 *emergencies, chemical infrastructure security, monitoring of chemical facilities and*  
77 *events, and the preparedness and response capabilities of 1) emergency management*  
78 *officials; 2) state and local public health agencies and their governing boards; 3)*  
79 *responders, receivers, and providers on the local, state, tribal, and federal levels; 4) the*  
80 *chemical industry; and 5) affected, or potentially affected communities .*  
81

### 82 **c. Process and Methods Used**

84 The full membership of the Chemical Emergencies work group convened nine meetings (six conference  
85 calls and three in-person meetings) toward the development of this report. Two topical subgroups were  
86 formed, and a series of subgroup meetings were held, as described below.  
87

#### 88 Caveats, Limitations, and Subgroup Formation

89  
90 The themes and concepts discussed in this report do not represent the entire range of issues  
91 related to chemical emergencies, nor do they reflect sufficiently each focus area of the charge of  
92 the Chemical Emergencies work group. Work group members relied on research and professional  
93 expertise. For example, while there are myriad issues concerning transportation related chemical  
94 emergencies, chemical infrastructure security, monitoring of chemical facilities and events, and  
95 the preparedness and response capabilities of the chemical industry, limited expertise and time  
96 constraints did not allow for a comprehensive review of each of these subjects.  
97

98 The membership of the work group decided to focus its considerations on the three themes which  
99 emerged from the Chemical Emergencies Break-out session held at the June 26, 2009 *National*  
100 *Conversation Kick-Off Meeting*: 1) training and capacity building; 2) systems and coordination,  
101 and 3) community preparedness and response.<sup>2</sup> To this end, the work group divided itself into  
102 two subgroups to accomplish the tasks outlined in the charge: 1) Training and Capacity Building  
103 and 2) Systems and Coordination. Work Group membership considered developing a third  
104 subgroup which would focus specifically on community preparedness and response. However,  
105 given the cross-cutting nature of community issues related to chemical emergencies, members  
106 decided to ensure that both the Training and Capacity Building and the Systems and Coordination  
107 Subgroups closely consider community issues related to the focus area during their deliberations.  
108

### 109 Subgroup Processes and Methods

#### 111 *Training and Capacity Building Subgroup*

113 Wanda Lizak Welles and Clark Phinney served as co-leaders of the Training and Capacity Building  
114 subgroup. Members of the subgroup included: Nathan Birnbaum, Jacque Darbonne, Jim Eaton, Joseph  
115 “Chip” Hughes, Nancy Hughes, Todd Jordan, Betsy Kagey, and Anthony Tomassoni.  
116

117 This subgroup convened eight subgroup calls and focused on reviewing current chemical response  
118 training of our nation’s emergency response and receiver communities to identify the gaps in and needs of  
119 current capacity. This subgroup’s determination of the current training status of selected response  
120 communities was based on several factors: 1) group consensus following discussion, 2) direct personal  
121 knowledge and involvement of subgroup members, 3) interviews and research performed independently  
122 by subgroup members and reported to the entire subgroup for review and discussion, 4) research and  
123 review of various existing standards and regulations from various government, regulatory and  
124 certification bodies, as well as 5) knowledge of professional and trade association literature and training  
125 curricula.  
126

127 Recognizing that the subject of emergency response training and capacity building is immense, this  
128 subgroup made a concerted effort to focus its attention and recommendations on competencies and best  
129 practices of the response community. The subgroup members sought to use a common language and base  
130 that have been well established in the responder community. For purposes of its review, the subgroup  
131 focused on first responders who are most likely to arrive on scene and provide immediate response to a  
132 chemical incident. These include but are not limited to: Fire, Police, Emergency Medical Services (EMS),  
133 and skill-specific response personnel such as Hazardous Materials (HAZMAT) Response Teams, Public  
134 Works, and industrial response teams. Within the first responder community, the fire service usually  
135 assumes lead command at a chemical emergency scene with EMS and law enforcement providing patient  
136 care and scene security, respectively. While EMS and law enforcement may have national competencies  
137 and standards for responding to chemical emergencies, those standards and competencies are lacking in  
138 hazardous materials content to adequately prepare EMS and law enforcement personnel to respond to and  
139 identify chemical emergencies.  
140

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

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<sup>2</sup> 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).

146 personnel. Therefore, the subgroup identified the training and capability needs among the members of the  
147 fire service as a priority for protecting responders, receivers, and the public during chemical emergencies.  
148 The intent was not to select only one first responder group, but to utilize this group as a prototype to  
149 identify the training and capability needs of all of the groups within first responders.

150

#### 151 *Systems and Coordination Subgroup*

152

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

156

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

165

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

171

#### 172 Terms and Definitions

173

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

180

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

185

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

191

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

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<sup>3</sup> 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](http://www.atsdr.cdc.gov/nationalconversation/work_groups.html)

194 treatment and their clothing or personal effects) (OSHA, 2007). First receivers often are the first to  
195 provide care to victims and those otherwise affected by a chemical emergency following initial field-  
196 based care that has been provided by the first responder personnel<sup>4</sup>.

197  
198 OSHA has specific requirements under 1910.120(q)(4) for what the agency refers to as “**skilled support**  
199 **personnel.**” The agency defines this group as, personnel, not necessarily an employer’s own employees,  
200 who are skilled in the operation of certain equipment, such as mechanized earth moving or digging  
201 equipment or crane and hoisting equipment, and who are needed temporarily to perform immediate  
202 emergency support work that cannot reasonably be performed in a timely fashion by an employer’s own  
203 employees, and who will be or may be exposed to the hazards at an emergency response scene.

204  
205 A **system** can be generally defined as a group of interacting, interrelated or independent elements that  
206 form a complex whole. For the purposes of the work of this subgroup, a chemical emergency system in  
207 general has parts spread across the federal, state and local sectors, depending upon the size and type of the  
208 emergency, and involves the environmental, emergency management, public safety, and public health  
209 agencies of the three levels of government. In addition, industry has a very important role to play in  
210 preparing for and responding to such emergencies (EPA, 2010). Such a system is composed of, but not  
211 limited to, the following elements:

- 212
- 213 • One or more identified chemicals with toxic or other undesirable properties
  - 214 • A source of the chemical(s)
  - 215 • Method(s) for transporting the chemical(s)
  - 216 • Facilities for storing the chemical(s)
  - 217 • Plan(s) for containing an accidental spill or discharge
  - 218 • Appropriate equipment for cleaning up (containment and recovery) an accidental discharge
  - 219 • Standards for certifying that an accidental discharge has been contained and recovered or  
220 removed
  - 221 • Facilities for storing and disposing of contaminated items (environmental or man-made)
  - 222 • Resources to control, coordinate and finance all emergency operations
  - 223 • Health care
  - 224 • Appropriate personnel
- 225

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

232  
233 For the purposes of this report, **industry** includes but is not limited to manufacturers, processors,  
234 transporters, and producers, and includes those industries involved in the production of petrochemicals,  
235 agrochemicals, pharmaceuticals, polymers, paints, oleochemicals, and other chemical products.

236  
237 **Green chemistry** can be defined as chemical research and engineering that encourages the design of  
238 products and processes that minimize the use and generation of hazardous substances.

239

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<sup>4</sup> 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.

240 A **vulnerable population**, as discussed in this document, includes those with functional or developmental  
241 needs, disabilities, and activity limitations (FEMA, 2010). It also includes those who are made vulnerable  
242 by their financial circumstances or place of residence, health, age, personal characteristics, ability to  
243 communicate effectively, and presence of chronic illness (President's Advisory Commission, 1998).

244

## 245 **II. CURRENT STATUS OF ISSUES UNDER CONSIDERATION**

246

### 247 *a. Training and Capacity Building*

248

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

256

#### 257 Chemical Emergency Training

258

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

263

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

275

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

278

279 *Awareness Level:* At a minimum, all first responders need to be trained to a HAZMAT awareness level.  
280 This would include all fire personnel, law enforcement and EMS. It would be better if they would be  
281 trained to the HAZMAT operational level so that they could deploy some actions that may reduce the  
282 impacts of a chemical emergency. International Fire Service Training Association (IFSTA) states in the  
283 "Hazardous Materials, Managing the Incident", 3<sup>rd</sup> ed., that First Responders at the awareness level are  
284 those individuals who are likely to witness or discover a hazardous substance release and who have been  
285 trained to initiate an emergency response notification process. The most common examples of first  
286 responder-awareness personnel include law enforcement and plant security personnel as well as some  
287 public works employees. Most fire department suppression personnel fall into the first responder-  
288 operations level and are those individuals who respond to releases or potential releases of hazardous  
289 substances as part of the initial response for the purpose of protecting nearby persons, property, or the  
290 environment from the effects of the release.

291  
292 *Operational Level:* All firefighting personnel should be trained to the HAZMAT operational level. This  
293 training is for those personnel who have some protective equipment and other resources that would enable  
294 them to take further defensive actions at a hazardous materials scene

295  
296 *Technician Level:* Responders working on the scene in the contamination zone for the purpose of  
297 stopping the release need to be trained to the HAZMAT technician level which includes the basic  
298 knowledge and skills to take appropriate offensive or defensive action that would require level A or level  
299 B personal protective equipment at an incident. This training needs to include monitoring for the  
300 hazardous material involved and knowledge of action levels for materials.

301  
302 Inconsistencies also exist between federal and state regulations and enforcement of training and capability  
303 requirements. The U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health  
304 Administration (OSHA) have standards which cover employees with regard to chemical exposures and  
305 HAZWOPER training standards. HAZMAT teams receive training, but are not licensed. First responder  
306 training is provided by multiple agencies, organizations and programs; however, there is no set of  
307 consistent standards which addresses the core competencies for first responder response to chemical  
308 emergencies.

309  
310 First responders do not have proper guidance as to what standards or protective levels to use during a  
311 response. OSHA standards and EPA environmental standards are not developed for responding to  
312 chemical emergencies.

313  
314 There currently exists a need for consistent training and national competency standards for responding to  
315 chemical emergencies. In addition, there need to be more options for *performance oriented* training and  
316 competency development.

317  
318 First responders may be involved in the incident before they realize a potential exposure hazard, and they  
319 may not have the proper training or resources to recognize and mitigate the presence of hazardous  
320 chemicals at a chemical emergency scene. When a chemical is not recognized or identified at the scene,  
321 contamination of responders, vehicles, equipment, and victims may carry through and contaminate the  
322 hospital emergency department, and in some cases major illness and injury, as well as death, can occur to  
323 exposed patients and responders. In areas where an incident overwhelms local support, variability of  
324 response exists based upon the capacity to respond. Coordination of HAZMAT team support may be  
325 dependent upon local funding as well as the support of regional HAZMAT teams. There is a need to  
326 continuously foster cooperation and coordination between response agencies, jurisdictions and support  
327 agencies.

328  
329 Skilled support personnel may not be readily available to assist with the response and chemical  
330 emergencies may go on for hours before actions are taken to begin mitigating the emergency. Capacity  
331 building should also include training of first receivers and the community in HAZMAT awareness.

332  
333 Hospitals currently plan and train for mass casualty events and need to be included in chemical  
334 emergency planning within their communities. Communication between first responders and health care  
335 providers needs to be strengthened so they receive adequate warning of chemical emergencies to prepare  
336 for the potential decontamination, triage, or treatment of incoming patients. Emergency Department staff  
337 as well as clinic and all hospital staff should have a level of chemical hazard awareness, with some key  
338 designated personnel receiving training to the operational level to facilitate safe and effective response  
339 and treatment.

340

341 The private sector should work with local emergency management agencies to help plan for response as  
342 well as to address inconsistencies in communication and messaging during an event. In addition, the  
343 general public needs to have an understanding of the type of response required during a chemical  
344 emergency, and the need for their compliance with instructions from law enforcement, emergency  
345 managers, and public health during such an event.  
346

347 While the fire service generally abides by stringent standards established by the National Fire Protection  
348 Association (NFPA) and follow training guidelines set by organizations such as the International Fire  
349 Service Training Association (IFSTA) (Noll & Hildebrand, 2005), and Rural Domestic Preparedness  
350 Consortium (RDPC), the current training for firefighters is not regulated under any federal mandates for  
351 content, competency testing, or certification. The only OSHA stipulation with regard to training for  
352 response to chemical emergencies is that an individual involved in responding to a chemical emergency  
353 have HAZWOPER training to the awareness level (OSHA 29 CFR 1910.120). There are no uniform  
354 nationwide criteria to define the members required in Hazardous Material Response teams (HAZMAT  
355 Teams). Furthermore there is no national certification process or licensing entity that oversees these  
356 groups.  
357

358 At the state level, individual states have differing guidelines that suggest different competency levels.  
359 Some states inconsistently use Emergency Management Agency (EMA) guidelines for training their  
360 personnel, but again there is no requirement that the responders meet these guidelines. Most municipal  
361 employees and other groups that receive federal funds are required to undergo the National Incident  
362 Management System (NIMS) training (at least levels 100, 700, 800). While this training is not incident  
363 specific, it does contribute to the overall management of incidents. The NIMS courses would qualify as an  
364 across the board type of required training that most responding firefighters would probably have.  
365

366 Extensive training classes exist both on-line and in person throughout the country. The breadth and depth  
367 of these classes covers almost every eventuality that one could expect to see in a chemical incident.  
368 However, no single source for cataloguing or evaluating available courses currently exists. No measures  
369 exist to determine a courses ability to provide students a level of competency. Without a standardized  
370 curriculum or measurable target capabilities, training is unfocused. The quality of training varies and has  
371 resulted in inconsistent and inadequate training of the workforce.  
372

373 An additional the weakness is that the level of training and experience can vary greatly from organization  
374 to organization (urban vs. rural, large vs. small, professional vs. volunteer). A national certification  
375 program should be developed that establishes minimum qualifications for responders focusing on  
376 hazardous materials response and offer that certification program to all first responders at no cost to the  
377 local entity. Currently, any attempt to require such training and certification as an unfunded mandate  
378 would only produce additional stress on already overextended public finances. As this will take some time  
379 and effort to develop, fund, and implement, it is recommended, in the interim, that emergency  
380 management ensure that training at the HAZWOPER awareness level is provided to all emergency  
381 responders. Key district or regional staff members should be required to receive training to the  
382 HAZWOPER Operations level.  
383

#### 384 ***b. Systems and Coordination***

##### 385 Barriers and Impediments

386 Specific, but widespread, impediments to success of the US chemical emergency system that must be  
387 overcome include organizations that are insular by nature, mission or past experience; interests and goals  
388 that are specific to particular organizations or types of groupings (i.e., not held in common or shared);  
389 channels of communication that are limited by custom, particular types or organizations and levels within  
390  
391

392 particular organizations; and personal factors such as ego, power, secrecy, and control that impede  
393 information sharing at times when speed is essential. Additional barriers include 1) limited funding; 2)  
394 inadequate coordination; 3) insufficient laws; 4) insufficient communications systems; and 5) insufficient  
395 data.

396  
397 1) *Limited funding:*  
398

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

408  
409 Funding is clearly needed for preparedness, but one critical challenge is *how to motivate* policy makers to  
410 make sustainable funding available. Could chemical company insurance coverage, for example, be linked  
411 to prevention and preparedness standards? Could tax breaks be used to motivate preparedness? How can  
412 increased government funding of preparedness be accomplished when existing programs and budgets are  
413 being slashed due to the ongoing economic crisis this country faces. These are questions that should be  
414 answered, but were beyond the scope of the Chemical Emergencies work group. These questions are  
415 amenable to empirical study, and work group members support the premise that efforts should be directed  
416 that way.

417  
418 2) *Inadequate Coordination:*  
419

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

428  
429 As this example demonstrates, several gaps exist regarding coordination of chemical emergency  
430 prevention, preparedness, and response. In addition to those mentioned above, significant gaps exist in  
431 jurisdictional responsibility and authority, real or perceived. Such gaps can be exacerbated by the  
432 complicated and confusing system of government agency responsibility for different aspects of a  
433 chemical emergency. In addition, local health departments (LHD), the general public, and many partners  
434 do not fully understand the LHD role in chemical emergencies. Further, poor funding of chemical  
435 emergency engagement contributes to a general lack of communication and lack of established capacity to  
436 communicate among LHDs and other relevant actors.

437  
438 When preparing for and responding to a public health emergency, there are many different groups that  
439 state health agencies need to work with to ensure that the response and recovery efforts are most efficient.  
440 State health agencies feel that coordination should first be focused on collaboration with the local health  
441 agencies, and then the state environmental agencies. Since local health agencies are “on the ground”,  
442 better in touch with what is happening in a specific community, and often the first to respond to an

443 emergency, state agencies should first focus on better coordination and training with the local health  
444 agencies in order to be more effective. Once this training and relationship is well established, the state  
445 health agencies should then focus on bringing the state, tribal (where applicable), and local environmental  
446 agencies into the partnership and strengthen collaboration with them. This will help build the network of  
447 collaboration and communication needed to be effective. In cases where environmental health staff  
448 members are located in the environmental agencies already, the relationship between the health and  
449 environmental agencies should be strengthened.

450

451 3) *Insufficient Laws:*

452 Current major federal laws governing chemical emergencies generally cover cleanup, planning, response,  
453 and risk management, but do not explicitly encourage or require facilities to assess or use alternatives that  
454 could remove the danger of a sudden chemical release. As a result, many communities host chemical  
455 hazards that may be simply unnecessary.

456

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

460

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

466

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

470

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

476

477 None of these laws regulate the vulnerability zones that chemical facilities present to surrounding  
478 communities in terms of distance, chemical intensity, or population at risk. At this time, these laws do not  
479 require companies to assess safer and more secure alternatives that can reduce or eliminate many existing  
480 chemical hazards.<sup>5</sup> However, the CFATS reauthorization currently pending approval has some language  
481 requiring companies to document that they have considered Inherently Safer Technologies (IST). Should  
482 this requirement be passed, it could have a positive impact on chemical safety; however, it is receiving a  
483 lot of push back and may be stricken.

484

485 4) *Insufficient Communication Systems and Strategies:*

---

<sup>5</sup> 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.

486  
487 Communication, or the lack thereof, is also a significant barrier to effective chemical emergency  
488 preparedness and response. Improving communication would involve establishing formal channels as  
489 well as promoting informal channels of communications. Simultaneously, communications should not be  
490 restricted to organizational peers but involve individuals with knowledge or the experience needed to  
491 address particular problems. Formal channels are well defined but require time for messages to move  
492 through them. Informal channels are very efficient and move quickly, and often integrate professionals at  
493 all levels of organizations, although they sometimes ignore titles and roles.

494  
495 5) *Insufficient Data:*

496  
497 Successful planning depends on the incorporation of appropriate measures in national and regional  
498 development planning. Its effectiveness will also depend on the availability of information on hazards,  
499 emergency risks, and the countermeasures to be taken. Barriers to achieving the vision include:

- 500
- 501 • No one repository or clearinghouse of information for planners, first responders, first receivers, or  
502 the community,
  - 503 • Little data for evidence-based planning,
  - 504 • Less funding to do chemical emergency planning than other types of planning (e.g. infectious  
505 disease),
  - 506 • Not all industries are covered by existing planning and hazard mitigation laws  
507 (RMP/PSM/CFATS),
- 508

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

515  
516 Specific data needs include:

- 517
- 518 • ***Green Chemistry research*** is needed and is currently gravely underfunded. A green chemistry  
519 approach to chemical emergencies should systematically generate solutions through the  
520 assessment and development of technological options that reduce or remove chemical hazards.  
521 This approach should not only promote expertise in government, industry, academia, and other  
522 communities of interest, but should also tap existing expertise through systematic review of and  
523 communication about safer alternatives.
  - 524
  - 525 • ***A scientific field research program*** to study actual chemical emergency hazards and responses  
526 and provide an evidence-base for best practices for prevention, planning, comprehensive training,  
527 and coordination is sorely needed. Also, while there are some steps in this direction such as the  
528 ATSDR Assessment of Chemical Exposure (ACE) program which draws on different expertise  
529 and tools within ATSDR and CDC to lend assistance when there is a chemical emergency  
530 affecting a large number of people, more is needed.
  - 531
  - 532 • ***Incident data are*** needed as it is impossible to even know what to prepare for when there is a lack  
533 of complete data on what chemical emergencies are occurring. There are disparate systems that  
534 are not working in a coordinated fashion. These include the National Response Center (NRC)  
535 Incident Reporting System, American Association of Poison Centers (AAPC) National Poison

536 Data System (NPDS), ATSDR National Toxic Substance Incidents Program (NTSIP) state  
537 surveillance system (severely cutback in recent years), the NIOSH Sentinel Events Notification  
538 System for Occupational Risk (SENSOR), Department of Transportation Hazardous Materials  
539 Information System (HMIS), EPA Risk Management Plan 5 year accident history, EPA TRI data,  
540 and States spills reporting systems among others. There are many lessons to be learned from this  
541 data as well as situational awareness, yet these systems are not maximally interacting and  
542 coordinating. When it was created, the CSB was tasked with creating an incident database that  
543 may require reporting legislation. The CSB placed an advanced notice of proposed rulemaking in  
544 the Federal Register in 2009, soliciting feedback on a regulation requiring accidental chemical  
545 releases to be reported to the CSB or to the NRC. While this feedback closed August 4, 2009, to  
546 date any intentions to proceed have yet to be announced. NTSIP does make an attempt to  
547 reconcile the disparate spill data and to gather complete and accurate data on chemical incidents.  
548 Yet it has been severely cut in recent years and can only collect accurate data for the seven states  
549 funded by ATSDR. NTSIP attempts to estimate national data by forging data sharing  
550 arrangements with other agencies to produce national estimations. This estimating activity too is  
551 limited to those agencies wishing to share their data.

552  
553 • **Commodity flow data** or materials accounting data on what is being stored or used or  
554 manufactured or transported for every locality is needed to fully understand what the risks are,  
555 what to plan for, and how to eliminate exposure risks, when feasible. For example, local  
556 emergency responders who would respond to a leak, spill, or fire, have limited knowledge of  
557 what is being transported by railroad companies through communities. Railroad authorities argue  
558 that providing this information is a matter of national security. The result is inadequate planning  
559 for potential hazardous materials derailments (Hunter 2010). While a community's "Right to  
560 Know" is well established as a principle, it has, in many instances, effectively been rescinded  
561 under the guise of national security, confidential business information, or trade secrets. This issue  
562 is even more pronounced for vulnerable and overburdened populations.

563  
564 Risk Assessment data can inform policy makers and planners regarding prioritization of funds,  
565 focus of training, research. Only by assuring a scientifically rigorously risk assessment process  
566 and education of policy and decision-makers regarding the use of risk assessments (making  
567 decisions with uncertainty) will risk assessments play an important role.

568  
569 Toxicological data is still needed regarding health risks from acute exposure so we can better  
570 understand immediate protective actions, medical countermeasures, safe clean-up measures,  
571 accurate risk communication and potential long-term effects

#### 572 573 Status of Tribal Chemical Emergency Management

574  
575 Tribes, as sovereign nations, have the authority to develop emergency management systems. Tribes may  
576 use a variety of terminology such as; LEPC (Local Emergency Planning Committee), TERC (Tribal  
577 Emergency Response Commission) to describe their emergency management systems, however it should  
578 be noted that due to a lack of capacity some tribes have not yet been able to establish such systems. It is  
579 important to remember that each tribe is unique in its status of working with the federal government.  
580 There are federally-recognized tribes, state-recognized tribes, and tribal groups who are seeking federal  
581 recognition. For federally-recognized tribes with reservation boundaries, jurisdiction does not reside with  
582 state, county, or local entities, and tribes should not be considered public entities. There are also tribes  
583 without reservation boundaries that have federal-recognition status. Additionally, individual tribal  
584 infrastructure varies; some tribes have their own fire departments and police or other form of security,  
585 some tribes will require services from adjacent entities, and some will have tribal members who  
586 voluntarily serve as first responders. Regardless of status, and similar to other entities, tribes are

587 negatively affected by the impediments and barriers highlighted above, and necessarily need access to  
588 training and funding to increase their capacity and expertise in the emergency management arena. As  
589 conveyed, opportunities to overcome system-wide impediments exist, and it is critical that any such  
590 efforts consider tribal concerns. Clear communication and coordination with tribes early and often would  
591 help to yield synergistic benefits, and more effective chemical emergency preparedness and response  
592 efforts.

593

### 594 **III. CEWG VISION OF A SUCCESSFUL SYSTEM**

595

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

601

#### 602 Prevention

603

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

609

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

620

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

629

630 In this system, all states would be covered by legislation similar to the Massachusetts Toxics Use  
631 Reduction Act (TURA), a law passed in 1989 to encourage a reduction in the amount of toxics used in  
632 Massachusetts and the amount of toxic byproducts generated (TURA, 1989). Toxics use reduction is the  
633 best method for protecting public health and the environment from hazardous pollutants. This method has  
634 decreased risk of major accidents from transportation and storage, protected workers from dangerous  
635 workplace exposures and created products that are safer for the public's use. In addition, in a successful  
636 system, there would be a federal counterpart of Toxic Use Reduction Institute (TURI) that provides  
637 training, services and grant programs to reduce toxic chemical use and advance energy and water

638 efficiency while enhancing the economic competitiveness of businesses. As a result of TURA and TURI,  
639 Texas Instruments Incorporated, Attleboro, Massachusetts reduced its reliance on trichloroethylene from  
640 850 tons a year in 1985 to less than two tons. Other victories include eliminating over two million pounds  
641 of anhydrous ammonia, and cutting its use of cyanide compounds from 35,000 pounds in 1996 to just  
642 5,000 in 2000, for which Texas Instruments received the Massachusetts Governor's Award for Excellence  
643 in Toxics Use Reduction (TURI, 2009).

644  
645 In a successful system, hazardous chemical facilities would develop knowledge and awareness of the  
646 potential harm, feasibility, costs and savings, advantages and disadvantages of best available technology  
647 options, and the government would systematically compile and disseminate knowledge of these options  
648 and foster a culture of awareness of prevention options. The choice of technology determines the  
649 associated hazards. A robust examination of prevention options would come first — before management,  
650 control, or response options that all too often prove insufficient in an emergency. Facilities that can  
651 remove or reduce chemical hazards not only reduce their own regulatory burdens, but also reduce burdens  
652 on regulatory agencies and emergency response systems. Information on chemical hazards and  
653 alternatives would be effectively organized and managed to reduce burdens on data providers as well as  
654 data users. An outreach strategy would be developed and implemented in order to disseminate  
655 information and materials to vulnerable populations within our diverse communities.

656  
657 Prevention must be implemented at the top of the hierarchy — before risk management, engineering or  
658 administrative controls, or cleanup. But aspects of prevention would be incorporated throughout the cycle  
659 of prevention, planning, preparedness, response, and recovery. For example, the CSB is an independent  
660 agency that arrives after major incidents and makes recommendations to prevent similar events in the  
661 future. The successful system could call for inspections of facilities and industries prior to an incident to  
662 identify potential problems that may lead to a chemical emergency. Localities and tribal governments  
663 would actively consider the use of zoning, fire codes, land use planning, and ordinances to mandate  
664 alternative assessments. However, planning, preparedness, response and recovery are especially needed  
665 where a hazard cannot be prevented. Ideally, local agencies and tribes would develop a working  
666 relationship with industry to foster a partnered inspection program in an attempt to prevent chemical  
667 emergencies by identifying potential problems or issues and bringing them to the attention of industry  
668 representatives. Funding for this partnership would be provided to local and tribal agencies by the federal  
669 government, demonstrating a commitment to the prevention of chemical emergencies. In addition, in  
670 order to prevent chemical emergencies, it is critical that all persons in all states have access to data which  
671 tracks chemical emergency incidents, and measures where preparedness and response efforts have been  
672 successful.

### 673 674 Planning

675  
676 A successful system from the Chemical Emergencies work group perspective will ensure that all  
677 communities, including rural and tribal communities, have adequate resources and legal authority to  
678 complete thorough vulnerability analyses, promote chemical emergency hazard reduction, have effective  
679 plans in place, and take immediate steps to mitigate any hazardous effects of a chemical emergency.  
680 Planning forms the foundation for a community's long-term strategy to reduce chemical emergency losses  
681 and break the recurring cycle. The planning process creates a framework for risk-based decision making  
682 to reduce harm to lives, property, and the economy from future chemical emergencies. Hazard reduction  
683 is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards,  
684 thereby creating safer communities and reducing loss of life and property. Adopting zoning ordinances  
685 that steer chemical facility development away from populated areas, designing roads that carry traffic  
686 away from vulnerable areas, acquiring damaged homes or businesses in areas prone to chemical releases,  
687 requiring businesses to switch to safer available alternative substances or processes are all examples of  
688 hazard mitigation strategies.

689  
690 Ideally, all federal agencies engaged in chemical emergency planning, other government, private and  
691 NGOs/VOADs would unite to create and promote a central clearinghouse for planning, i.e. databases,  
692 regulations, planning tools. A thorough review of all federal, state, and local statutes on chemical  
693 planning would also occur, followed by proposed model legislation that can be considered and enacted at  
694 the federal, state, and tribal levels. Lastly, in a successful system, the planning bodies that exist (e.g.  
695 LEPCs) will all have adequate resources, financial and informational, needed to perform their jobs  
696 properly.

#### 697 Comprehensive Training

698  
699  
700 *“Once we have good plans in place, we must invest far more in leadership training for first responders.*  
701 *We must make sure that they have all the resources and practice they need. After that, we must unleash*  
702 *them to attack a crisis with full force and authority. To paraphrase Winston Churchill in World War II,*  
703 *let us give them the tools they need so they can finish the job.”(Gergen, 2010).*

704  
705 The Chemical Emergencies work group envisions a system where, in the event that preventative measures  
706 fail, and a chemical emergency takes place, the roles and responsibilities of those involved in chemical  
707 emergency management would be planned for and clearly defined, and those charged with response  
708 would be trained to a level that would support a successful response resulting in no deaths or injuries and  
709 completed with a successful mitigation of the hazards associated with the chemical emergency. Simply  
710 put, responders and receivers would have the “tools they need so they can finish the job.” Lines of  
711 communication and structures and procedures for collaboration among relevant local, state, tribal, and  
712 federal actors would be established prior to the chemical emergency. Effective coordination of chemical  
713 emergency engagement would be accomplished because of the increased amount of and better quality of  
714 training for relevant actors, especially emergency responders.

715  
716 The 2010 Deep Water Horizon Gulf Oil Spill (Gulf oil spill) provides timely, salient examples of why  
717 training is the foundation of successful preparedness and response to chemical emergencies. One specific  
718 lesson learned from the Gulf oil spill response is that clear and repeated information and training must be  
719 provided to all contractors, clean-up workers and volunteers based on an analysis of job tasks and  
720 potential exposure to oil waste and weathered by-products. This is particularly true for first receivers who,  
721 as this report has indicated, are often inadequately trained. Risk protection messages are most effective  
722 when they are delivered often and in close proximity to the behaviors of interest.

#### 723 Coordination and Integration

724  
725  
726 In the context both of federalism and ever-increasing global inter-connectivity, effective coordination is  
727 more crucial than ever (Kouzoukas, 2007). A successful system also would be a coordinated system, with  
728 little to no unnecessary fragmentation. This would improve coordination and integration among different  
729 governmental jurisdictions, as well as across multiple sectors and disciplines (Moulton, Gottfried,  
730 Goodman, Murphy & Rawson, 2003).

731  
732 Government jurisdictions can be visualized as silos. Silos emerge as organizations expand in size, assume  
733 new responsibilities and become so focused on their own activities that they become inordinately  
734 impressed with their own importance. Silos promote exclusivity among members of various communities  
735 and allow their inhabitants to surround themselves with like-minded persons. This fosters familiarity but  
736 impedes progress in emergencies. Response efforts may require coordination across multiple levels and  
737 various silos, including local, state, tribal, and federal governments, and even with international  
738 organizations.

739

740 Silos create barriers to communication. Reducing or eliminating silos would change organizational  
741 channels of communication and speed up sharing information and addressing problems. As barriers are  
742 eliminated, new channels of communication should emerge. Communications should not be restricted to  
743 organizational peers but involve individuals with knowledge or experience that is needed to address  
744 particular problems. Integrating people at different levels in a variety of organizations enhances  
745 information exchange. The metaphor for the resulting product is a crystal lattice where energy  
746 (communications) can flow easily and without barriers (that exist in silos).

747  
748 Coordination of legal responses to chemical emergencies also may involve a horizontal dimension  
749 comprising numerous and diverse sectors, such as public health, environmental protection, emergency  
750 management, public and private health care, education, law enforcement, and the chemical industry  
751 (Moulton, Gottfried, Goodman, Murphy & Rawson, 2003).

752  
753 Lessons learned from the 2010 Gulf oil spill also underscore how critical coordination is to successful  
754 chemical emergency preparedness and response. Work group members active in the response noted that  
755 all state and federal health and safety agencies need access to all oil response areas on water and land to  
756 assure the safety of all response workers. In assuring safe operations while handling absorption booms  
757 and conducting skimming operations that take place on the water, the US Coast Guard must make sure  
758 that the right to entry to assure responder safety is not dependent on the responsible party and its  
759 contractors.

760  
761 Successful coordination for chemical emergency preparedness and response also depends on solid and  
762 established public- private relationships. For example, another key lesson learned from the Gulf oil spill is  
763 that the responsible party should establish, in conjunction with the Incident Commander, a comprehensive  
764 injury and illness reporting system to ensure full reporting of ALL safety and health related issues  
765 experienced by clean-up workers. In this particular instance, British Petroleum (BP) and public health  
766 agencies should partner in establishing diagnostic criteria and population surveillance for all responders  
767 and not rely solely on the contractors and contractor diagnosis and reporting. In addition, collaborative  
768 processes should be established to share data among the responsible party and federal, state, and tribal  
769 health agencies. Together and openly, they should gather, tabulate and analyze information related to  
770 exposure of cleanup workers to oil, degreasers, and detergents. As part of the current Job Hazard Analysis  
771 (JHA) process, the Incident Commander should require representative individual exposure monitoring of  
772 critical job tasks during the time they are working on particular response tasks. Relaxing barriers  
773 (reducing silos) and encouraging open exchanges of information (sanctioning informal channels of  
774 communication) have the potential to speed up the recovery process.

775

#### 776 IV. ACTION RECOMMENDATIONS

777

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

784

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

790 personal and community responsibilities and roles in chemical emergency prevention, preparedness and  
791 response.

792  
793 Ideally, this office would establish a National Clearinghouse for Chemical Emergencies. In part, the  
794 Office should collect, develop and disseminate toxicological informational tools. The Office would be  
795 charged with receiving reports of chemical emergencies and guiding timely response through referrals to  
796 agencies of jurisdiction (for instance through public health, first response, first receiver and poison center  
797 channels). In addition, this office would be responsible for ensuring that responders at all levels have  
798 access to real-time information on regional resources and response capabilities.

799  
800 The recommended Clearinghouse could emulate the national Poison Control System, already partially  
801 funded by the Health Resources and Services Administration (HRSA). Advantages of using the existing  
802 hotline structure for access include:

- 803
- 804 • Immediate access to medical toxicologists
  - 805 • Availability of specialists in poison information trained to collect exposure data
  - 806 • Real-time response and staff trained in risk communications with professionals/public
  - 807 • Alignment with academic resources
  - 808 • Public and professional familiarity with the existing phone number and service
  - 809 • Economies of scale
  - 810 • Robust regional knowledge of response partners and public health agencies

811  
812 A structure utilizing one or more regional poison control centers might form the backbone of the  
813 emergency reporting and response system under this Office. The availability of clinical toxicologists and  
814 other specialists may yield high quality interpretation of exposure data (often incomplete in the literature,  
815 or requiring collection from several esoteric sources), provide real-time treatment recommendations for  
816 first responders and first receivers, and direct access to the system for the public and other professionals.  
817 Poison control center personnel routinely capture, record and report emergency events, exercises and  
818 drills, and engage in related public health notifications and risk communications for the public.  
819 Mechanisms for raising awareness of services already exist, and modest enhancement in function and  
820 dedicated funding of one or more poison control centers to adopt this important function would shorten  
821 turn-around time for the creation of this Office and to endow it with functionality. Re-branding of poison  
822 control centers should be advertised to the public, chemical industry and professionals. Moreover, contact  
823 data for the Office and for the Poison Control system (1-800-222-1222) should be included on all MSDS  
824 sheets and similar chemical datasheets. In addition, web searches of terms such as “chemical emergency,”  
825 should yield this site among the first listed. The website should be easy to navigate to find the needed  
826 information and, if additional assistance is needed, there should be the option to chat with a live operator.

827  
828 Because there are many potential actors involved with preventing, preparing for, responding to,  
829 recovering from, and mitigating chemical emergencies, with varying skills, education and training, it will  
830 be difficult to develop such a clearinghouse without a unifying body. Thus this recommendation focuses  
831 first on the establishment of an Office of the Chemical Emergencies Coordinator whose goal would be to  
832 coordinate and integrate the efforts of all relevant federal government agencies.

833  
834 In addition, there are multiple local, state, tribal, and federal agencies and NGOs at all levels, who have  
835 the resources and expertise to assist communities and industries during a chemical release. Another goal  
836 of this Office would be to establish outreach and volunteer training programs to promote and support  
837 individual and community preparedness (e.g., public education, training sessions, demonstrations),  
838 including preparedness of those with functional needs. This would allow agencies and NGOs at all levels  
839 to have a centralized location to report efforts so that duplication is avoided and stakeholders can follow

840 the process. A comprehensive, easily accessible website should also be established for this service, with  
841 an eye toward providing ongoing education with regard to chemical release and its prevention.

842  
843 The Department of Health and Human Services, in coordination with the Department of Homeland  
844 Security, the National Response Center, and other appropriate agencies should be considered as key  
845 resources during the establishment of this office. The Office may draw upon other resources such as  
846 medical toxicologists, clinical toxicologists, or basic science toxicologists (available through  
847 organizations such as the American College of Medical Toxicologists, American Academy of Clinical  
848 Toxicology, American Association of Poison Control Centers, the Society of Toxicology and other  
849 organizations), the chemical industry, industrial hygienists, academia, ATSDR, OSHA, NIOSH, EPA and  
850 others.

851  
852 Although establishment of the Office of the Chemical Emergencies Coordinator could be led by DHHS, it  
853 might be more effective if it is established as an independent entity, and not under the ownership or  
854 control of any one agency. In addition, the Office of the Chemical Emergencies Coordinator should work  
855 free from political persuasion, with major funding coming from a pool of contributions by all relevant  
856 federal agencies or funding triggered by a federal emergency declaration.

857  
858 **RECOMMENDATION #2: Federal government agencies with responsibilities for providing**  
859 **applied research funding and other funding to tribes and state and local government agencies on**  
860 **chemical emergencies should require that relevant funding announcements include language**  
861 **strongly encouraging the development of partnerships with non-governmental organizations**  
862 **(NGOs) and community-based organizations, academia, labor unions, and industry.**

863  
864 Partnerships are an important tool in preventing chemical exposure and in preparing for and responding to  
865 chemical exposures. “NGOs, such as community-based, faith-based, or national organizations play vital  
866 roles in emergency management and incident response activities. NGOs that have the capacity and desire  
867 to be involved should be fully integrated into a jurisdiction’s preparedness efforts, especially in planning,  
868 training, and exercises. Furthermore, a memorandum of agreement should be established with each NGO  
869 prior to an incident so that each organization is aware of the capabilities, expectations, and roles of  
870 others.” (Institute for Homeland Security Solutions, 2005).

871  
872 Academia is a highly untapped resource in chemical emergency preparedness and response. The resources  
873 that academia brings to the table are highly trained people with expertise in chemistry, public health,  
874 environmental health, engineering, emergency management, biology, etc. Similarly, industry often has  
875 extensive knowledge of particular chemicals (either individual molecules or classes of compounds),  
876 employees with high levels of expertise and modern (state of the art and frequently expensive) equipment.  
877 Partnerships must be balanced; each partner must gain from any alliance; a win-win situation must be  
878 established.

879  
880 Optimally, partnerships with industry will focus at least in part on encouraging the use of safer  
881 alternatives and green chemistry technologies toward the prevention of chemical emergencies. Ideally,  
882 these partnerships will lead to information sharing on processes and technologies that can remove major  
883 chemical hazards.

884  
885 Where appropriate, proposals for funding that include representatives from industry, academia, and  
886 community organizations/NGOs as co-equal partners should be encouraged and incentivized, and should  
887 receive priority for acceptance and funding. Roles and responsibilities should be shared and clearly  
888 delineated to avoid enlisting and creating participants in name only. Proposals that include more than one  
889 institution or industry partner (again, as co-equal partners) should receive bonus points during the review  
890 process. External auditors (one each from the funding source and each recipient institution) should

891 annually review the structure, operating efficiency and results of any partnerships created as a result of  
892 grant-related activities. If recipients are found to be non-compliant with the terms of this  
893 recommendation, funding may be reduced or withheld.

894

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

899

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

903

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

909

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

913

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

925

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

935

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

938

939 **RECOMMENDATION #4: ATSDR and its partner agencies should establish a collaborative**  
940 **program that promotes the capacity across government agencies, industry, and academia for the**

941 **development of technical and policy expertise in green technologies that remove or reduce the**  
942 **possibility of a significant chemical emergency.**

943  
944 The principles of eliminating or vastly reducing chemical hazards are inherent in the theories supporting  
945 green chemistry. Green chemistry is a broad term with many definitions. As defined by the USEPA,  
946 Green Chemistry, also known as sustainable chemistry, is the design of chemical products and processes  
947 that reduce or eliminate the use or generation of hazardous substances, thus preventing a chemical  
948 emergency from occurring. Green Chemistry should be applied across the entire life cycle of a chemical  
949 product, including its design, manufacture, use and disposal. The Green chemistry movement seeks to  
950 align science, the environment, and economics to create more innovative, efficient and safer product and  
951 business designs. Industry should be provided regulatory incentives to assess, use, and develop such  
952 technologies.

953  
954 EPA through its Green Chemistry Program should expand their funding program to provide research  
955 grants for resolving practical problems in the implementation of technologies that design out the potential  
956 for a chemical emergency. Federal agencies should develop program coordination for the promotion of  
957 green technologies, including dedicated expertise in engineering, policy, and alternatives assessment. The  
958 results of any related research should be made available through the Clearinghouse discussed in  
959 Recommendation #1.

960  
961 **RECOMMENDATION #5: ATSDR, in collaboration with other federal government agencies,**  
962 **should develop an ongoing national program to assess and improve the health care response to**  
963 **hazardous chemical releases, and to develop an evidence base for chemical emergency planning.**

964  
965 One of ATSDR's missions is to prevent exposure and adverse health effects from unplanned releases of  
966 hazardous substances. In order to achieve this mission, ATSDR educates physicians and other health care  
967 providers and provides technical support and advice to other federal agencies, states, and local and tribal  
968 governments that respond to hazardous chemical releases. Hospital preparedness programs include  
969 preparedness planning for mass casualties and decontamination planning. In many communities, health  
970 care preparedness planning is ongoing with public health, EMS, local emergency management agencies,  
971 law enforcement, and other responders. An important component of hospital preparedness is the training  
972 and exercising of any hospital preparedness plans that are developed. Efforts toward preparing the health  
973 care sector for chemical and other emergencies stem from the federal level and, in theory, are funneled  
974 down to local public health and hospitals. As such, hospital preparedness programs should be specifically  
975 integrated with state, tribal, local planning and capacity building protocols for response to chemical  
976 emergency events.

977  
978 The passage of SARA Title III and the Nunn-Lugar Anti-Terrorism Act reflect increasing concern in  
979 recent decades about this country's preparedness to manage adverse health effects due to hazardous  
980 chemical incidents. Unfortunately, there is a lack of empirical studies that would allow for the evaluation  
981 of this country's current levels of preparedness or guide the establishment of effective preparedness  
982 programs. Limited data suggest that the level of preparedness is not adequate. Since planning is only as  
983 good as the assumptions on which it is based, it is important that planning assumptions are correct.

984  
985 To address this deficiency, ATSDR should work with its partners to develop an on-going national  
986 program that includes the following elements and the necessary sustainable funding<sup>6</sup>:

- 987  
988 1. Establishment of a regularly updated national collection of published and unpublished documents,  
989 reports, and research papers on the responses to chemical emergencies and the lessons learned

---

<sup>6</sup>Note that these elements could be extrapolated to all-hazards preparedness as well.

990 from them that would be made available to planners, policy-makers, practitioners, and the public.  
991 This closely relates to the clearinghouse mentioned in Recommendation #1.

- 992 2. Establishment of a standing national, rapid-response field chemical emergency research team that  
993 would mobilize quickly to gather data on the operational lessons learned and best practices from  
994 the responses to chemical emergencies. This can be in conjunction with the ATSDR ACE teams  
995 that collect data on chemical emergency exposures and outcomes, short and long-term. It is  
996 important to collect information from multiple events to identify common trends and patterns and  
997 to generate a large enough sampling to analyze.
- 998 3. Utilization of the data from 1 and 2, to establish evidence-based criteria for effective chemical  
999 emergency preparedness that can be housed in a clearinghouse such as the one proposed in  
1000 recommendation #1.
- 1001 4. Using the criteria from 3, carry out regular national randomized surveys of chemical response  
1002 organizations and institutions to assess their levels of preparedness. (One might consider this a  
1003 national “preparedness surveillance system.”)
- 1004 5. Without an understanding of the chemical emergencies that are occurring and their effects, it is  
1005 impossible to effectively plan for a chemical emergency. Surveillance data on chemical  
1006 emergencies needs to be expanded. This can be done by providing funds to additional NTSIP  
1007 states and by promoting the sharing of existing chemical emergency incident data.
- 1008 6. Based on the information generated from the above elements, generate recommendations for  
1009 chemical emergency/disaster preparedness that can be included in training materials for first  
1010 responders and receivers.

1011  
1012 **Recommendation #6: Congress should pass a law requiring facilities to assess, and in certain cases**  
1013 **to implement, safer and more secure alternatives that can reduce or eliminate the possibility of**  
1014 **toxic gas releases.**<sup>7</sup>

1015 In the body of this report, it was identified that there are laws addressing risk management preparedness  
1016 and response, but no law addressing primary prevention of chemical emergencies. The House of  
1017 Representatives has acted to fill this gap by passing H.R. 2868, The Chemical and Water Security Act of  
1018 2009.<sup>8</sup> The act would require facilities to assess, and in certain cases to implement, safer and more  
1019 secure alternatives that can reduce or eliminate the possibility of acute release of toxic inhalable gases.  
1020 The legislation authorizes funds for implementation. It assigns authority over private sector facilities to  
1021 DHS under the existing Chemical Facility Anti-Terrorism Standard. It assigns authority over Drinking  
1022 Water Facilities to EPA under the Safe Drinking Water Act and for wastewater facilities to EPA under  
1023 the Clean Water Act. For this legislation to be implemented successfully, it will require cooperation  
1024 between these agencies and other agencies with relevant expertise. While we do not take a position on  
1025 this particular House bill, we believe the Senate should pass similar legislation and the President should  
1026 sign it.

1027  
1028 The only certain way to protect our communities is to remove the possibility of a toxic gas release by  
1029 converting facilities to safer, more secure alternative technologies. There are many existing off-the-shelf  
1030 remedies that can be used. Bleach plants can reduce danger to employees and surrounding populations by  
1031 generating chlorine on-site without rail shipment and bulk storage. Water utilities could convert from  
1032 chlorine and/or sulfur dioxide gas liquid bleach or ultraviolet light. Developing commercial scale solid  
1033 acid catalyst alkylation methods could provide a new generation of refinery technology. The primary  
1034 criterion for substitution should be to reduce the number of people potentially exposed to acutely toxic  
1035 gases. Additional criteria should be to reduce the probability of release and/or to reduce the toxicity of the  
1036 material that would potentially be released.

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<sup>7</sup> Work Group Member Derek Swick of the American Petroleum Institute does not support recommendation #6.

<sup>8</sup> As of the writing of this report, a law has been introduced but not passed.

1037 Although primary prevention will not be possible in every case and some risks will always need to be  
1038 managed, prepared for and responded to, the above examples of existing, off-the-shelf technologies  
1039 indicate that there are many opportunities for primary prevention that have not yet been realized. A law  
1040 requiring assessing opportunities for, and in some cases, implementing safer technologies will lead to  
1041 much risk reduction.

1042 **Recommendation #7: The EPA, OSHA, CPSC, DOT, and the US Coast Guard should be mandated**  
1043 **by law to follow the United Nation's (UN) Globally Harmonized System of Classification and**  
1044 **Labeling of Chemicals (GHS) safety data sheet (SDS<sup>9</sup>) format and content requirements for**  
1045 **providing information on chemicals.**

1046  
1047 Requirements for providing information about the hazards of chemicals and their safe use and handling  
1048 are inconsistent among agencies both domestically and internationally. The diverse and sometimes  
1049 conflicting domestic and international requirements can create confusion among those who seek to use  
1050 hazard information. SDSs may include symbols and hazard statements that are unfamiliar to readers or  
1051 not well understood, and information may not be easy to find. In (chemical) emergencies, easy access to  
1052 information that is readily understandable is a critical response factor.

1053  
1054 The GHS is a common and coherent approach to defining and classifying hazards and to communicating  
1055 information on labels and SDSs. To address the needs of the diverse audiences for SDSs, a standardized  
1056 format was seen as a way to make the information on SDSs easier for users to find, segregate technical  
1057 sections of the document from more basic elements, facilitate computerized data retrieval systems, and  
1058 simplify training for those who use SDSs. The GHS establishes a 16-section SDS format for presenting  
1059 information with standardized headings for the SDS sections. In the recommended GHS SDS format, the  
1060 information of greatest concern to emergency responders is featured at the beginning of the SDS,  
1061 including information on composition, fire-fighting, and accidental release measures.

1062  
1063 The GHS is in the process of being implemented globally and domestically. The European Union has  
1064 adopted all of the GHS classifications, including ecotoxicity, and the United States should do the same.  
1065 DOT has essentially implemented the necessary changes to align with the GHS, and OSHA has published  
1066 the NPRM to align its current Hazard Communication Standard with the GHS. However, EPA and CPSC  
1067 are not making progress in implementing the GHS, and the Coast Guard's support of the International  
1068 Maritime Organization (IMO) SDS format and content is not consistent with the harmonized UN-  
1069 endorsed GHS SDS. These Coast Guard activities will impede emergency response to affected cargoes  
1070 carried in international waters, i.e., MARPOL Annex I cargoes and marine fuel oils, because conflicting  
1071 and non-harmonized hazard communication information will be provided to SDS users, including  
1072 chemical emergency response personnel. Coordination among agencies in the adoption of GHS should be  
1073 improved. One agency should be designated the lead agency for this purpose.

1074  
1075 In practice, collaboration is needed with the Canadian authorities: Health Canada (WHMIS/SDSs,  
1076 pesticides, and consumer products) and Transport Canada. Similar hazard communication/SDS systems  
1077 exist in Canada with conflicting requirements, and Canada is in the process of implementing the GHS.

1078  
1079 A uniform domestic SDS format is needed to ensure emergency response personnel and community  
1080 members have complete and consistent access to information on chemical exposures and hazards. To  
1081 accomplish domestic harmonization of the SDS requirements:

1082

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<sup>9</sup> 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.

- 1083 1. Agencies need to have adequate resources/funding to accomplish the consistent adoption of the  
1084 GHS. Agencies also need adequate resources/funding to ensure industry compliance with SDS  
1085 requirements.
- 1086 2. Timeline: the implementation could be phased-in over a 3-5 year transition period. Either the  
1087 GHS or domestic hazard communication/SDS requirements could be used during the transition  
1088 period and then the GHS requirements would be mandated.
- 1089 3. OSHA should work closely with other government agencies to ensure consistent and timely  
1090 implementation of the GHS and alignment to the UN-endorsed version of the GHS.
- 1091 4. Within three years, EPA should align the SDS requirements in Title III of the Superfund  
1092 Amendments and Reauthorization Act (SARA, also known as the Emergency Response and  
1093 Community Right-to-Know Act of 1986) with the OSHA/UN endorsed version of the GHS. This  
1094 would harmonize SDSs made available to state emergency response commissions, local  
1095 emergency planning committees, and fire departments in order to assist in planning and response  
1096 to emergencies, as well as provide members of the general public with information about  
1097 chemicals used in their communities.
- 1098 5. Within three years, EPA should align the FIFRA hazard communication requirements with the  
1099 UN endorsed version of the GHS as far as is feasible.
- 1100 6. The recent International Maritime Organization (IMO)/Coast Guard activities related to SDSs do  
1101 not promote global harmonization and a consistent SDS format. Within three years, the Coast  
1102 Guard should align its SDS requirements for MARPOL Annex I cargoes and marine fuel oils  
1103 with the OSHA/UN endorsed version of the GHS.
- 1104 7. Within three years, CPSC should align its hazard communication requirements with the UN  
1105 endorsed version of the GHS as far as is feasible.  
1106

1107 **RECOMMENDATION #8: All first responder and first receiver organizations should be provided**  
1108 **with a core competency curriculum of training on basic chemical emergency response,**  
1109 **communication and coordination of the prevention, planning, response and recovery phases to**  
1110 **ensure that there is a common foundation on which all further training can be based.**  
1111

1112 All first responders, including but not limited to fire service (both career and volunteer), law enforcement  
1113 and Emergency Medical Services personnel, and first receiver organizations should possess a basic core  
1114 knowledge and competency in responding to chemical emergencies. Training should include HAZMAT  
1115 response, terminology, communication and incident command structure to optimize both their response  
1116 capability and responder/receiver safety.  
1117

1118 The Department of Homeland Security (DHS) and the Department of Health and Human Services  
1119 (DHHS) are best suited for this as both agencies already provide multiple trainings either directly or by  
1120 funded/contracted third-parties to the target receiver and responder populations. We recommend a model  
1121 similar to that used to train individuals on the concepts of Incident Command System (ICS) and the  
1122 National Incident Management System (NIMS). The country needs a series of successive and interrelated  
1123 trainings, delivered through existing training providers and funded by federal agencies including DHS and  
1124 DHHS, that all build upon each other to strengthen capacity related to chemical emergency event  
1125 planning, response and clean up. Existing training partners such as the International Fire Safety and  
1126 Training Association (IFTSA) and the Rural Domestic Preparedness Consortium (RDPC) are ideal  
1127 resources for the development and delivery of training.  
1128

1129 The Emergency Management Institute (EMI) coordinated by the Federal Emergency Management  
1130 Agency (FEMA) already provides multiple self study courses and would be an ideal delivery method. The  
1131 Chemical Emergencies work group strongly encourages FEMA to expand the community education  
1132 offerings already a part of the EMI training to include chemical awareness and basic emergency response  
1133 topics geared toward the community members and the general public. By having all training coordinated

1134 and approved through DHS, the integrity of the topics and information is ensured as is the consistency of  
1135 a common curriculum. An additional benefit would be a seamless integration with the current NIMS and  
1136 ICS training already developed and offered.

1137  
1138 Success of this program could be measured by the decreased number of responder and receiver injuries  
1139 and deaths, as well as by better controlled responses to chemical emergencies where the impact to the  
1140 general public is reduced due to fewer incidents, or through better management of the incidents and  
1141 increased protection of the public through various protective measures. Implementation of this program  
1142 should occur within one year.

1143  
1144 **RECOMMENDATION #9: Since all emergency responses occur at the local level, the Department**  
1145 **of Homeland Security should partner with the Department of Health and Human Services to**  
1146 **provide both funding and logistical support for hands-on, real-time training, including functional**  
1147 **drills, to support local interagency emergency response to chemical events.**

1148  
1149 One of the common concerns and barriers to competency raised by members of the responder and  
1150 receiver communities is the inability to have the opportunity to translate a book, seminar or web-based  
1151 training into real time and real life training scenarios. While hands on full scale drills are becoming more  
1152 accepted and used in the responder and receiver communities, they often focus on scenarios built around a  
1153 large scale, mass casualty event such as a bus or plane crash or pandemic viral outbreak (pan flu). We call  
1154 upon DHS and DHHS to provide both the financial and logistical support to enable communities and the  
1155 responders and receivers who service them to plan and execute training drills directly related to chemical  
1156 emergencies in their specific areas. The chemical scenarios drilled should be relevant and related to  
1157 specific threats or chemical related hazards present in the community such as a leak at a local  
1158 manufacturing plant, train derailment, etc. This process must involve not only the responders and  
1159 receivers but also members of the business community and industry. Tribes, communities, and the general  
1160 public should be considered when planning and performing a drill and the specific needs related to  
1161 notification, evacuation and awareness education should be considered and made part of the drill.

1162  
1163 Members of the Chemical Emergencies work group are also very aware of the need to provide continued  
1164 training, including refresher training to address complacency, and resources for all first responders,  
1165 including volunteers, at hours and locations that are accessible. DHS and DHHS should look for ways to  
1166 partner with state and local resources to ensure the highest possible participation from all members of the  
1167 responder and receiver communities. This is particularly true in rural areas where many of the intended  
1168 training participants are volunteers and hold regular full time employment elsewhere. Night and weekend  
1169 trainings are necessary to allow these members an opportunity to attend training.

1170  
1171 Success of this program should be measured by tracking total number of personnel trained, as well as  
1172 their performance during drills, exercises, and responses to events. Implementation should occur near-  
1173 term.

1174  
1175 **RECOMMENDATION #10: OSHA, EPA, and NIOSH, together with various other response**  
1176 **agencies, such as the CSB and state agencies, need to develop clear, easy-to-understand chemical**  
1177 **emergency exposure standards or guidance values which better represent real-life risks incurred by**  
1178 **first responders at chemical emergencies.**

1179  
1180 Current resources used to determine the potential risk of chemical specific exposures include OSHA  
1181 Permissible Exposure Limit (PEL) standards, NIOSH Recommended Exposure Limit (REL) and Short  
1182 Term Exposure Limit (STEL) guidance values, and current American Conference of Governmental  
1183 Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) guidance. For responder/receiver members,  
1184 there is a gap between the recognized legal exposure values provided by OSHA and the exposure values

1185 provided by other entities such as NIOSH and the ACGIH. These values were developed for specific  
1186 populations and circumstances. None of these values were developed for guiding response and limiting  
1187 exposures during an emergency situation. As a result of this gap, there is great concern and debate in the  
1188 responder and receiver community as well as the general public regarding which exposure value is  
1189 applicable in an emergency. Further work needs to develop similar protective standards which are tied  
1190 directly to the current research and knowledge regarding exposure levels for community exposures.

1191  
1192 In order to make this possible, Congress should streamline or remove the impediments that make it harder  
1193 for OSHA to do this. Congress should authorize and appropriate sufficient funds for the agencies to carry  
1194 out this recommendation. Congress should examine and modify, and where appropriate, remove  
1195 legislative and legal, and other impediments to fulfillment of this recommendation. The Office of  
1196 Information and Regulatory Affairs in the Office of Management and Budget should do everything in its  
1197 power to facilitate the swift fulfillment of this recommendation.

1198  
1199 Success of this program could be measured by reduced exposure to responders, tribal communities, and  
1200 the general public as reported to various state and federal agencies, including the military. Implementation  
1201 may take one to three years. OSHA shall continue to regularly evaluate standards established by this  
1202 program to ensure proper protection of responders and the general public and adjust those standards as the  
1203 needs arise.

1204

1205 **RECOMMENDATION #11: There is a need for a single, user-friendly, accessible planning tool for**  
1206 **toxicological hazard and hazard vulnerability analysis (HVA) for local response to chemical**  
1207 **emergencies.**

1208

1209 This database must be a tool that is assessable to responders in the field by way of laptop, PDA, mobile  
1210 smart phone, etc., as well as to receivers and members of the public via the internet.

1211

1212 The DHS should support the National Library of Medicine (NLM) and EPA to further develop, integrate,  
1213 and disseminate modern response tools including training to all district and local emergency management  
1214 agencies and first responders. Existing tools such as NLM's Wireless Information Systems for  
1215 Emergency Responders (WISER) and National Oceanic and Atmospheric Administration's (NOAA)  
1216 Computer Aided Management of Emergency Operations (CAMEO) provide partial data to support a  
1217 response; however, they are lacking full functionality as a complete one-stop resource. Each program has  
1218 been developed as a stand-alone function; however each contains information missing from others.  
1219 WISER is the preferred tool for many in the responder and receiver community and has wide name  
1220 recognition. We envision an expanded set of information within WISER to fully inform and educate  
1221 responders and receivers on chemical emergency response steps and needs. The NLM is currently  
1222 developing an internet based web portal to assist first responders, first receivers and emergency planners  
1223 to prepare for and respond to chemical emergencies. The portal Chemical Emergency Medical  
1224 Management (CHEMM) is under development and is similar to the popular internet site Radiation  
1225 Emergency Medical Management (REMM). This portal will interact with WISER.

1226

1227 Ideally these products would be able to interact with tools such as CAMEO and MARPLOT that can help  
1228 both identify and pinpoint hazards and assist with evacuation and containment modeling.

1229

1230 This tool should be made available to everyone, potentially through the clearinghouse discussed in  
1231 Recommendation #1. A public side of this program should also be developed that allows local citizens  
1232 and tribal communities access to information on known chemical storage and use sites in the community  
1233 and basic education on health effects and response procedures. Information such as Material Safety Data  
1234 Sheets (MSDS), local response planning via a local emergency management agency could also be linked  
1235 for public use.

1236  
1237 Training should be provided at no cost to the response community on the use and function of the program.  
1238 DHS should task NLM and EPA to continuously upgrade and update the program to meet the  
1239 continuously changing needs of the response community. Success of this program could be measured by  
1240 the number of response agencies that download versions of this program and continuously upgrade the  
1241 programs as updates and upgrades are issued by NLM and EPA. Implementation should be planned to  
1242 occur within two years.

1243  
1244 Tracking program usage, updates, and upgrades will serve as an indicator of the value to responders and  
1245 the success of the training. Implementation should be able to occur within two to three years.  
1246

1247 **RECOMMENDATION #12: The federal government should provide support in concept and**  
1248 **through funding for the ongoing development of a cadre of trained and experienced Emergency**  
1249 **Support Function 8 (ESF 8 Health and Medical) planners and responders who will improve**  
1250 **emergency operational capabilities, critical decision making and better integrate the tiers of private**  
1251 **sector and government responses to public health emergencies during chemical disasters/events.**  
1252

1253 Quoting Dr. Margaret Chan of the World Health Organization: “*As the determinants and consequences of*  
1254 *health emergencies become broader, so has the range of players with a stake in the security agenda.*” *The*  
1255 *new watchwords are diplomacy, cooperation, transparency and preparedness.*” (WHO, 2007). Planners  
1256 must be educated to these ends, and prepared to plan responses that integrate the capabilities and  
1257 capacities of the many diverse agencies and organizations that may be called upon to respond to a  
1258 chemical emergency at any geopolitical level. The strategic objectives of such a training program should  
1259 be to:

- 1260
- 1261 1. Educate medical, public health, and emergency management professionals to serve as ESF #8  
1262 (Health and Medical response) planners and response coordinators and to become leaders in this  
1263 field.
  - 1264 2. Provide an experienced and ready cadre of personnel that can coordinate or assist in ESF #8  
1265 planning and can augment ESF #8 response elements at the local, tribal, state and national levels.
  - 1266 3. Enhance effectiveness of ESF #8 regional planning and response partners at the Local, State,  
1267 Tribal, and National levels by standardization of theory and methods.
  - 1268 4. Create a highly competent and dynamic faculty/staff that trains organizations by coordinating or  
1269 assisting in multi-jurisdictional planning and responses, as well educating students participating  
1270 in the program.

1271  
1272 Such an ESF-8 program is currently under development, in pilot testing, and is demonstrating promising  
1273 results. The Yale/Tulane ESF-8 Planning and Response Program is a collaborative program bringing in  
1274 diverse partners from academia, public health, civilian, governmental and military sectors and rooted in  
1275 extensive after-action analysis of large scale disasters impacting health.<sup>10</sup> It is also a multi-disciplinary,  
1276 multi-center, graduate-level, certificate program designed to produce ESF #8 planners and responders  
1277 with standardized skill sets that are consistent with evolving public policy, technologies, and best  
1278 practices (Yale New Haven Center for Emergency Preparedness and Disaster Response, 2010). The  
1279 program is intended to be replicable on a large scale, accessible and sustainable. The education and  
1280 training provided focus on a set of base competencies. In its current format, the training already addresses  
1281 planning for chemical emergencies, and includes placement/internship for practical experience to improve  
1282 translation from classroom theory to actual planning practice.  
1283

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<sup>10</sup>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>.

1284 Through prior planning and training, leaders at the federal, tribal, state, and local levels will be better  
1285 prepared to help coordinate response planning involving all stakeholders. Planners trained to optimize  
1286 information flow and facilitate decision analysis through emergency operations will help to provide  
1287 response plans designed to lessen the impact of chemical emergencies on public health, continuity of  
1288 operations, and local economies. Through more effective planning and training, as chemical emergencies  
1289 evolve and outside resources and governmental agencies arrive on scene to support operations, local  
1290 responders will possess improved skills and knowledge to properly place these resources in the most  
1291 efficient area of need. Additionally, as federal, tribal, and state agencies arrive, local responders will have  
1292 a clearer understanding of the capabilities, resources, and needs that accompany those federal, tribal, and  
1293 state responders.

1294  
1295 The success of this program might be measured through improved plan quality, and by increased  
1296 collaboration between local, state, tribal, and federal agencies that may need to respond to chemical  
1297 emergencies on scene or by transporting and/or treating victims. As planners and plans bring diverse  
1298 response agencies together prior to a chemical emergency, an integrated response to an actual chemical  
1299 emergency may be enhanced. Implementation of the training program should occur within 1-2 years and  
1300 be sustained.

1301

## 1302 **V. CONCLUSION**

1303

1304 Several key themes are consistent throughout this report. When attempting to prevent, prepare for,  
1305 respond to, recover from, or mitigate chemical incidents, there is a need for the following: (1) develop  
1306 improved channels of communication and better coordination among federal, state, local, and tribal  
1307 agencies; (2) improve better communication and outreach to community groups and residents, including  
1308 the need for a single, centralized communications system that can serve as a portal for chemical safety  
1309 information that is more easily accessible, sometimes technical in nature, but available and in language  
1310 that is understandable by the “lay-person”; and (3) develop improved and more extensive training and  
1311 education for responders, receivers, and providers, particularly those at the local level. Realizing and  
1312 recognizing the need for more resources may not always mean or translate into increased funding for  
1313 agencies at the federal, state, and/or local levels. Consideration should be given to re-evaluating the  
1314 distribution of current expenditures and resources available for chemical emergency prevention to  
1315 determine where there is redundancy and duplication, identify priorities, and make any necessary  
1316 adjustments to ensure that our citizens and communities across this country are prepared and more  
1317 adequately protected from major chemical incidents. Lastly, this nation and its people will benefit most as  
1318 the vast resources and energies required now and in the past for the reclamation of the environment and  
1319 the care of people injured by chemical emergencies can be re-directed by our leaders toward the future  
1320 protection of all by a consummate intent and a deliberate design that strives to prevent chemical  
1321 emergencies, reduces their frequency and, when all else fails, responds immediately and cohesively to  
1322 minimize their impact.

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## 1324 **VI. APPENDICES**

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1326 a. Full membership list

1327 b. Acknowledgments

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**Appendix A**  
**Full Membership List**

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1400 Leadership Team

1401 Andrea Kidd Taylor, Morgan State University, *chair*  
1402 Scott Deitchman, NCEH/ATSDR *senior liaison*  
1403 Dana Goodson, RESOLVE *facilitator*  
1404 Jennifer Peyser, RESOLVE *facilitator*  
1405 Montrece Ransom, NCEH/ATSDR *staff*  
1406

1407 Members

1408 Bill Benerman Denver Department of Environmental Health  
1409 Nathan Birnbaum, USDA Animal and Plant Health Inspection Service  
1410 Kathleen Curtis, Clean New York  
1411 Jacque Darbonne, Harris County Public Health & Environmental Services  
1412 James Eaton, Maine Health and Environmental Testing Lab  
1413 Fleming Fallon, Bowling Green State University  
1414 Joseph Hughes, National Institute of Environmental Health Sciences  
1415 Nancy Hughes, American Nurses Association  
1416 James James, American Medical Association  
1417 Todd Jordan, Occupational Safety and Health Administration  
1418 Betsy Kagey, Division of Emergency Preparedness and Response, Georgia Department of Community  
1419 Health  
1420 Mark Kirk, U.S. Department of Homeland Security  
1421 Jacqueline McBride, Love, Peace and Prosperity International, Inc  
1422 Maureen Orr, Agency for Toxic Substances and Disease Registry  
1423 Paul Orum, NGO Chemical Safety Consultant  
1424 Clark Phinney, Maine Oxy  
1425 Darius Sivin, International Union, UAW  
1426 Syndi Smallwood, Pechanga Band of Luiseno Indians  
1427 Derek Swick, American Petroleum Institute  
1428 Connie Biemiller Thomas, South Fulton and Fayette Community Task Force  
1429 Anthony Tomassoni, Yale University School of Medicine  
1430 Wanda Lizak Welles, New York State Department of Health  
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**Appendix B**  
**Acknowledgments**

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