CONDUCT AN INVENTORY OF CHEMICAL SITE HAZARDS USING COMMUNITY RIGHT TO KNOW LAWS

A) Where are the chemical production and storage sites in our community?

In order to assess the vulnerabilities posed to the community by each chemical storage, usage or production facility, concerned citizens and officials can use information available under existing Right to Know and chemical accident preparedness laws to prepare a local inventory.

The Right to Know laws are the essential tool of local citizens and government officials in gathering the baseline of information needed concerning local facilities. The **1986 Emergency Planning and Community Right to Know Act**, required facilities to report to federal, state and local officials regarding the amounts of hazardous chemicals at their sites. These facility reports are known as **annual chemical inventories**. The law also created **Local Emergency Planning Committees** (LEPC's) to develop emergency response plans in the event of releases of chemicals indicated by the facilities' inventories. As a result of this process, LEPC's were required to generate plans that include an inventory of facilities utilizing significant quantities of extremely hazardous materials in their area, transportation routes likely to be used by those facilities, and other facilities (e.g. hospitals, schools, or natural gas facilities) that are subject to added risk due to their proximity to the facilities.[1] Therefore, the first stage of reassessment may include initially looking at what the LEPC has done so far to assess community vulnerabilities.

Local emergency response planners should have already compiled a list of vulnerable facilities and transportation issues. Examining their work is a good first step to developing an inventory.

However, not every LEPC has complied with this requirement, and even if the emergency plan was prepared, it may not give you sufficient information to identify the largest vulnerabilities. The next place for the community reassessment process to turn is individual facilities' annual chemical inventory forms, which should be available at the LEPC, the local fire department, or the State Emergency Response Commission (SERC).

The basic annual inventory reports are known as "Tier One" reports, and provide aggregate information, by chemical category, about the amount and location of hazardous chemicals stored at the facility. This information is only listed according to types of chemicals, for example corrosive materials, rather than the specific chemical names. Some 860,000 facilities across the U.S. are required to submit this information to local emergency planning committees, state emergency response commissions, and local fire departments.

The EPCRA inventories cover many thousands of chemicals.

More detailed information on the amount of 600 specific chemicals stored on-site is available through the Toxic Release Inventory, an EPA-maintained database that discloses toxic emissions as well as toxics stored at about 23,000 facilities across the US.

Still more detailed information can be requested from the facility under EPCRA by the LEPC, SERC or fire department. When requested, the facility must provide more detailed "Tier Two" information, detailing individual chemicals rather than categories. This more detailed information may also be available to concerned citizens upon written request to the LEPC or SERC. Local citizens can ask any of those entities to obtain this information on their behalf, though it is discretionary for the officials to do so.

By reviewing chemical inventories, you can at

TABLE 1

EXAMPLE OF EPCRA CHEMICAL INVENTORY DATA ON AMOUNTS OF EXTREMELY HAZARDOUS SUBSTANCES STORED AT A FACILITY

How identical substances are described in either Tier 1 or Tier 2 data

TIER OF DATA	HOW CHEMICALS ARE DESCRIBED	QUANTITY
Tier One Data	Corrosive compounds	3,000,000 lbs.
Tier Two Data	Hydrochloric acid	300,000 lbs.
	Sulfuric acid	2,000,000 lbs.
	Chlorine	700,000 lbs.

TABLE 2

POINTS OF VULNERABILITY

Industry Sectors Reporting the Most Processes Containing Extremely Hazardous Substances

	NUMBER OF PROCESSES INVOLVING EXTREMELY HAZARDOUS SUBSTANCES REPORTED IN THE US:
Farm supplies wholesalers	4409
Water supply and irrigation	2059
Sewage treatment	1646
Petroleum refineries	1609
Basic organic chemical manufacturers	655
Chemical and allied products wholesalers	607
Refrigerated warehousing and storage facilities	549
Natural gas liquid extraction	533
Plastics material and resin manufacturing	418
All other basic inorganic chemical manufacturing	358

Data generated under EPA's Risk Management Planning program indicate that the largest number of processes containing extremely hazardous substances in the US occur in a few sectors. RMP data exclude gasoline.

TABLE 3

EXAMPLES OF INFORMATION SOURCES REGARDING LOCAL FACILITIES FOR CHEMICAL SECURITY AND SAFETY

TYPE OF INFORMATION	NAME OF SOURCE	LOCATION
Contacting our local emergency planning committee	National LEPC list	http://www.epa.gov/ceppo/lepclist.htm
Hazards of specific local facilities: worst case scenarios and accident history over five years	RMP database, on internet	http://www.rtknet.org/rtkdata.html
Assessing School and hospital vulnerability, determining whether site is within toxic chemical vulnerability zones	EPA's Vulnerable Zone Indicator System	www.epa.gov/ceppo/vzis.htm type in address to ascertain whether vulnerable
Summary data on categories of extremely hazardous chemicals stored at site	"Tier One Data" under EPCRA	Local emergency planning committee, fire department or state emergency response commission
Detailed data on amounts of each extremely hazardous chemical stored at site	"Tier Two Data" under EPCRA	Local emergency planning committee, state emergency response commissionor fire department (requires separate request)
For each facility, a description of worst case scenarios, offsite consequences, andprevention and response plans	Risk Management Plan Summary	www.epa.gov/ceppo/readingroom.htm Possibly also through Local Emergency Planning Committee
Analysis of process hazards and internal strategies such as training, add-on technologies, etc.	EPA and OSHA requirements for detailed analysis by the facility	Held by company onsite - accessible to employees and unions, LEPCs
Changes in process design and capacities	OSHA Management of Change info	Held by company onsite - accessible to employees and unions, LEPCs
Annual toxic pollution emissions report and amounts of certain substances stored onsite	Toxic Release Inventory database	www.scorecard.org and www.rtknet.org
Hazards and precautions related to specific chemicals	Material Safety Data Sheets	Povided by facilities to LEPC and fire departments
Map of our community showing hospitals, schools, pollution emitters, waste sites	EPA's Enviromapper website	http://maps.epa.gov/ enviromapper/
Past chemical spills and accidents	Chemical Spill Reports	www.nrc.uscg.mil/foia.htm and www.rtknet.org

a minimum generate a list of local facilities of concern. You may need to come back later and fill in information gaps - e.g. specific chemical identities rather than just the large categories. When you have enough information to identify priority facilities, you should move on to the next step, identifying transportation issues of concern.

B) What are the dangers of hazardous materials being transported through our community?

Materials in transit present special concerns and vulnerabilities. Even a terrorist organization could set up a new trucking company in the U.S. or Canada, and obtain operating authority in the U.S. for an 18-month period without any federal or state safety review or security check simply by paying a fee. After obtaining a hazardous materials endorsement for a commercial drivers license by passing a written exam, drivers can legally drive semi-trailers carrying up to 80,000 pounds of hazardous materials on nearly all roads and through all cities in the U.S.[2]

After obtaining a hazardous materials endorsement for a commercial driver's license by passing a written exam, drivers can legally drive semi-trailers carrying up to 80,000 pounds of hazardous materials on nearly all roads and through all cities in the U.S. Little has been done to prevent these licenses from falling into the wrong hands.

Finding out exactly what materials are in transit in your community can also be a vexing problem. Materials that are in transit have been exempted from government "right to know" requirements. As a result, emergency responders, emergency planners and concerned citizens typically lack the information needed to plan for, and prevent, accidents or terror attack incidents involving transportation. The Environmental Protection Agency's guide "Chemicals in Your Community" suggests a combination of legwork and guesswork to anticipate and cope with these chemicals in transit:

> Chemicals transported through your community by rail, barge, or truck **are not reported to EPA**. You may assume that any of the chemicals you find at facilities in your locality are moving through your community via railroad lines or major highways. But, chemicals also may be transported through your community on the way to some other location. Some [Local Emergency Planning Committees] have surveyed traffic on major roads and rail lines to determine which chemicals are being transported and who is transporting them. Most vehicles that carry hazardous materials must be marked with placards that identify the hazard class and give a number that identifies the specific chemical.[3]

Despite the lack of effective information resources on these hazards, according to a recent report done for the Department of Transportation (DOT) by the Argonne National Laboratory on transportation hazards, "the potential exists for very serious accidents involving large numbers of injuries and fatalities, especially for TIH [toxic-by-inhalation] materials." The report notes that six toxic-by-inhalation (TIH) chemicals account for over 90% of total TIH transportation-related risk.[4] See box page 2-5. The Argonne report estimates that there are 100,000 shipments a year of highly toxic chemicals such as chlorine.

Local emergency planners in some communities have conducted the best analysis that they could, based on available information, of the hazards of transportation and transportation-related storage in their areas. Reassessment efforts should begin by examining the extent to which the emergency planning process has effectively addressed this issue. Special attention should be given to the extent to which the assessment addresses issues associated with transport such as:

- **Storage of the materials in unguarded areas.** Many facilities store tank cars full of extremely hazardous materials in side yards (sometimes called "leased sidings"), often in close proximity to residential neighborhoods. The graffiti commonly found on rail cars attests to how poor security is for rail cars. Sometimes the storage areas are a mile or more from the facility that uses the materials - so that these sites are not readily apparent in assessing the facility. A reassessment must make detailed inquiry into storage locales to identify the range of vulnerabilities.

TOXICS IN TRANSIT

TOXIC BY INHALATION
- ammonia
- chlorine
- sulfur dioxide
- hydrogen fluoride
- fuming nitric acid
- fuming sulfuric acid

FLAMMABLE/EXPLOSIVE
- liquefied petroleum gas
- gasoline
- explosives

Source: Argonne National Laboratories

- **Potential for chain reactions** among, for instance, tank cars on a rail line.

- **Movement through urbanized, highly populated areas.** This issue has been largely unregulated by the Department of Transportation. Local governments can prohibit transport of hazardous materials through some congested areas, but few have done so.

C) What are the vulnerabilities posed to the community by facilities and transportation?

Risk Management Plan (RMP) summaries identify some key vulnerabilities and prevention efforts.

The 1990 Clean Air Act established risk management planning, making the issues of chemical risks more graphic for the community. That law required facilities to prepare maps of the zone which could be impacted in the event of a worst case scenario chemical release, regardless of whether it is caused by terrorism or by an accident. The law also created an obligation, known as a "General Duty", for companies to prevent catastrophic chemical incidents. Documents summarizing facilities' plans for emergency notification and for community response, based on potential scenarios for incidents at facilities, were prepared by facility owners and operators and submitted to the Environmental Protection Agency (EPA). Portions of these documents are available on the internet - see reference in Table 3. In addition, more detailed renditions of these documents are available through regional Environmental Protection Agency reading rooms and through local emergency planning committees. However, the LEPC's have no formal role or requirement in disseminating this information. The more detailed documents - available by direct inquiry to the agencies, rather than on the internet - include maps showing the vulnerable zones in relation to a worst-case and more likely case scenario associated with each facility.

The **worst case scenario** is typically based upon what would happen if there were a release of all of the chemicals from the largest storage unit at a facility, and all active containment and protection systems were to fail in worst-case weather conditions. The more likely scenario, also known as the **planning scenario**, is based on an assumption that various protective systems (e.g. secondary containment systems, shut-off valves, etc.) inside of the facility function as intended in the event of an incident. These release incidents are utilized to draw a map estimating the range within which human health and safety may be threatened by an incident. The **offsite consequence analysis** indicates how many people may be within range of serious harm in the event of an incident. The **toxic release endpoint** indicates the range within which people could be hurt or killed. Across the US, in facility plans the average (median) toxic release endpoint from a facility is 1.6 miles, and the average (median) number of potentially affected people is 1500 people. A given facility may, however, affect substantially more or less than this. For instance, some facilities have endpoints affecting up to twenty five miles away, with potential to affect hundreds of thousands of people.

The worst case scenarios generated by companies as part of risk management planning have new significance. In the past, many companies asserted that the scenarios were unlikely; but in the face of potential terrorist assaults, the improbability of those scenarios can no longer be taken for granted.

RMP summaries which include a description of worst case scenarios and potential offsite consequences, are available online through http://www.rtknet.org/rtkdata.html. Local access to this data is also available. As of August 4, 2000, LEPCs and related local government agencies such as fire, police and planning departments are authorized to provide citizens with *read-only* access to Offsite Consequence Analysis information (if they have it) for facilities within the LEPC area where residents live or work, and for any other facilities that have vulnerable zones that extend into those LEPC areas. You can find contact information for an LEPC on the Web at http://www.epa.gov/ceppo/lepclist.htm or http://www.rtk.net/lepc/ or by calling your local fire department or the EPA's RCRA, Superfund & EPCRA Hotline at (800) 424-9346. EPA and the Department of Justice have

The September 11 Terrorists May Have Been Scoping Out Chemical Sites

Mohammed Atta, believed to have been the ringleader of the September 11 terrorists, had conversations with a junk car dealer in Tennessee in which he expressed an extraordinary and persistent interest in a chemical storage facility and surrounding rail tank cars. Why he wanted to know, we can only speculate, but there is ample reason to believe that he may have had in mind attacks on chemical facilities as weapons of mass destruction. After all, the approach, which the terrorists ultimately chose on September 11, used our own day to day technologies ~~jet~~ aircraft ~~a~~against us as weapons of mass destruction. Atta's inquiry regarding the chemical plants stands as a warning to our communities that these chemical storage sites, pervasive in their presence, represent a point of vulnerability.

Danny Whitener, a 48-year-old junk car dealer who was alone tending his plane when the strangers arrived, is convinced one of the men was Mohamed Atta, whom authorities believe was the ringleader of the September 11 suicide hijackings.

When photos of the hijackers were released, "I knew it was him," Whitener said. "I will never forget that face of his." Whitener said the man told him he had flown from the Atlanta area and asked about a nearby chemical plant. Uneasy about the conversation, Whitener reported it to the airport manager, who joked that the men might be terrorists.

.Whitener said he spoke to the man he later recognized as Atta for about 15 minutes. That man was the pilot; the accompanying passenger never spoke and neither man used any airport facilities, he said.

According to Whitener the man asked: "So tell me about this factory I just flew over," referring to a former copper processing plant nearby, with dozens of round steel tanks and flanked by towering smokestacks. At the time, hundreds of rail tanker cars were parked near the plant, Whitener said.

The plant's owner, Intertrade Holdings, had recently stopped storing sulfuric acid and other hazardous chemicals in the tanks in preparation for closing the plant's acid manufacturing operation.

"He was just persistent about the chemical company," Whitener said. "I told him the tanks were empty. He came back and said 'Don't tell me that. What about all the ... tanker cars?' This guy was just arrogant."

Whitener said he repeated, "They are all empty."

Joel Engelhardt , "Hijacking Suspect Cased Targets, Experts Say Mohamad Atta Called A 'Little Bomb Walking Around'," *Palm Beach Post*, October 28, 2001, pg. 17A.

also established ten regional reading rooms for access to the RMP information. For details, see www.epa.gov/ceppo/readingroom.htm.

Using this data, concerned citizens are able to make inquiries of facilities as to their efforts to reduce the hazards, especially the size of the vulnerable area at risk from the facility. Current law provides that companies must file updates of these offsite consequence analyses whenever the company makes a change that doubles or halves the "footprint" (vulnerable area) or at minimum every five years.

EPA has exempted certain facilities from this risk management planning reporting system. Most important are facilities containing only explosives or gasoline, and ammonia held by farmers. Special attention may be merited to assess vulnerabilities relative to such facilities.

D) How have the events of September 11, 2001 changed our community's understanding of the vulnerabilities and the needs for hazard reduction?

The terrorist acts of September 11, 2001, have given new urgency to reassessing and reducing facility hazards. People intent on causing mass injuries and property damage could override all the safety measures put in place at chemical sites to prevent releases. The potential for an assault on chemical sites by aircraft, vehicles, rocket launchers or high-powered rifles cannot be ignored. Many conventional accident prevention measures may not work; safer materials and lower storage volumes are examples of measures that would work, because they would eliminate rather than simply defend against the vulnerability of facilities.

The worst case scenarios generated by companies as part of risk management planning have also taken on new significance. When those scenarios were generated, many companies made a point of persuading local communities that the scenarios were unlikely; but in the face of potential terrorist assaults, the improbability of those scenarios can no longer be taken for granted.

E) Which are the priority facilities that pose the greatest danger to our community?

By this point you have compiled an inventory of sites and identified the facilities with highest volumes of extremely hazardous substances. You have reviewed vulnerability information including the proximity of the facility to local populations and the number of people in the vulnerable zone. Now you need to identify priority facilities. You may wish to also take account of an array of other information. For instance:

- Are there other factors that make this facility especially vulnerable to terrorism?
- Are there known alternatives to the extremely hazardous substances used at the facility that make this a likely place for reducing vulnerabilities? See alternatives Table in Appendix for examples.
- Does the accident record of the facility compound the sense of a need for hazard reduction? For instance, what is the facility's record of accidents as indicated in the risk management plan's five year accident reports, or accidents reported to the National Response Center? What is the facility's record of near misses? Are there certain units in the facility that have been prone to accidents or near misses? Have there been complaints by employees or local citizens filed with federal, state, or local agencies?
- Have the facility's hazard reduction measures already been thoroughly reviewed by third-party experts with local citizen oversight?

In setting priorities for hazard reduction, you may want to consider the vulnerabilities of facilities to accidents as well as criminal assaults.

An essential issue worthy of consideration is the potential for accidents at facilities as well as of intentional/criminal actions. An enormous number of accidents occur in the US each year. By one measure, facilities in the United States report more than 25,000 fires, spills, or explosions involving hazardous chemicals to the National Response Center. This is a broad, but incomplete, federal record of mishaps involving oil or chemicals.[5] At least 1,000 of these events each year involve deaths, injuries, or evacuations. When one combines data from additional federal sources, analysts at the Texas A&M University concluded that in 1998 there were over 100 deaths, nearly 5,000 injuries, and when including small spills, almost 50,000 incidents related to ordinary industrial use of chemicals in the United States.[6]

How can the national databases inform your priorities? One way is by focusing you on some problem industries and chemicals. Data submitted to the U.S. Environmental Protection Agency as part of Risk Management Plans (RMP's) under the Clean Air Act demonstrate that certain types of industries and types of chemicals are most prevalent and cause the most chemical accidents. See Tables 4 and 5. For instance, ammonia and chlorine together account for about half of all facilities in the US storing high volumes of extremely hazardous substances reported under risk management

TABLE 4

ACCIDENTS REPORTED BY INDUSTRY SECTOR, IN THE RISK MANAGEMENT PLANS DATABASE

(RMP*Info) for the period 1994-1999

NAICS Description	NAICS Code	Number of Accidents
Petroleum Refineries	32411	192
Water Supply and Irrigation Systems	22131	116
Sewage Treatment Facilities	22132	110
All Other Basic Inorganic Chemical Manufacturing	325188	89
All Other Basic Organic Chemical Manufacturing	325199	89
Other Chemical and Allied Products Wholesalers	42269	87
Farm Supplies Wholesalers	42291	85
Alkalies and Chlorine Manufacturing	325181	80
Nitrogenous Fertilizer Manufacturing	325311	68
Poultry Processing	311615	67
Petrochemical Manufacturing	32511	55
Pulp Mills	32211	54
Refrigerated Warehousing and Storage Facilities	49312	50
Animal (except Poultry) Slaughtering	311611	47
Natural Gas Liquid Extraction	211112	34
Plastics Material and Resin Manufacturing	325211	34
Frozen Fruit, Juice, and Vegetable Manufacturing	311411	32
Meat Processed from Carcasses	311612	31
Paper (except Newsprint) Mills	322121	25
Industrial Gas Manufacturing	32512	24
Other Basic Organic Chemical Manufacturing	32519	24
Other Basic Inorganic Chemical Manufacturing	32518	22
Pesticide and Other Agricultural Chemical Manufacturing	32532	22
Ice Cream and Frozen Dessert Manufacturing	31152	19

Table includes most frequently occurring National Industrial Classification System (NAICS) Sector Codes

TABLE 5

ACCIDENTS REPORTED BY CHEMICAL INVOLVED IN THE ACCIDENT FROM 1994-1999

Chemical Name	Number of Accidents
Ammonia (anhydrous)	656
Chlorine	518
Hydrogen Fluoride	101
Flammable Mixture	99
Chlorine Dioxide	55
Propane	54
Sulfur Dioxide	48
Ammonia (concentration 20% or greater)	43
Hydrogen chloride (anhydrous)	32
Hydrogen	32
Methane	30
Butane	26
Ethylene oxide	19
Hydrogen Sulfide	19
Formaldehyde	17
Isobutane	17
Pentane	17
Titanium tetrachloride	15
Phosgene	12
Nitric Acid (conc 80% or greater)	12
Ethane	12
Oleum	11
Ethylene	11
Vinyl chloride	11
Trichlorosilane	11
Methyl chloride	10

*Extremely hazardous substances most frequently involved in accidents according to the Risk Management Plans database for 1994-1999. Note that database excludes gasoline and explosives. Source: Belke, James C., *Chemical accident risks in U.S. industry - A preliminary analysis of accident risk data from U.S. hazardous chemical facilities*, United States Environmental Protection Agency Chemical Emergency Preparedness and Prevention Office, September 25, 2000.

planning; they also account for the most releases reported in the RMP's.

F) What are our priority strategies for hazard reduction?

Once priority chemical sites are identified, a range of choices typically exist to reduce the hazard of the facilities. These include:

- **Clean Production:** Designing production processes and products to maximize the use of clean safe materials, renewable energy, and closed loop, efficient process systems. This eliminates or dramatically reduces harm to environment and public health.
- **Inherent Safety:** Eliminating or dramatically reducing the worst toxic release or explosion that can happen at a site through adopting safer materials, lower

volumes of toxic materials stored on site, or other design factors.

- **Buffer Zones:** Expanding the space between the facility and potentially affected populations.

- **Add-on/Capture Technologies:** Improving equipment to capture and prevent any release from reaching the environment.

- **Site Security:** Preventing access to facilities and their infrastructure by those with potential to intentionally cause releases.

- **Emergency Response Plans:** Improving plans for warning local residents in the event of a release, and for evacuation or sheltering against exposures. The reassessment group should commit to giving top priority to the most effective strategies whenever possible.

From the standpoint of preventing terrorism as well as protecting the local environment, these activities can be listed as a hierarchy. At the top of the hierarchy, clean production and inherent safety methods are less prone to failure than the methods at the bottom of the list. These measures can have the greatest benefit for the environment as well as for public safety. Even from the standpoint of cost and the array of benefits to all concerned, inherent safety and clean production can also prevail as the clear winners. Companies that have invested primarily in add-on approaches often presume that it is too expensive to employ clean production methods or inherent safety. Yet the costs of changing are often fully recovered through savings in reduced costs of maintenance, regulatory compliance, insurance and other hidden costs such as lower costs of materials. Many companies have produced long-term financial gains by evaluating and applying safer materials.

Traditionally, more emphasis has been placed on measures toward the bottom of the chart. But as demonstrated later in this guide, expenditures in this area may be the least effective in improving the real safety or security of the community. Before embarking on the process of reassessing local facilities, your reassessment group should consider your priorities for hazard reduction. We recommend that you adopt the hierarchy shown above, placing the greatest emphasis on opportunities for improving inherent safety.

However, you also need to apply this analysis to your local circumstances. In a community with hundreds of hazardous facilities and a volunteer fire department ill-equipped to respond to chemical incidents, you may need a two-track strategy, which both seeks inherent safety opportunities while simultaneously improving equipment, training and other funding for emergency responders. Reassessment of inherent safety options at facilities may need to proceed on a parallel track with a reassessment of emergency response capabilities.

Notes

1. 42 USC 11003 (c)(1); EPCRA section 303 (c)(1).
2. Testimony of Joan Claybrook, Advocates for Highway and Auto Safety and Public Citizen, before the Senate Subcommittee on Surface Transportation and Merchant Marine, Senate Committee on Commerce, Science, and Transportation, October 10, 2001.
3. USEPA, Chemicals in Your Community, (1999), page 17.
4. D.F. Brown, W.E. Dunn, and A.J. Policastro, A National Risk Assessment for Selected Hazardous Materials Transportation, Argonne National Laboratory,December, 2000, research sponsored by the US DOT, Research & Special Programs Adminisration, Office of Hazardous Materials Technology.
5. National Response Center. The NRC is the central federal agency to which chemical companies and transporters report oil and chemical spills. Reports to the NRC cover incidents small and large. Reports are initial and subject to verification and change (www.nrc.uscg.mil/foia.htm).
6. Sam Mannan, Michela Gentile, and Mike O'Connor, "Chemical Incident Data Mining and Application to Chemical Safety Trend Analysis," Mary Kay O'Connor Chemical Process Safety Center, Texas A&M University, 2001.

A HIERARCHY OF HAZARD REDUCTION RESPONSES