4. Executive Order on Improving Chemical Facility Safety and Security

The Executive Order on Improving Chemical Facility Safety and Security directs the Federal Government to:

- improve operational coordination with state and local partners;
- enhance Federal agency coordination and information sharing;
- modernize policies, regulations and standards; and
- work with stakeholders to identify best practices.

Improving Operational Coordination with State and Local Partners

Federal, state, local, and tribal governments have different responsibilities in addressing risks associated with chemical facilities, including response planning for potential emergencies. To improve the effectiveness and efficiency of risk management and response measures, the Executive Order charges Federal agencies with improving coordination and information sharing with state and local governments. For example, the Executive Order requires Federal agencies to develop a plan within 90 days that identifies ways to ensure State homeland security advisors, State Emergency Response Commissions (SERCs), Tribal Emergency Response Commissions (TWERCs)
(TERCs), Local Emergency Planning Committees (LEPCs), Tribal Emergency Planning Committees (TEPCs), State regulators, and first responders have ready access to key information in a useful format to prevent, prepare for, and respond to chemical incidents.

**Enhancing Federal Coordination and Information Sharing**

Programs designed to improve the safety and security of chemical facilities through regulations, information reporting requirements, site inspections, and voluntary partnerships are managed by multiple Federal agencies, including the Environmental Protection Agency (EPA), Department of Homeland Security (DHS), Department of Labor (DOL), and the Department of Justice (DOJ). To improve the collective performance of these Federal programs, the Executive Order calls upon Federal agencies to initiate innovative approaches for working together on a broad range of activities, such as identification of high-risk facilities, inspections, enforcement, and incident investigation and follow up. For example, the Executive Order requires that the Federal agencies deploy a regional pilot program that will validate best practices and test innovative new methods for Federal interagency collaboration on chemical facility safety and security. Additionally, Federal agencies are specifically directed to modernize the collection and sharing of chemical facility information to maximize the effectiveness of risk reduction efforts and reduce duplicative efforts.

**Modernizing Policies, Regulations and Standards**

The Executive Order directs Federal agencies to work with stakeholders to improve chemical safety and security through agency programs, private sector initiatives, Federal guidance, standards, and regulations. For example, to reduce risks associated with ammonium nitrate, agencies will examine new options to address the safe and secure storage, handling, and sale of this explosive chemical. Agencies will also determine if additional chemicals should be covered by existing Federal regulatory programs, such as EPA’s Risk Management Program (RMP), DHS’s Chemical Facilities Anti-Terrorism Standards (CFATs), and DOL’s Process Safety Management Standards (PSM). In addition, agencies will consider whether to pursue an independent, high-level assessment of the U.S. approach to chemical facility risk management to identify additional recommendations for all levels of government and industry to reduce the risk of catastrophic chemical incidents in the future.

**Working with Stakeholders to Identify Best Practices**

Many chemical facilities have taken steps to create safer work environments and reduce risks of chemical incidents to nearby communities. The Executive Order directs key Federal agencies to convene a wide range of interested stakeholders, including representatives from industry, state, local, and tribal governments, non-governmental organizations, and the first responder community, to identify and share successes to date and best practices to reduce safety and security risks in the production and storage of potentially harmful chemicals, including through the use of safer alternatives, adoption of best practices, and potential public-private partnerships.

**Background on Federal Programs for Chemical Facility Safety and Security**

Federal agencies implement a number of programs to help prevent chemical facility accidents, reduce risks of terrorist attacks on chemical facilities, protect chemical facility workers, collect and share relevant information with the public and decision makers, and prepare communities and local, tribal, and state first-responders to respond to potential large-scale
accidents. State, local, and tribal authorities also have critical responsibilities in managing risks from chemical facility accidents through setting and enforcing requirements for zoning, siting, and emergency response and planning. The primary Federal agencies and programs aimed at addressing chemical safety and security at chemical facilities[1] are summarized below:

Environmental Protection Agency (EPA)

- EPA’s Risk Management Program (RMP), established under the Clean Air Act, is aimed at reducing chemical risk at the local level. EPA’s rules require owners and operators of a facility that manufactures, uses, stores, or otherwise handles certain listed flammable and toxic substances to develop a risk management program that includes hazard assessment (including an evaluation of worst-case and alternative accidental release scenarios), prevention mechanisms, and emergency response measures. Facilities submit information regarding their risk management program (the information submitted is a "Risk Management Plan" or "RMP") to EPA. RMP information helps local fire, police, and emergency response personnel prepare for and respond to chemical accidents, while allowing citizens to understand chemical hazards in their communities. EPA has focused its chemical plant safety inspection and enforcement efforts on the highest risk facilities.
- EPA also implements the Emergency Planning and Community Right to Know Act (EPCRA), which was designed to promote emergency planning and preparedness at the state, local, and tribal levels. EPCRA helps ensure local communities and first responders have needed information on potential chemical hazards within their communities in order to develop community emergency response plans. Under EPCRA, facilities with Extremely Hazardous Chemicals must notify the State Emergency Response Commission or Tribal Emergency Response Committees (TERCs) and Local Emergency Planning Committee (LEPC), as well as participate in local emergency planning activities. LEPCs and TERCs are then responsible for developing a community emergency response plan.

Department of Labor/Occupational Safety and Health Administration (OSHA)

- OSHA’s Process Safety Management (PSM) standard sets requirements for the management of highly hazardous substances to prevent and mitigate the catastrophic releases of flammable, explosive, reactive, and toxic chemicals that may endanger workers. The PSM standard covers the manufacturing of explosives and processes involving threshold quantities of flammable liquids and flammable gasses, as well as 137 other highly hazardous chemicals.
- In 2011, OSHA launched its Chemical Plant National Emphasis Program (NEP) to conduct focused inspections at randomly-selected facilities among worksites likely to have highly hazardous chemicals in quantities covered by the PSM standard. Under this program, OSHA has corrected serious safety issues through approximately 350 inspections and the issuance of 1,325 violations.

Department of Homeland Security (DHS)/National Protection and Programs Directorate (NPPD)
DHS/NPPD is responsible for implementing Chemical Facility Anti-Terrorism Standards (CFATS), the Federal government’s primary regulatory authority for security of chemicals at stationary facilities. CFATS is helping make the nation more secure by requiring high-risk chemical facilities to develop and implement security plans that meet eighteen risk-based performance standards established by the Department. Additionally, since the program’s inception, more than 3,000 facilities have voluntarily removed or reduced the onsite quantity of chemicals of interest to the point that the facilities are no longer considered high-risk.

Department of Homeland Security (DHS)/United States Coast Guard (USCG)

- The U.S. Coast Guard (USCG) is responsible for maritime security under the Maritime Transportation Security Act (MTSA), 46 U.S.C. § 70101, et seq., which includes authority over certain port facilities that use, store, or transport chemicals or engage in other chemical-related activities.
- MTSA reinforces the national and global importance of security for the marine transportation system, and provides a crucial framework for ensuring the safety of maritime commerce and our domestic ports. MTSA’s key requirement is to prevent a maritime transportation security incident (TSI) - defined as any incident that results in a significant loss of life, environmental damage, transportation system disruption, or economic disruptions to a particular area. Within the maritime venue, preventing TSI's has been a core mission of the Coast Guard since its beginning.

Department of Justice/Bureau of Alcohol, Tobacco, Firearms, and Explosives (DOJ/ATF)

- ATF is responsible for enforcing federal explosives laws that govern commerce in explosives in the United States including licensing, storage, record keeping, and conduct of business. ATF conducts inspections of federal explosives licensees who manufacture, import, sell or store explosives in the United States to ensure explosives are managed in accordance with federal law. In Fiscal Year 2012, ATF conducted 5,390 explosives inspections resulting in approximately 400 reports of violations.

[1] The Federal government also has a number of regulatory programs related to the safe and secure transportation of chemicals across all modes of transportation, including highway, rail, aviation, maritime, and pipeline. This fact sheet is focused on chemical safety and security at fixed facilities and does not address the programs focused on the transportation of hazardous materials.
I wish to submit references 1, 2, 3, and 9 for the record. Access to these documents is provided in the URL’s accompanying the references. Please include them in the docket to enable easy access. These references represent the work I have done on the economic and safety benefits of adopting or developing inherently-safer technology alternatives and provide the basis for my recommending that EPA should require firms in high-risk or inherently-unsafe facilities to:

(1) identify where in a facility’s production process changes to inherently-safer inputs, processes, and final products could be made, and

(2) identify specific existing inherently safer technologies that could be substituted – or could be developed. The former is termed an Inherent Safety Opportunity Audit (ISOA); the latter is called a Technology Options Analysis (TOA).

Rather than require protracted, expensive, and largely uninformative or ineffective worst-case scenarios, EPA should amend its approach under the Clean Air Section 112(r)(7) by accepting and encouraging a more meaningful two-step ISOA/TOA in lieu of a worst-case analysis.

In addition, I develop in the following comment, the inappropriateness of utilizing a cost-benefit analysis to justify requiring firms to adopt an inherent-safety approach to preventing chemical accidents in high-risk or inherently-unsafe facilities.
differ in the response they have thus far received from industry and from government. While many firms are embracing pollution prevention (some enthusiastically, some more tentatively), far fewer are moving to primary accident prevention. In all likelihood, this disparity is due to a difference in the size and nature of the incentives facing individual facilities.

The reasons that firms are embracing pollution prevention and cleaner production today are because individual firms face (1) the increased costs of continuing the current practices of waste transport/treatment and pollution control, (2) liability for environmental damage due to industrial releases of toxic substances, (3) increasingly available information about pollution and toxic releases to the public\(^1\), and (4) the EU IPPC Directive [18] (and possibly the EMAS [19] and ISO 14000 [20] requirements), and to a lesser extent the Pollution Prevention Act of 1996 in the United States [21], force increased attention to changing production technology, rather than relying solely on end-of-pipe, add-on technologies. Thus, both economic and informational mechanisms are causing a gradual cultural shift away from pollution control and waste treatment and towards pollution prevention and cleaner production. *It is economically rational for individual firms to adopt cost-saving pollution prevention options.*

With regard to primary accident prevention, the same economic signals are not really there [2]. Firms do not pay the full social costs of injuries to workers (or to the public) and firms are underinsured. Unlike pollution, which is expected and which has to be reckoned with as a part of production planning, accidents are rare events and their consequences are not factored into the planning process. Thus, firms may anticipate accidents, and may be motivated to take some steps to avoid them, but they do not feel a strong financial incentive to invest in primary accident prevention, i.e., inherent safety. Further, while some of the information reportable under EPCRA is relevant to chemical accidents, this information alone – without detailed and plant-specific data on production processes—does not allow the firm, or the public, to assess the accident potential of a particular facility.

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\(^1\) The Emergency Planning and Community Right-to-Know Act (EPCRA) has provided firms and the public with plant-specific information revealing large inventories and emissions of toxic substances.
Furthermore, an organization’s gradual emissions or wastes can be observed and calculated for any given time period, and this information can be used to measure the effectiveness of the organization’s pollution prevention efforts. Because acute chemical accidents are relatively rare events, an organization implementing an effective chemical safety program may therefore receive no form of positive feedback – or evidence of reward -- whatsoever. Because the safety system appears to be working, accidents do not occur. Of course, a hazardous chemical plant may eventually receive negative feedback, but only when it is too late to take preventive measures.

Although there are demonstrable benefits to individual firms adopting inherently-safer alternatives – such as lower costs than (1) using unsafe technology components, or (2) safety systems based on secondary prevention that need to be monitored, tested, and repaired, or (3) lower costs than doing expensive and complicated worst-case scenarios -- not all the possible benefits of inherently safer technologies accrue to individual firms. Only those firms whose chemical accidents are actually prevented by employing inherently-safer technologies reap the full benefit. The adoption of inherently-safer technologies works like insurance; since it is not known in advance which specific firms in a particular risk category will have a chemical accident, the only way to ensure that accidents rates are lower for firms in the category is for every firm to adopt inherently-safer technology in that category. Like drivers who complain that they have been paying insurance every year but never had an accident, this confuses individual liability with collective liability. Both the reluctance of individual firms to adopt inherently-safer alternatives and the reluctance of the government to require the adoption of collective cost-saving inherently-safer alternatives suffer from this problem. Thus, the focus of the Executive Order on collecting information on the costs and benefits of individual firms is misguided. Certainly the enormous costs in term of injuries, deaths, and property values demand a more modern and different approach than that which has been forthcoming.

In earlier work, Ashford [2] summarized the barriers to primary prevention:

- (1) inadequate information about the potential for catastrophic accidents, the significant costs of secondary prevention and mitigation and the costs of chemical accidents, and the existence of inherently-safe[r] alternatives; (2) insufficient economic
incentives - in the form of workers’ compensation, the tort system, regulatory fines, and insurance; (3) organizational and managerial barriers -- linked to corporate attitudes, objectives, structure, and internal incentives, and the lack of a labor-management dialogue on safety; (4) a lack of managerial awareness and expertise about inherently safe[r] technologies; (5) inadequate worker knowledge about primary accident prevention; (6) technological barriers limiting primary accident prevention; and (7) regulatory problems. Primary prevention shares some of these barriers with secondary prevention and mitigation, but these barriers are of different importance.

Although firms sometimes do anticipate accidents and try to avoid them, the expenditures for adequate prevention have not been, and are not likely to be, invested without the right incentives. To the extent that the firm knows that the costs of maintenance and the inflexibility of traditional safety approaches are greater than using more reliable inherently-safer approaches, the firm may respond by changing its technology.

One way of providing firms with more visible economic incentives would be to encourage them to exploit the opportunity to prevent accidents and accidental releases (1) by identifying where in the production process changes to inherently safer inputs, processes, and final products could be made and (2) by identifying specific existing inherently safer technologies that could be substituted – or could be developed. The former is termed an Inherent Safety Opportunity Audit; the latter is called a Technology Options Analysis (TOA) [2, 3, and 9]. Unlike a hazard, risk, or technology assessment, these techniques seek to identify where and what superior technologies could be adopted to eliminate the possibility, or to dramatically reduce the probability, of accidents and accidental releases\(^2\).

\(^2\) A risk assessment, in practice, is generally limited to an evaluation of the risks associated with the firm’s established production technology and does not include the identification or consideration of alternative production technologies that may be inherently safer than the ones currently being employed. Consequently, [risk] assessments tend to invite secondary accident prevention and mitigation strategies, which impose engineering and administrative controls on an existing production technology, rather than primary accident prevention strategies, which utilize input substitution and process redesign to modify a production technology. In contrast to a risk assessment that suggests “fixing the current production system defects, by end-of-pipe additions,” a technology options analysis would expand the evaluation to include alternative
From a general safety perspective, it is widely recognized that safety performance is determined by three elements:

- management and organizational factors,
- technological factors, and
- behavioral factors (also referred to as the human dimension, i.e., people).

These three factors interact and influence the safety of industrial manufacturing and production processes through their effects on the willingness, opportunity, and capability of organizations and people to change.

In some approaches that promote the adoption of inherent safety, the emphasis is on mainly technological factors, i.e., on identifying and disseminating information on superior technologies. In the current approaches to safety management -- especially those falling under the rubric of Safety Management Systems -- the emphasis is on management and organizational factors, and also on the human dimension, addressing the management of safety; these approaches assume minimal technological change, implicitly leaving the core and secondary production technologies essentially unchanged. Both of these distinct approaches are by themselves insufficient to maximize the adoption of desirable inherently safer technologies and frustrate further progress in safety performance and continual progress in safety management. There is therefore a clear need, both from a technical point of view and from an industrial practice perspective, for a generally accepted approach that bridges traditional safety management with inherent safer technology.

REFERENCES

production technologies and would facilitate the development of primary accident prevention strategies.


6. Alternatives Analysis/Technology Options Analysis

Alternatives analysis for chemical hazards has its origins in 1980 in the work of Nicholas Ashford and colleagues at MIT who developed decision analysis tools for chemical regulation for the US Council on Environmental Quality. They developed the concept of "technology options analysis" to identify alternatives to hazardous chemicals in use in order to promote environmental and occupational health. Because the focus of regulatory agencies at the time was the control of exposure to acceptable levels, rather than the elimination of those hazards, alternatives analysis did not receive much attention. With the increased attention being paid to chemical accidents and the resulting safety amendments to the Clean Air Act, the concept of identifying inherently safer technologies resurfaced in a 1993 MIT reported funded by EPA. However, while the EU Seveso Chemical Safety Directive clearly identified inherent safety as a preferred approach over pollution and accident control, the US EPA declined to emphasize primary prevention initiatives as a result of resistant industry pressure. Finally, attention is being increasingly placed on inherently safer alternatives to eliminate or significantly reduce both gradual pollution and chemical accidents, and several state initiatives and the EU REACH directive have made alternative analysis a central feature of their regulatory approaches.
