



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
P.O. Box 402
Trenton, NJ 08625-0402

JON S. CORZINE
Governor

MARK N. MAURIELLO
Acting Commissioner

Inherently Safer Technology (IST) Implementation Summary

January 15, 2010

Background

The Best Practices Standards at TCPA/DPCC Chemical Sector Facilities (Best Practices Standards), issued November 21, 2005 by the New Jersey Domestic Security Preparedness Task Force, required Chemical Sector facilities subject to the Toxic Catastrophe Prevention Act (TCPA) Program rules to prepare inherently safer technology (IST) review reports.¹

Subsequently, the Department of Environmental Protection adopted new rules under the TCPA Program, published in the May 5, 2008 New Jersey Register at N.J.A.C. 7:31-3.6 and 4.12, that require all facilities regulated under the TCPA to conduct IST reviews and to submit an IST review report to the Department by September 2, 2008. As a result of this action, water and wastewater treatment facilities, food manufacturing and handling facilities, refineries, power generation facilities and other facilities that handle Extraordinarily Hazardous Substances (EHS) performed IST reviews, as Chemical Sector facilities did under the Best Practices Standards.

The Best Practices Standards and the TCPA IST rules are similar in that they require the subject facilities to conduct the IST review and to evaluate identified IST alternatives to determine whether they are feasible. The IST alternatives are not mandated to be implemented. If the facilities decide to implement any of the ISTs, the implementation schedule is required to be included in the IST review report submitted to the Department. The following paragraphs outline the results of the implementation of the IST review requirements under both the Best Practices Standards and the State IST rules. It should be noted that these are facilities that have been regulated under the TCPA program for many years resulting in the past implementation of IST and risk reduction measures. That being said, even after twenty years of the TCPA program targeting risk reduction, the IST evaluations resulted in the discovery of additional implementable alternatives in approximately half of the TCPA facilities.

¹ The Best Practices Standards define Chemical Sector Facilities as all facilities that are subject to the TCPA or the Discharge Prevention, Containment and Countermeasure (DPCC) programs and that are identified by any of the following Standard Industrial Classification (SIC) major groups: 28 (chemical and allied products), 30 (rubber and miscellaneous plastic products), 5169 (chemicals and allied products, not elsewhere classified), or the corresponding North American Industry Classification System (NAICS) codes (325, 326, and 424690).

Summary

This summary is based on the Department's review of 85 IST reports that have been submitted since August 2008. From the 85 facility reports, a total of 143 additional IST measures were reported to have been implemented or scheduled to be implemented. Forty-one facilities implemented or scheduled to implement from one to eleven additional IST measures. Table 1 below provides a summary of IST implementation for the following sectors: chemical, food (ammonia refrigeration), power generation, petroleum refinery, water/wastewater, and other.

Table 1. Summary of IST Measures Implemented or Scheduled by Sector

Sector	# of Facilities Submitted an IST Report	Total # of IST Measures Implemented or Scheduled	# of Facilities Reporting One or More Measures to be Implemented	Percentage of Facilities Implementing IST Measures	Maximum # of ISTs to be Implemented by a Facility	# of Facilities Eliminated EHS Use by Implementing IST
Chemical	41	77	18	44	11	0
Water/wastewater	13	15	7	54	4	2
Refinery	4	10	2	50	3	0
Food	14	35	9	64	7	0
Power	6	1	1	17	1	0
Other	7	9	4	57	4	0
Total	85	143	41	48	11	2

Chemical Sector Facilities

Forty-one of the 85 reports reviewed by the Department were from chemical facilities subject to the Best Practices Standards. Eighteen facilities implemented or scheduled to implement from one to eleven additional IST measures. A total of 77 additional IST measures were reported to be implemented or scheduled to be implemented. Facilities reported some significant IST measures resulting from the IST review. One facility has replaced bulk storage of acetylene with onsite generation. Another facility is planning to greatly reduce its chlorine inventory with an onsite generation process. Other significant examples of IST measures reported to be implemented include redesign of a relief system, changes in equipment and vessel configuration, safer EHS storage location, addition of remotely activated valves and automatic

shutdown systems with interlocks, protection of storage vessels from weather conditions, changes to truck traffic patterns, improved types and materials of construction of piping, installation of power backup systems for controls and equipment, improved computer control systems, addition of EHS leak detectors, and a closed circuit television system. Several of the chemical sector facilities that had no additional IST recommendations had already implemented IST measures in the past that were identified in process hazard analysis and risk assessment studies. Also, many of these chemical manufacturing facilities run processes in which there is no feasible alternative for the EHS and inventories have already been minimized.

Water/Wastewater Treatment Facilities

Thirteen water/wastewater facilities submitted IST reports. Seven facilities implemented or scheduled from one to four additional IST measures. A total of 15 additional IST measures were reported to be implemented or scheduled to be implemented. Two facilities replaced chlorine with sodium hypochlorite. One facility plans to replace anhydrous ammonia with aqueous ammonia as one of its treatment chemicals. Other IST measures reported include elimination of 150 pound cylinder usage, a scrubber for the chlorine storage room, upgrading the control system, equipment redesign and reconfiguration, and adding remote shutoff through the computer control system. Some of the water/wastewater facilities utilize ozone for treatment, which is considered an IST since ozone is generated onsite and continuously consumed. The facilities that are registered for chlorine have implemented past IST measures such as indoor storage, leak detectors, remote and automatic shutdown, scrubbers, and mitigation systems such as water fogs/sprays; these facilities have identified alternatives to replace chlorine but have not reported plans to implement replacement.

Petroleum Refineries

Four petroleum refineries submitted IST reports. Two of the refinery facilities implemented or scheduled to implement additional IST measures as a result of the IST review. A total of six additional IST measures were reported to have been implemented or scheduled to be implemented. Examples of the IST measures reported to be implemented include labeling of valves and equipment and revising procedures. The four refineries reported that many IST measures were identified in past process hazard analysis and risk assessment studies and had already been implemented. One New Jersey refinery that uses hydrogen fluoride (HF) in the alkylation unit reported that it would investigate the use of a solid catalyst and identified substituting HF with sulfuric acid or modified HF as possible alternatives, but stated that implementing these substitutes was too costly to implement. Refineries in California and other states have chosen to utilize a modified HF alkylation process, which incorporates a suppressant in the HF that reduces the HF volatility and amount of an airborne release. This significantly reduces the number of people that would be impacted by an accidental release. Using a sulfuric acid process or a solid catalyst would completely eliminate the risk of an HF release.

Ammonia Refrigeration at Food Manufacturing and Handling Facilities

Fourteen food ammonia refrigeration facilities submitted IST reports. Nine facilities implemented or scheduled to implement from two to seven additional IST measures. A total of 35 additional IST measures were reported to be implemented or scheduled to be implemented. Examples of significant IST measures reported for implementation include adding leak detectors to shut down equipment, updating computer controls, replacing mechanical controls with microprocessors, installing interlocks, converting single safety valves to dual valve systems, removing unnecessary piping and equipment, installing seal-less pumps, upgrading the material of construction of equipment, adding safety instrumentation, installing fail-safe instrumentation, indoor containment of storage vessels, and redundant critical equipment. Several facilities reported they would not replace ammonia with another refrigerant such as hydrochlorofluorocarbons and hydrofluorocarbons due to environmental concerns such as contribution to the greenhouse effect and ozone depletion potential of these chemicals. Several facilities identified carbon dioxide systems or carbon dioxide/ammonia cascade systems as potential replacements for the existing system but stated that they would not implement due to the substantial cost to completely replace the entire refrigeration system.

Power Generation Facilities

Six power generation facilities, five of which use aqueous ammonia and one which uses anhydrous ammonia to reduce nitrogen oxides emissions in a selective catalytic reduction process, submitted IST reports. Only one of these facilities reported one additional IST measure scheduled to be implemented, which is to install an emergency stop and interlocked shutdown of the unloading pump. The facilities stated that additional IST measures were not necessary because of the measures already in place which resulted in no or minimal offsite impact of a release. Some IST measures reported already in use include storage tank spill containment, leak detection, deluge systems, and automatic shutdown systems.

Other Sector Facilities

Seven facilities in other miscellaneous sectors submitted IST reports and reported a total of nine additional IST measures to be implemented or scheduled to be implemented. Four facilities implemented or scheduled from one to four additional IST measures. Examples of the IST measures reported to be implemented include installing a computer control system, enhanced pipe inspections, installing a simulation training station, adding a thermal imaging camera, reducing the frequency of storage cylinder changes, and adding light towers for EHS leak alarms, warning labels, upgraded filter media, and reducing EHS flow.

Conclusion

The Best Practices Standards and TCPA IST rules were successful in encouraging several facilities to implement additional IST measures. Two water treatment facilities have substituted their EHS, chlorine, with sodium hypochlorite as a result of the IST review and have deregistered from the TCPA program. Approximately 48% of the 85 facilities reported that they had implemented or scheduled to implement IST measures as a result of conducting the IST review. Several facilities reported that there are no additional IST measures available beyond those that have already been implemented in their processes. A few facilities did identify additional IST measures but chose not to implement them, primarily for economic reasons, and some facilities indicated that these IST measures would be evaluated and considered in the future.

Most of the facilities that use extraordinarily hazardous substances could become less attractive terrorist targets by converting to alternative chemicals or processes identified through periodic IST reviews if feasible and practicable. It is clear that IST evaluation has the potential to provide cost effective and technically feasible alternatives at many of the facilities of concern.