

U.S. CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD

INVESTIGATION REPORT

CHEMICAL WASTE-MIXING INCIDENT

(36 Injured)

KALTECH INDUSTRIES GROUP, INC.

BOROUGH OF MANHATTAN, NEW YORK, NEW YORK

APRIL 25, 2002

KEY ISSUES

HAZARD COMMUNICATION

HAZARDOUS WASTE HANDLING

MUNICIPAL OVERSIGHT

REPORT No. 2002-02-1-NY

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This investigation report examines a chemical waste-mixing incident that occurred on April 25, 2002, at the Kaltech Industries Group, Inc., sign manufacturing facility in the Chelsea district of New York City. An explosion and fire in a confined basement workspace in a mixed-occupancy building injured several employees, members of the public, and six firefighters. This report identifies the root and contributing causes of the incident and makes recommendations on hazard communication, hazardous waste handling, and municipal oversight.

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Acronyms and Abbreviations

AFL–CIO	American Federation of Labor–Congress of Industrial Organizations
CAS	Chemical Abstracts Service
CDP	Census designated place
CFR	Code of Federal Regulations
CLS	Consolidated Laws and Services (New York)
CSB	U.S. Chemical Safety and Hazard Investigation Board
DSHM	Division of Solid and Hazardous Waste (NYSDEC)
EPA	U.S. Environmental Protection Agency
FDNY	New York City Fire Department
HAZCOM	Hazard Communication Standard (OSHA)
HMIS	Hazardous Materials Inventory Statement
HMMP	Hazardous Materials Management Program
ICC	International Code Council
IFC	International Fire Code
LQG	Large quantity generator
MSDS	Material safety data sheet
NFPA	National Fire Protection Association
NYSDEC	New York State Department of Environmental Conservation
NYCDEP	New York City Department of Environmental Protection
NYCRR	New York City Rules and Regulations
OSHA	Occupational Safety and Health Administration
PE	Professional Engineer
RCRA	Resource Conservation and Recovery Act
SFPBCC	State Fire Prevention and Building Code Council
SIC	Standard industrial classification
SQG	Small quantity generator
UFC	Uniform Fire Code

Executive Summary

On April 25, 2002, a chemical waste-mixing incident occurred at Kaltech Industries Group, Inc., a sign manufacturer located in the Chelsea district of New York City. At least 36 people were injured, including members of the public and six firefighters. Kaltech employees were consolidating hazardous waste from smaller containers into two larger drums when the explosion and fire occurred.

The Kaltech facility was located in a mixed-occupancy building in a densely populated urban area. Because the highly confined workspace in the basement offered limited pathways for the explosion to vent, there was extensive damage to the 10-story building. Street traffic was restricted for several days, and building tenants faced significant business interruptions.

The investigation by the U.S. Chemical Safety and Hazard Investigation Board (CSB), conducted in collaboration with the New York City Fire Department (FDNY), the New York City Department of Environmental Protection (NYCDEP), the New York State Department of Environmental Conservation (NYSDEC), and the Occupational Safety and Health Administration (OSHA), revealed the following:

- Kaltech had no chemical hazard communication program for employees.
- Kaltech did not manage its hazardous waste operations in accordance with established Federal, State, and local requirements.

It was determined by CSB investigators—and confirmed by NYCDEP analyses—that one of the containers gathered for consolidation contained nitric acid. It is likely that a chemical reaction caused the explosion when the acid was combined with lacquer thinner from another container.

CSB also found that New York City fire codes are outdated.

This investigation report makes recommendations to the Mayor and Council of the City of New York; NYSDEC Region 2; Kaltech Industries Group, Inc., and Beyond Signs, Inc.; OSHA Region II; FDNY; Association of State and Territorial Solid Waste Management Officials; Building Owners and Managers Association; New York City

Kaltech employees were consolidating hazardous waste from smaller containers into two larger drums when the explosion and fire occurred.

The Kaltech facility was located in a mixed-occupancy building in a densely populated urban area.

It is likely that a chemical reaction caused the explosion when the [nitric] acid was combined with lacquer thinner from another container.

Central Labor Council, AFL–CIO; National Conference of Mayors; National League of Cities; New York Committee for Occupational Safety and Health; New York State Conference of Mayors and Municipal Officials; Real Estate Board of New York; and Skyscraper Safety Campaign.

1.0 Introduction

1.1 Background

On April 25, 2002, an explosion and fire occurred in a 10-story mixed-occupancy¹ building in the Chelsea district of Manhattan, New York City. The incident originated in space leased by Kaltech Industries Group, Inc. Kaltech employees had just finished consolidating hazardous waste from smaller containers into two larger drums. The wastes were incompatible, and an explosion occurred. Thirty-six people were injured, including six firefighters and 14 members of the public. The building was extensively damaged.

Because of the serious nature of this incident and the fact that a chemical reaction was likely involved, the U.S. Chemical Safety & Hazard Investigation Board (CSB) initiated an investigation to determine the root and contributing causes of the incident and to issue recommendations to help prevent similar occurrences.

Kaltech employees had just finished consolidating hazardous waste from smaller containers into two larger drums . . . [when] an explosion occurred. Thirty-six people were injured, including six firefighters and 14 members of the public.

1.2 Investigative Process

The New York City Fire Department (FDNY) responded to the incident to rescue and aid the victims, and the City Fire Marshal established control over the site for investigative purposes. The New York City Department of Environmental Protection (NYCDEP) hazardous materials team also responded to the chemical release. The team performed chemical monitoring to identify the substances that were stored and used at the facility. NYCDEP also issued a Commissioner's Order, requiring immediate implementation of remedial actions, and oversaw the removal of chemicals and decontamination of the building. CSB investigators arrived at the scene on April 27.

CSB examined the damage and evidence in the building and then interviewed witnesses, employees, and company officials. The Fire Marshal, NYCDEP, the New York State Department of Environmental Conservation (NYSDEC), and the Occupational Safety and

¹Mixed occupancies are those involving combinations of two or more occupancy classes within one building (e.g., residential, business, mercantile, industrial, storage, and places of assembly). The building where the incident occurred had business, mercantile, industrial, and storage occupancies.

Health Administration (OSHA) oversaw the recovery of physical evidence and documents.

On April 16, 2003, CSB held a public hearing in New York City and heard testimony from city officials, fire code experts, and others.

1.3 Building Description

At the time of the incident, Kaltech occupied the basement of the building and portions of the mezzanine and first floor.

Kaltech Industries Group, Inc., had leased space at 123 West 19th Street in Manhattan for about 10 years. The 10-story masonry structure was built in 1902. It was occupied by a variety of tenants, including commercial, professional service, and manufacturing. Over time, the neighborhood changed as manufacturing entities declined and general business and residential occupancies increased. The area was zoned as a light-manufacturing district until 1999, when it was reclassified as commercial, which allows for new residential development.

At the time of the incident, Kaltech occupied the basement of the building and portions of the mezzanine and first floor. Kaltech's tenancy agreement was in the form of a standard New York Real Estate Board store lease; however, riders had been added to provide for paint booth operations, as well as for storage and general use of chemicals. The riders stipulated that government and insurance requirements applied to the use and storage of chemicals, but these requirements were not specified.

1.4 Kaltech Industries Group, Inc.

Kaltech manufactured architectural quality metal signs and letters . . . Production methods included metal cutting, forming, sandblasting, treating, etching, silk screening, polishing, and coating.

Kaltech manufactured architectural quality metal signs and letters. The signs were made primarily from stainless steel, aluminum, and brass. Production methods included metal cutting, forming, sandblasting, treating, etching, silk screening, polishing, and coating.

Graphic artwork and lettering were first created on a separate photo-resistant masking material. A mask was applied to the metal piece prior to photo development. Letters were engraved into the metal

surface by a chemical etching process, which involved dissolving metal with an aqueous solution of ferric chloride and hydrochloric acid to create the desired surface pattern. Finally, the signs were polished and coated with paints, lacquers, and inks. Most of the manufacturing operations were conducted in the basement of the building (Figure 1); painting and coating were performed on the mezzanine level.

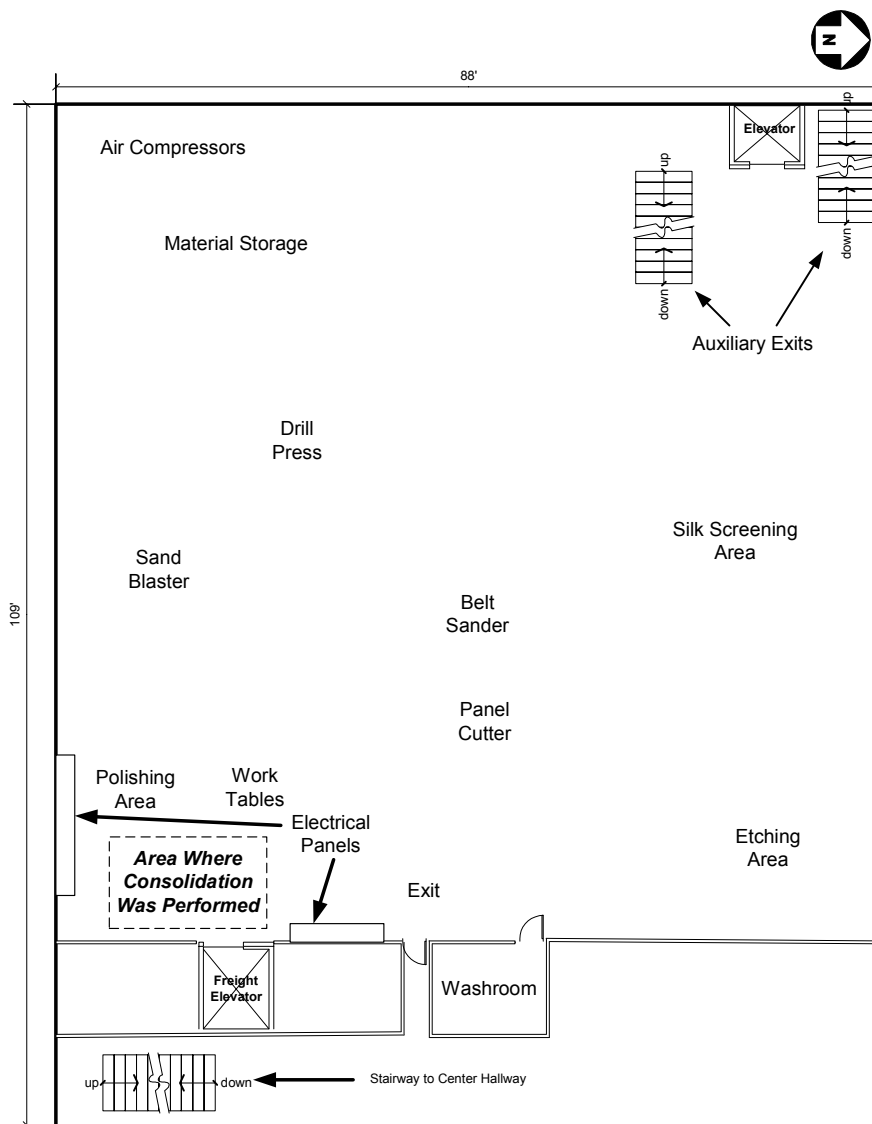


Figure 1. Basement plan, 123 West 19th Street.

Kaltech held an FDNY Bureau of Fire Prevention permit for the use and storage of up to 1,000 gallons of paint and lacquer, and up to 550 gallons of flammable solvents . . .

The company produced enough hazardous waste during various periods of its operation to be designated as a “large quantity generator” . . .

Many of the manufacturing employees were immigrants, some of whom had limited English literacy.

Kaltech held an FDNY Bureau of Fire Prevention permit for the use and storage of up to 1,000 gallons of paint and lacquer, and up to 550 gallons of flammable solvents—mainly alcohol and lacquer thinner used for paint and ink thinning and for cleaning. However, Kaltech had not applied for the required Bureau of Fire Prevention permits for other hazardous materials, such as hydrochloric acid and nitric acid.

Kaltech generated hazardous waste during the course of normal operations. Most of this waste was spent etching solution—an aqueous mixture of ferric chloride, ferrous chloride, hydrochloric acid, and solubilized metals classified as hazardous due to corrosiveness. Paint waste and solvent, classified as hazardous due to ignitability, accounted for a smaller portion of the waste.

Kaltech contracted with a licensed hazardous waste firm to periodically transport its accumulated waste to an authorized treatment facility. The company produced enough hazardous waste during various periods of its operation to be designated as a “large quantity generator” (LQG)² under provisions of the U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) of 1976.

The two Kaltech owners, who held equal shares in the corporation, closely managed day-to-day operations. A foreman supervised the manufacturing activity. Kaltech employed about 50 sales, administrative, and manufacturing personnel at the time of the incident. Many of the manufacturing employees were immigrants, some of whom had limited English literacy. During employee interviews, CSB investigators retained translation services for Polish, Spanish, and Swahili.

²A “large quantity generator” (LQG) is defined as a business or entity that generates 1,000 kilograms or more per month of nonacute hazardous waste; generates (or accumulates) greater than 1 kilogram per month of acute hazardous waste; or generates (or accumulates) at any time greater than 100 kilograms of spill cleanup material contaminated with RCRA acute hazardous waste (6 NYCRR Part 372).

2.0 Description of Incident

2.1 Pre-Incident Events

Kaltech typically accumulated waste chemicals onsite and arranged for them to be picked up every few months by a hazardous waste disposal contractor. Although the waste was stored in 55-gallon drums and 15-gallon carboys,³ it was shipped from the facility exclusively in 55-gallon drums.

The day of the incident coincided with a hazardous waste pickup, which was completed uneventfully.⁴ The contractor departed the building on the morning of April 25 with 13 drums of waste—12 drums of corrosive spent etching solution and one drum of solvent and paint waste.

Meanwhile, Kaltech employees were engaged in other activities in the basement. Employees stated that one carboy was reportedly leaking and emitting a foul odor. The foreman instructed a worker normally responsible for handling waste etching solution to transfer the contents of the carboy to a 55-gallon drum.

The worker and a helper gathered the subject carboy and approximately 10 others for consolidation. They used a pump to transfer the liquid from the smaller containers into a 55-gallon plastic drum.⁵ This task was conducted in the southeast corner of the basement, adjacent to the freight elevator (Figure 1). Other personnel working in that general area reported seeing the two workers engaged in this activity.

Upon completion of the pumping, the lead worker advised the helper to seal the drums with a bung⁶ and then took the pump to a remote area of the basement to rinse it with water. The helper, intending to seal the drums later, went to the washroom.

... One carboy was reportedly leaking and emitting a foul odor.

[Two workers] gathered the subject carboy and approximately 10 others for consolidation. They used a pump to transfer the liquid from the smaller containers into a 55-gallon plastic drum.

³A carboy is a shipping and storage container for liquids, smaller than a 55-gallon drum. The carboys in use at Kaltech had a capacity of 15 gallons.

⁴Although the shipment was completed uneventfully, the hazardous waste manifest incorrectly identified the drum of lacquer thinner as a drum of corrosive waste. This inaccuracy was discovered by environmental enforcement authorities after the incident.

⁵The lead worker stated that he intentionally selected a plastic drum because he thought the carboys contained spent etching solution. It is unknown whether one or two 55-gallon drums were used to receive the waste from the various carboys.

⁶A bung is a closure consisting of a threaded plug. It is screwed into a fitting in the top of the drum.

2.2 The Incident



Figure 2. Front of building, windows blown out up to fifth story.

The highly confined environment of the basement offered limited pathways for the explosion pressure to vent.

Thirty-one people were taken to hospitals; of 16 admitted for treatment, four had critical injuries and required intensive care.

Just moments after the workers left the immediate area where the waste consolidation was performed, vigorous chemical activity commenced in one of the 55-gallon drums. Other workers heard a hissing sound rising to a jetting noise, and liquid spewed upward from the drum. The lead worker who had conducted the consolidation started back toward the drum. Most personnel rushed toward the exits. An explosion occurred seconds later, before many could escape.

The blast dislodged portions of the basement ceiling and inside walls. A cloud of dust created an atmosphere that witnesses described as darkness. The dust, coupled with fallen debris, impeded the egress of basement occupants. FDNY rescued people who were trapped in the building.

The highly confined environment of the basement offered limited pathways for the explosion pressure to vent. The blast was partially relieved via the building's center hall stairway. However, the associated shock caused the stairwell to collapse, injuring two painting contractors—one working on the second floor and the other on the fourth floor. The collapse of the stairwell further restricted egress from the basement and impeded rescue efforts. A stairway from the northwest part of the basement leading to the mezzanine⁷ was the only other exit pathway, but it was damaged and obstructed by large pieces of ceiling masonry.

The blast vented through the freight elevator shaft by blowing in the doors at the basement station. Portions of the elevator shaft masonry walls in the basement, on the mezzanine, and on the first floor were blown out. Additionally, a high interior wall on the mezzanine collapsed, and windows in the stairwell and elevator shaft blew out from the ground level up to the fifth floor, showering glass onto 19th Street (Figure 2). Parts of the building façade fell to the sidewalk.

A fire ignited in the area where the workers had consolidated the waste. Fortunately, the explosion did not damage the fire sprinkler system, which activated and contained the fire. Because the fire was limited, those who could not escape the basement were able to be rescued; most of the injuries were caused by falling debris. Thirty-one people were taken to hospitals; of 16 admitted for treatment,

⁷The doorway atop the stairs at the mezzanine level was also locked.

four had critical injuries and required intensive care. One individual spent an extended time in the burn unit.

Most of the injured were employees of Kaltech. However, 14 were members of the public, including visitors to the building and at least one pedestrian. Six firefighters were also injured.

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Following the explosion, the New York City Building Department issued an order for all tenants to vacate the building pending a structural evaluation. A few days later the structure was determined to be sound; however, the tenants experienced significant business interruption because they were not permitted to return to the premises for many weeks. Vehicular traffic flow was also disrupted because 19th Street remained closed for 2 weeks.

Operations at Kaltech were suspended. The Fire Marshal retained control of the Kaltech space; and NYCDEP oversaw the work of a hazardous environment remediation contractor that analyzed and removed the chemicals, and decontaminated the building. The scene was declared a lead- and asbestos-contaminated zone; FDNY kept emergency equipment and personnel on hand during the cleanup.

Various assets from Kaltech were eventually passed to a successor company, Beyond Signs, Inc., which is owned and managed by relatives of the previous owners.

2.3 Incident Aftermath

. . . Tenants experienced significant business interruption because they were not permitted to return to the premises for many weeks.

The scene was declared a lead- and asbestos-contaminated zone; FDNY kept emergency equipment and personnel on hand during the cleanup.

3.0 Analysis of Incident

3.1 Explosion Origin

Blast damage was evident throughout the basement, up the stairwell, on the mezzanine level, and in the freight elevator shaft. The heaviest damage appeared to be in the southeast portion of the basement, near the freight elevator station, where the elevator door frame was blown into the shaft and portions of the surrounding wall collapsed. The heavy elevator doors were severely bent inward near the hinges, indicating the force of a strong frontal blast.

The lead worker and others who had been working in the general area stated that the consolidation was performed near the elevator. Eyewitness accounts were consistent about a drum in this area that later began to hiss and expel its contents. The lead worker witnessed the blast and described a fiery red bubble. These accounts, combined with the severity and direction of the blast damage, confirm that the explosion was centered in the area where the waste consolidation had taken place.

The same area of the basement was also the only part of the building that displayed signs of direct fire contact. Drywall panels for a lunchroom partition wall southeast of the elevator station were blown off, exposing the wooden 2- by 4-inch framing studs. The faces of the studs were blackened by fire, but the extent of burning was superficial. There was no indication that combustion had penetrated into the wood beyond the surface. Similarly, numerous papers and cardboard cartons in the vicinity were partly burned or charred. Soot was visible on the ceiling but only in the southeast quadrant of the basement. Overall, the damage suggests that the fire was limited and quickly controlled by sprinklers.

CSB investigators found two 55-gallon drums in the blast area that showed signs of being pressurized; one was metal and the other plastic. The plastic drum ruptured; the full length of the sidewall was torn open, and the bottom had blown out (Figure 3). The vendor label indicated that the drum originally contained ferric chloride solution.

Both of the workers who performed the consolidation stated that they pumped the waste from the smaller containers into a 55-gallon plastic drum. CSB investigators believe that the ruptured plastic drum was likely the receiving container.

These accounts, combined with the severity and direction of the blast damage, confirm that the explosion was centered in the area where the waste consolidation had taken place.



Figure 3. Ruptured 55-gallon plastic drum.

CSB investigators believe that the ruptured plastic drum was likely the receiving container.

After the wastes were mixed in the drum, a chemical reaction most likely occurred, which rapidly generated gas or vapor.

CSB investigators believe that the blast knocked the metal drum over, spilling some of its flammable contents. The alcohol likely ignited and served as the source of fuel for the fire . . .



Figure 4. Bulged metal drum

The ignition source may have been one of the many electrical devices in the general area of the consolidation . . . [none of which] were suitable for use around flammable solvents.

After the wastes were mixed in the drum, a chemical reaction most likely occurred, which rapidly generated gas or vapor. Because neither the gas nor the vapor could vent fast enough through the open bung hole in the top, the internal pressure increased until the drum suddenly burst.

The other container that displayed indications of overpressure was a 55-gallon metal drum. Although the drum did not rupture, the top was bulged upward and the bottom was rounded (Figure 4)—a clear indication that it had been pressurized. The paint on the drum was not scorched, and the top and side labels were still intact and quite readable. The vendor label described the original contents to be Inksolv solvent (Figure 5; i.e., ethyl alcohol to which propyl alcohol and propyl acetate are added as denaturants).⁸ OSHA analyzed a liquid residue found in the bulged drum after the incident. Its composition was found to be consistent with the solvent described on the label.

CSB investigators believe that the blast knocked the metal drum over, spilling some of its flammable contents. The alcohol likely ignited and served as the source of fuel for the fire, which probably flashed back into the drum, causing an internal deflagration severe enough to distort the container. The ignition source may have been one of the many electrical devices in the general area of the consolidation.



Figure 5. Legible side label on bulged drum.

⁸A denaturant is a chemical that is intentionally added to alcohol to render it unfit for human consumption.

None of these devices—including lighting, wall outlets, circuit breakers, and switches—were suitable for use around flammable solvents.⁹

3.2 Explosion Cause

The workers who consolidated the waste told CSB investigators that the last carboy they pumped from was unique because it was a silver-colored metal and the others were plastic. CSB investigators found only one such carboy onsite, located near the elevator. NYCDEP recovered a sample of brownish-colored liquid from the container and reported it to be concentrated nitric acid.¹⁰

Investigators also observed numerous plastic carboys in the area of the consolidation. Analysis by OSHA indicates that several of these carboys contained dissolved metals (consistent with acidic etching solution) commingled with lacquer thinner.

Lacquer thinner is primarily composed of acetone and toluene. If it comes into contact with concentrated nitric acid, a reaction may release heat and gas. Although CSB investigators could not identify the exact chemistry that led to pressurization of the plastic drum, a reaction between nitric acid and lacquer thinner is most likely to have occurred. *Bretherick's Handbook of Reactive Chemical Hazards* (1999) states the following:

Nitric acid is the common chemical most frequently involved in reactive incidents . . . and this is a reflection of its exceptional ability to function as an effective oxidant even when fairly dilute . . . or at ambient temperature.

In another publication, Bretherick (1989) writes:

It is a fact that most chemical reaction hazards involve oxidation reactions, and the oxidant that most frequently features in reported accidents is nitric acid . . . The two most significant characteristics of nitric acid in the

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⁹OSHA cited Kaltech for using electrical components unsuitable for use in hazardous locations.

¹⁰Sixty to 68 percent strength nitric acid is typically delivered in a stainless-steel carboy. More concentrated, fuming grades are typically delivered in an aluminum carboy. Either material could be considered to meet the workers' description of the container as “silver.”

present context are that it is a powerful oxidant even when cold or somewhat diluted and that gases are almost invariably evolved when it functions as such. If the material being oxidized is organic, considerable volumes of carbon dioxide as well as oxides of nitrogen may be produced.

3.3 Workplace Practices

. . . The containers gathered for consolidation on the day of the incident had been unused in the workplace for many years. The lead worker . . . assumed that the containers . . . contained spent etching solution.

Contrary to OSHA requirements, Kaltech did not maintain a list of hazardous substances present in the facility . . .

Kaltech had no training plans, and workers received no formal training on the hazards of materials in the workplace.

Employees stated that the containers gathered for consolidation on the day of the incident had been unused in the workplace for many years. The lead worker who performed the consolidation assumed that the containers—including the silver-colored metal carboy—contained spent etching solution.

As detailed above, NYCDEP identified the residue in the single metal carboy as nitric acid. However, during interviews, none of the employees or owners recalled ever using or storing nitric acid. Workers (several of whom had been employed at the facility for many years) had no recollection of handling that particular carboy. CSB investigators reviewed company purchase records but found none for nitric acid; no material safety data sheet (MSDS) for the material was found in company records. CSB considers it likely that the nitric acid was used at one time¹¹ and since forgotten. Contrary to OSHA requirements, Kaltech did not maintain a list of hazardous substances present in the facility; because waste containers were not labeled, workers were unaware of their actual contents.

OSHA regulations also require employers to inform and train workers about the hazards of chemicals in the workplace. Although Kaltech received MSDSs from the vendors that supplied chemicals, they were kept in the files of the purchasing manager or owners, who did not communicate the hazards to the workforce.

Kaltech had no training plans, and workers received no formal training on the hazards of materials in the workplace. Some workers stated that they did not read the labels on vendor-furnished containers, and others were unable to read English.

¹¹The technical literature states that nitric acid can be used for etching zinc; however, the owners stated that they outsource zinc etching. Nitric acid also has a potential application as an adjunct to ferric chloride when etching steels that contain molybdenum.

4.0 Regulatory Analysis

4.1 FDNY Regulations

New York City has adopted regulations for the safe handling and storage of hazardous materials. The Fire Prevention Code of the City of New York¹² was originally adopted in 1918 and has been periodically amended. However, FDNY officials acknowledge that: “The Fire Prevention Code of the City of New York has never undergone a comprehensive review or revision.”¹³ Consequently, the Code does not address some recent developments in hazardous materials safety, such as requirements for chemical identification, labeling, and training; and prohibitions against mixing incompatible materials.

Model fire codes—such as those of the International Code Council (ICC) and the National Fire Protection Association (NFPA)—do address these issues. FDNY officials acknowledge: “It appears that select model codes are more complete in scope and breadth as compared to the current New York City Fire Prevention Code.”¹⁴

“The Fire Prevention Code of the City of New York [adopted in 1918] has never undergone a comprehensive review or revision.”

4.1.1 New York City Fire Prevention Code

4.1.1.1 Hazardous Materials

The Fire Prevention Code establishes a permitting process for flammable liquids, such as acetone and toluene; and for corrosives, such as nitric acid. The permit system requires application to and approval by the fire commissioner, qualification for a certificate of fitness,¹⁵ and payment of an annual fee. Requirements for a certificate of fitness include passing an examination on relevant regulations and on risks and precautions related to the permitted hazardous material.

¹²Title 27, Chapter 4, of the New York City Administrative Code.

¹³James Hansen, Director of Engineering and Technical Standards Management, FDNY Bureau of Fire Prevention. Testimony at CSB public hearing on the Kaltech incident, April 16, 2003, New York City.

¹⁴James Hansen, testimony at CSB public hearing on the Kaltech incident, April 16, 2003, New York City.

¹⁵A certificate of fitness is granted to an individual after demonstrating competency by examination.

Although the Fire Prevention Code requires a permit for storage of one or more carboys of nitric acid, Kaltech did not have one. Kaltech was permitted by FDNY to store flammable mixtures.

The Fire Prevention Code does not specifically require the identification or labeling of chemicals.

The Code makes it unlawful only for wholesale drug stores and chemical supply houses to store incompatible chemicals next to each other Currently, these safety regulations do not apply to manufacturing establishments such as Kaltech.

Although the . . . permitting process requires that an applicant pass a certificate of fitness exam, it does not require that employees who handle hazardous materials be made aware of the hazards and be trained in methods of safe handling.

Although the Fire Prevention Code requires a permit for storage of one or more carboys of nitric acid, Kaltech did not have one. Kaltech was permitted by FDNY to store flammable mixtures. The consolidated examination (C98) and study materials for a certificate of fitness for flammable mixtures are the same as those required for nitric acid. The study materials address the hazards of incompatible chemicals, including a specific statement that nitric acid should not come into contact with flammable liquids.

The metal carboy of nitric acid involved in the incident was not identified or labeled by Kaltech, nor were the other carboys whose contents were pumped into the 55-gallon drum prior to the explosion and fire. The employees engaged in this task did not know the identity of the materials, their hazards, or their compatibility. The Fire Prevention Code does not specifically require the identification or labeling of chemicals. If FDNY personnel observe unlabeled containers during an inspection, they have no specific authority under current regulations to require materials identification and hazard labeling.

The Fire Prevention Code does not prohibit the mixing of incompatible chemicals in manufacturing facilities. Although the study materials for the certificate of fitness examination address the incompatibility of nitric acid and flammable liquids, this guidance is voluntary. The Code makes it unlawful only for wholesale drug stores and chemical supply houses to store incompatible chemicals next to each other. For these establishments, the Code specifically prohibits “any organic substance, or other acids or chemicals in close proximity to such carboys or stocks of nitric acid.” Currently, these safety regulations do not apply to manufacturing establishments such as Kaltech.

The Kaltech employees who were transferring the contents of the carboys to a 55-gallon drum had not received any formal training on chemical hazards in the workplace or on safe handling practices. The workers were never shown MSDSs, nor did they have access to them. In fact, Kaltech did not have an MSDS for nitric acid onsite.

Although the Fire Prevention Code permitting process requires that an applicant pass a certificate of fitness exam, it does not require that employees who handle hazardous materials be made aware of the hazards and be trained in methods of safe handling. Further, the Code does not mandate that MSDSs be made available to workers onsite.

FDNY personnel conducted periodic inspections of the Kaltech facility. The company was issued citations for blocking exit pathways, absence of exit signs, lack of a certificate of fitness for the individual responsible for paint booth operations, and improperly vented storage cabinets. However, FDNY officials acknowledge that they were unaware that Kaltech stored and handled permitted substances (e.g., flammables and nitric acid) in the basement.¹⁶ FDNY had not inspected the basement area.

The addition of more comprehensive hazardous materials coverage to the Fire Prevention Code, such as that provided in current model codes, would offer better protection to occupants and workers in buildings and to nearby residents. For example, a key feature of both the ICC International Fire Code (IFC) and the NFPA Fire Protection Code (NFPA 1) is a requirement that a Hazardous Materials Management Plan (HMMP) be submitted as part of the permitting process.

The HMMP includes a facility site plan that requires information on the maximum amount of material stored or used in each area and container sizes. If an HMMP had been available prior to the Kaltech incident, fire inspectors would have been aware of the permitted hazardous materials stored and handled in the basement. The HMMP would provide fire inspectors with thorough background information for conducting inspections. Fire safety experts stated to the Board that the requirements for submission of a management plan and inventory statement are important elements of a model code.¹⁷

. . . FDNY officials acknowledge that they were unaware that Kaltech stored and handled permitted substances (e.g., flammables and nitric acid) in the basement.

. . . A key feature of both the International Fire Code and . . . NFPA 1 is a requirement that a Hazardous Materials Management Plan be submitted as part of the permitting process.

4.1.1.2 Fire Safety in Office Buildings

The Fire Prevention Code stipulates that office buildings in the city with more than 100 occupants above or below street level, or more than 500 occupants overall, must have a fire safety plan and a fire safety director. The plan is submitted to FDNY for approval.

¹⁶ The Fire Prevention Code of New York City does not prohibit the storage of containers of flammable materials in the basements of buildings. Model fire codes prohibit basement storage.

¹⁷ Glenn Corbett, PE, Assistant Professor, John Jay College of Criminal Justice, Department of Public Management, City University of New York. Guy Colona, PE, Vice-President, National Fire Protection Association. Dan Lane, Eastern Regional Director of Fire Service Activities, ICC. Testimony at CSB public hearing on the Kaltech incident, April 16, 2003, New York City.

. . . The Fire Prevention Code should require the owner of mixed occupancy buildings with a hazardous occupancy to collect hazardous materials information from tenants, to develop a building hazardous materials safety plan, and to designate a responsible person to implement the plan.

IFC comprehensively addresses requirements for the safe storage, use, and handling of hazardous materials.

New York State has adopted a version of IFC, which includes modifications developed by the State Fire Prevention and Building Code Council. The [State] Fire Code . . . applies to all local governments except New York City.

Fire safety directors are required to hold a certificate of fitness from FDNY. One of their roles is to designate fire wardens for each floor and conduct fire drills so that the fire safety plan is understood and effectively implemented. The Fire Prevention Code does not require the fire safety director to address hazardous materials safety in mixed occupancy buildings.

Because the requirement for a fire safety director is based on number of occupants, 123 West 19th Street did not have a fire safety director. In the interest of public safety, the Fire Prevention Code should require the owner of mixed occupancy buildings with a hazardous occupancy to collect hazardous materials information from tenants, to develop a building hazardous materials safety plan, and to designate a responsible person to implement the plan. The plan would be distributed to all tenants.

4.1.2 Model Fire Codes

IFC comprehensively addresses requirements for the safe storage, use, and handling of hazardous materials. The code includes 18 chapters on a variety of hazard categories, such as flammable and combustible liquids, oxidizers, and corrosive materials. Both an HMMP and a Hazardous Materials Inventory Statement (HMIS) must be submitted prior to receiving a permit for storage or use. The HMIS must include detailed information on hazard classification, MSDS, maximum quantity stored, and storage conditions. Additionally, IFC requires that MSDSs be readily available on the premises and that all individual containers be labeled as to chemical hazard.

IFC specifies the separation of incompatible materials. This requirement applies to all covered facilities, including manufacturing facilities. Under IFC, personnel working with hazardous materials must be trained on the hazards as well as on the appropriate emergency response.

New York State has adopted a version of IFC, which includes modifications developed by the State Fire Prevention and Building Code Council (SFPBCC). The Fire Code of the State of New York applies to all local governments except New York City. However,

State law provides that SFPBCC can impose the State code on New York City if it determines that the local code provisions are less stringent.

The State Fire Code has adopted the requirements of IFC that pertain to labeling, MSDSs, worker training, and the separation of incompatible materials—requirements that are not addressed in the New York City Fire Prevention Code. The State code does not include IFC permitting provisions, such as requirements for the submission of an HMMP or HMIS.

NFPA has similar requirements in NFPA 1 (Uniform Fire Code [UFC]). Additionally, NFPA has separate codes for specific classifications of hazardous materials, such as the Code for Storage of Liquid and Solid Oxidizers (NFPA 430). NFPA 1 covers nitric acid as a class 2 oxidizer. NFPA 430 requires that oxidizers be identified and labeled; it also requires separation of incompatible materials and employee training on the safe handling of covered oxidizers.

The New York City Fire Prevention Code has significant gaps in its coverage of hazardous materials, such as nitric acid, with regard to:

- Chemical identification and labeling
- MSDS requirements
- Worker training
- Separation of incompatible materials at manufacturing facilities.

IFC and NFPA 1 specifically address these requirements.

If the New York City Fire Prevention Code had adequately covered these safety requirements, and if it had been enforced, the April 25 incident would have been less likely to occur. FDNY officials informed CSB that they will review model fire codes as a result of activity by the Mayor’s Commission to Study the Feasibility of Adopting a Model Building Code. On May 27, 2003, the Mayor accepted the Commission recommendation to adopt the International Building Code. The State Fire Code recognizes that fire prevention codes and building codes are closely related.¹⁸

The State Fire Code has adopted the requirements of IFC that pertain to labeling, MSDSs, worker training, and the separation of incompatible materials . . .

The New York City Fire Prevention Code has significant gaps in its coverage of hazardous materials, such as nitric acid, with regard to:

- *Chemical identification and labeling*
- *MSDS requirements*
- *Worker training*
- *Separation of incompatible materials at manufacturing facilities.*

FDNY officials informed CSB that they will review model fire codes as a result of activity by the Mayor’s Commission to Study the Feasibility of Adopting a Model Building Code.

¹⁸NY CLS Exec Preceding § 371 (2)(b)(2).

4.2 NYSDEC Regulations

A review of Kaltech hazardous waste manifests for the past 2 years . . . indicates that the company exceeded the Subtitle C SQG waste limits and was an LQG on the day of the incident.

4.2.1 Resource Conservation and Recovery Act (RCRA)

The NYSDEC Division of Solid and Hazardous Materials (DSHM) administers the New York State RCRA¹⁹ program through nine regional field offices. Kaltech waste management operations were under the jurisdiction of the Region 2 office, located in Long Island City.

Kaltech began shipping hazardous wastes in the early 1990s after being issued a generator identification number by EPA.²⁰ On its original application to EPA, Kaltech indicated that it was a small quantity generator (SQG).²¹ A review of Kaltech hazardous waste manifests for the past 2 years, however, indicates that the company exceeded the Subtitle C SQG waste limits and was an LQG on the day of the incident.

4.2.2 RCRA Subtitle C Requirements

4.2.2.1 Hazardous Waste Determination and Container Labeling

RCRA requires waste generators to determine if their wastes are hazardous and if they are compatible for mixing, if applicable. Generators are then required to label waste containers with the

¹⁹RCRA was enacted in 1976 as an amendment to the Solid Waste Disposal Act of 1965. It authorizes EPA—and states granted authority by EPA—to promulgate regulations ensuring environmentally sound waste management practices. Subtitle C of RCRA specifically outlines the regulation of hazardous wastes and creates a tracking and compliance program for generators and transporters, and for those who treat, store, or dispose of such wastes. EPA granted New York State final authority to implement its own RCRA program on May 29, 1986. Soon thereafter, New York State promulgated RCRA regulations and codified those pertaining to Subtitle C in New York Codes, Rules, and Regulations, Title 6, Chapter IV, Subpart B, Parts 370 through 376.

²⁰The issuance of generator identification numbers is one of the Subtitle C functions that EPA did not delegate to NYSDEC. EPA forwards the generator application information and identification number to NYSDEC for waste tracking and compliance assurance.

²¹An SQG is defined as a business or entity that generates between 100 and 1,000 kilograms of nonacute hazardous waste per month.

words “hazardous waste” and any other wording necessary to identify the specific hazards associated with the waste materials. Any unknown wastes must be tested and characterized so that they can be properly labeled to ensure safe handling and disposal.

The hazardous waste contractor used by Kaltech routinely provides these types of testing services to its clients; according to the contractor, Kaltech declined these services.

On the day of the incident, Kaltech employees mixed the unknown contents of an unlabeled carboy with other known waste materials, which led to a violent reaction. Proper testing and labeling would have helped prevent this event by communicating to workers that the material in the carboy was a strong acid and incompatible with other wastes.

A manifest for a shipment that left Kaltech just prior to the explosion and fire revealed other errors in waste characterization, indicating that testing and labeling inadequacies extended beyond the single carboy involved in this incident.

4.2.2.2 Personnel Training

RCRA requires LQGs to conduct formal training—either classroom instruction or on-the-job-training—for all personnel involved in hazardous waste operations. The instruction must be directed by a person trained in hazardous waste management and must focus on relevant duties to be performed by the employee. The training must also communicate the specific hazards associated with waste management and provide enough information so that the employee can respond effectively to emergency situations. The facility owner must maintain accurate and detailed training records.

Kaltech had no formal training program and did not maintain any records of training. Workers claimed that they never received formal training, but simply followed the instructions of their supervisor when preparing hazardous wastes for disposal. The Kaltech hazardous waste contractor offers waste management training to its clients for a fee, but CSB investigators were told that Kaltech had declined it.

Proper testing and labeling would have helped prevent this event by communicating to workers that the material in the carboy was a strong acid and incompatible with other wastes.

RCRA requires LQGs to conduct formal training—either classroom instruction or on-the-job-training—for all personnel involved in hazardous waste operations.

Kaltech had no formal training program and did not maintain any records of training.

A formal training program would have alerted employees to the hazards associated with mixing uncharacterized and unlabeled wastes, and would have likely prevented this incident.

4.2.3 NYSDEC Region 2 RCRA Subtitle C Inspections

At the time of the CSB investigation, NYSDEC Region 2 reported that it was responsible for 5,335 RCRA facilities, as detailed in Table 1.

Although less than 2 percent of all NYSDEC Region 2 RCRA facilities are inspected annually,²² Region 2 staff told CSB investigators that they substantially meet annually projected inspection goals.

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Table 1
NYSDEC Region 2 RCRA Facility and Inspection Data

Generator/Facility Type	DEC Region 2 Facilities (April 1, 2003)	DEC Region 2 Inspections (FY 2002–2003)	DEC Region 2 Inspection Goals (FY 2002–2003)
Large quantity	537	8	Not specified
Small quantity	2,703	12	Not specified
Conditionally exempt small quantity	2,092	53	Not specified
Transfer, storage, and disposal (operating)	3	5	5
TOTAL	5,335	78	74 (a)

(a) The specific number of inspections to support annual inspection goals at SQG, LQG, and conditionally exempt small quantity facilities was not provided.

²² Approximately 1.5 percent of all LQGs in New York State are inspected annually.

Each of the NYSDEC regions prioritizes generator inspections using the following general guidelines:

- LQGs not inspected in the last 5 years
- Generators with major violations in past inspections
- Generators that have never been inspected.

Region 2 currently has two credentialed²³ inspectors, who also perform other duties. Because inspections require an average of 3.2 person-days,²⁴ they are limited and prioritized.

To inspect each LQG every 5 years, Region 2 would have to conduct approximately 100 additional inspections each year, which would require additional resources.

Kaltech was never inspected during its decade of operation as a hazardous waste generator, despite its change from SQG to LQG—and despite operating in a mixed-occupancy²⁵ facility within a densely populated area.²⁶ A NYSDEC compliance inspection would likely have identified and corrected the problems that led to this incident, such as inadequate testing and labeling and the lack of a formal training program.²⁷

Kaltech was never inspected during its decade of operation as a hazardous waste generator, despite its change from SQG to LQG—and despite operating in a mixed-occupancy facility within a densely populated area.

²³A credentialed inspector has the required training and experience to conduct RCRA Subtitle C inspections in accordance with NYSDEC regulations.

²⁴3.2 person-days includes the administrative activities associated with each inspection.

²⁵NFPA 101 and proposed NFPA 5000 define a mixed occupancy as one in which two or more classes of occupancy exist in the same building or structure and where such classes are intermingled, so that separate safeguards are impracticable.

²⁶A “densely populated area” is an area within a 1998 U.S. Bureau of Census “Census Designated Place” (CDP) that contains at least 1,000 people per square mile, and has or is part of a block of contiguous CDPs with a total population of at least 10,000. Kaltech is clearly located within such a CDP.

²⁷The NYSDEC RCRA Subtitle C inspection form addresses the RCRA deficiencies causally related to this incident.

4.3 NYCDEP Regulations

NYCDEP gathers information on facilities using or storing hazardous substances by requiring them to submit a facility inventory form annually.

Bureau [of Fire Prevention] staff advised CSB investigators that access to the facility inventory data gathered through the Right-to-Know program could be useful for permit compliance and enforcement.

The nitric acid and other carboys that Kaltech attempted to consolidate immediately prior to the explosion and fire were not labeled. In addition, CSB determined that the facility inventory form submitted to NYCDEP was incomplete.

The New York City Community Right-to-Know Law²⁸ states:

The Commissioner [of NYCDEP] shall have the power to collect, compile, and manage information concerning the amount, location, and nature of hazardous substances present in the city. This information shall be made available to city personnel responsible for responding to emergencies involving hazardous substances and the public.

NYCDEP gathers information on facilities using or storing hazardous substances by requiring them to submit a facility inventory form annually. Facilities are required to declare whether they have quantities in excess of threshold values for some 3,000 substances listed by NYCDEP as hazardous.

NYCDEP compiles information on the location, quantity, and identity of hazardous substances in the city and shares it with FDNY, which uses it for emergency response. This information is not currently shared with the FDNY Bureau of Fire Prevention, which is responsible for approving and issuing hazardous materials permits. Bureau staff advised CSB investigators that access to the facility inventory data gathered through the Right-to-Know program could be useful for permit compliance and enforcement. Subsequently, FDNY officials stated that they were interested in developing a system to share the information more broadly within the department, including the Bureau of Fire Prevention.²⁹

NYCDEP also conducts compliance inspections. The NYCDEP 2001 Annual Report states:

DEP's Right-to-Know inspection team has conducted 2,522 inspections this year. Three hundred and ninety (390) Notices of Violation have been issued compared to 647 last year. This decrease is a result of achieving compliance in the public power utility sector during the previous year. Most (96.4%) of the 390 violations have been for failure to file a Facility Inventory Form.

²⁸Local Laws of the City of New York, No. 26, 1988; to amend the Administrative Code of the City of New York in relation to the reporting of certain information on the storage of chemicals and other hazardous substances.

²⁹Ronald Spadafora, Assistant Chief of Fire Prevention, FDNY. Testimony at CSB public hearing on the Kaltech incident, April, 16, 2003, New York City.

The Right-to-Know law also requires that: “. . . All hazardous substances present at such facility shall be clearly marked with a label showing the chemical name and CAS³⁰ identification number of the hazardous substance.”

The nitric acid and other carboys that Kaltech attempted to consolidate immediately prior to the explosion and fire were not labeled. In addition, CSB determined that the facility inventory form submitted to NYCDEP was incomplete. Many chemicals stored onsite were not declared, including nitric acid, for which the NYCDEP reporting threshold is 10 pounds. A full carboy of nitric acid would contain more than 10 times that amount.

NYCDEP did conduct facility inspections at Kaltech. However, no violations of labeling or Right-to-Know submissions were identified. The owners stated that NYCDEP inspections focused on the quality of the company’s wastewater discharge to city sewers.

Many chemicals stored onsite were not declared, including nitric acid, for which the NYCDEP reporting threshold is 10 pounds. A full carboy of nitric acid would contain more than 10 times that amount.

4.4 OSHA Regulations

Two OSHA standards address the major causes of this incident—the OSHA Hazard Communication Standard (CFR 1910.1200; HAZCOM) and the Flammable and Combustible Liquids Standard (CFR 1910.106).

4.4.1 HAZCOM Requirements

HAZCOM provides a framework for informing workers about the identities and hazards of chemicals in the workplace. Its purpose is to provide workers with the information they need to protect themselves and to effectively participate in their employers’ chemical safety programs. In addition, the standard gives employers information they need to design and implement an effective protective program. The standard has four basic requirements, as described below.

³⁰Chemical Abstracts Service (CAS)—which assigns unique identification numbers to millions of chemical substances—is an entity of the American Chemical Society.

Each container in the workplace must be labeled, tagged, or marked with the identity of hazardous chemicals contained therein and must show hazard warnings appropriate for employee protection.

Employees are to be trained before they are assigned to work with a hazardous chemical. If they do not understand verbal English, the employer must train them in a language that is comprehensible.

All workplaces where employees are exposed to hazardous chemicals are required to have a written plan that describes how the HAZCOM standard is implemented . . .

4.4.1.1 Labeling

Each container in the workplace must be labeled, tagged, or marked with the identity of hazardous chemicals contained therein and must show hazard warnings appropriate for employee protection. Labels must be legible, written in English (plus other languages, if desired), and prominently displayed. If hazardous chemicals are transferred into unmarked containers, the containers must be labeled except when they are for the immediate use of the employee performing the transfer.

4.4.1.2 Material Safety Data Sheets

MSDSs for hazardous chemicals at the worksite must be readily accessible during the workshift to employees who work in the area where an exposure may occur.

4.4.1.3 Training

Employers are responsible for training workers on the chemical hazards in their workplaces, retaining warning labels, and making available the MSDSs for hazardous chemicals. Employees are to be trained before they are assigned to work with a hazardous chemical. If they do not understand verbal English, the employer must train them in a language that is comprehensible. In addition to information on OSHA requirements and the employer's program, the training must cover operations in work areas where hazardous chemicals are present.

4.4.1.4 Written Plan

All workplaces where employees are exposed to hazardous chemicals are required to have a written plan that describes how the HAZCOM standard is implemented in that facility. The plan must contain a list of hazardous chemicals to be used in informing employees of the hazards of nonroutine tasks (e.g., collection and repackaging of wastes).

4.4.2 Flammable and Combustible Liquids Requirements

The Flammable and Combustible Liquids standard is the key OSHA regulation related to the protection of workers from fire and explosion hazards. It was promulgated in 1974—based on the 1969 version of NFPA 30—and addresses the primary concerns of design and construction, ventilation, ignition sources, and storage.

Three specific areas are relevant to this incident:

- Location of flammable or combustible liquids outside storage rooms or cabinets.
- Separation of flammable and combustible liquids and protection of employees by means of adequate drainage and ventilation.
- Grounding of containers that receive flammable liquids.

The Flammable and Combustible Liquids standard is the key OSHA regulation related to the protection of workers from fire and explosion hazards.

4.4.3 OSHA Citations

Following the April 25, 2002, incident, OSHA conducted a comprehensive safety and health inspection and cited Kaltech for 36 alleged serious violations. This was the first OSHA visit to Kaltech; interviews with employees revealed that they generally did not know of OSHA's function or that such an agency existed.³¹

OSHA alleged that Kaltech was in violation of a number of standards that are intended to prevent incidents and injuries related to hazardous materials.

OSHA cited a number of violations of HAZCOM, specifically sections dealing with a written hazard communication program, MSDSs, training, and labeling.³²

Following the April 25, 2002, incident, OSHA conducted a comprehensive safety and health inspection and cited Kaltech for 36 alleged serious violations. This was the first OSHA visit to Kaltech . . .

³¹The majority of Kaltech employees were immigrants. OSHA conducts foreign language outreach activities through grants and publications; however, foreign language publications are almost exclusively limited to Spanish.

³²HAZCOM is the most cited OSHA standard in the manufacturing sector.

The metal carboy of nitric acid was not identified or labeled, nor were the other carboys. There was no list of chemicals stored or used in the Kaltech facility, and workers had no formal training in chemical safety. The employees who pumped the contents from the carboys prior to the incident incorrectly assumed the identity of the materials. MSDSs were not readily accessible to employees. There was no hazard communication program, written or otherwise.

The employees who pumped the contents from the carboys prior to the incident incorrectly assumed the identity of the materials. MSDSs were not readily accessible to employees. There was no hazard communication program, written or otherwise.

If Kaltech was in compliance with HAZCOM and if the workers were aware of the hazards inherent in the chemicals they were using and mixing, it is likely that this incident would not have occurred.

OSHA also cited Kaltech for noncompliance with the Flammable and Combustible Liquids standard and for the use of electrical components unsuitable for hazardous locations. Violations covered storage, separation, and grounding of flammable and combustible liquids.

Finally, OSHA cited Kaltech in other areas that may not have direct relevance to the causation of this incident, but are nevertheless essential to prevent or reduce the severity of future incidents. These citations included the following:

- Inadequate emergency response plans.
- Inadequate training on the use of fire extinguishers.
- Improper use of respirators and other personal protective equipment.
- Inadequate egress.
- Mixing incompatible chemicals (General Duty³³ clause citation).

OSHA also cited Kaltech for noncompliance with the Flammable and Combustible Liquids standard and for the use of electrical components unsuitable for hazardous locations.

³³The General Duty Clause, Section 5(a)(1) of the Occupational Safety and Health Act, requires employers to keep their workplaces free of serious, recognized hazards. This clause is generally cited when no OSHA standard applies to the hazard.

4.4.4 OSHA Enforcement Policy

OSHA has a program for targeting businesses for inspection if their injury and illness rates are among the highest in certain designated high risk classifications. Some 14,000 establishments are identified on a priority inspection list. The overall classification to which Kaltech belongs—“Signs and Advertising Specialties”³⁴—is included on the list. Nationally, there are 54 firms with high enough injury and illness rates to be included on the priority inspection list—three of which are in New York State (but not in New York City). Kaltech is not on the list.

In the absence of a major event (e.g., explosion), an incident that involved fatalities or a number of serious injuries, or an employee complaint, it is unlikely that OSHA would inspect businesses of the type and size of Kaltech. As noted in Section 4.4.3, the post-incident inspection was OSHA’s first visit to Kaltech.

Where there is evidence that a specific industry has excessive safety and health problems, OSHA often establishes a “special emphasis program,” either on the local or national level. Among the standards cited by OSHA in its Kaltech investigation, eight are among the top 10 most commonly cited standards for small businesses in the manufacturing sector. Nevertheless, because no one was killed in the Kaltech incident, and because there is insufficient evidence of a large number of similar incidents in the same industry or in the same geographic area, it is unlikely that OSHA could justify a local or national special emphasis program.

However, OSHA also identifies businesses in need of inspection through “referral agreements.” Under a referral program, when other government agencies with more frequent access to certain worksites observe working conditions that are clearly unsafe and do not fall within their jurisdiction, they refer the problem to OSHA.

In the absence of a major event (e.g., explosion), an incident that involved fatalities or a number of serious injuries, or an employee complaint, it is unlikely that OSHA would inspect businesses of the type and size of Kaltech.

Among the standards cited by OSHA in its Kaltech investigation, eight are among the top 10 most commonly cited standards for small businesses in the manufacturing sector.

³⁴SIC Code 3993.

OSHA has formal agreements on the Federal level with EPA, the Wage and Hour Division of the U.S. Department of Labor,³⁵ and the U.S. Department of Agriculture Food Safety and Inspection Service. On a regional level, OSHA has referral agreements with state highway departments (for highway construction), with local police departments (for identifying trenching and shoring hazards in the construction industry), and with medical examiners' offices.

Referral systems are not intended to promote redundancy in enforcement responsibilities or to encourage agencies to refer problems that they should address themselves. Training on relevant OSHA standards is a component of most referral programs.

FDNY frequently inspects small businesses such as Kaltech as part of the hazard permit process. Because FDNY inspectors may be in a position to observe obvious workplace safety and health hazards that are outside of their jurisdiction, a referral arrangement between FDNY and OSHA may be an appropriate and effective means of bringing obvious violators of workplace safety practices to OSHA's attention.

Because FDNY inspectors may be in a position to observe obvious workplace safety and health hazards that are outside of their jurisdiction, a referral arrangement between FDNY and OSHA may be an appropriate and effective means to bring obvious violators of workplace safety practices to OSHA's attention.

³⁵The Wage and Hour Division enforces Federal minimum wage, overtime pay, record keeping, and child labor requirements of the Fair Labor Standards Act. It also enforces the Migrant and Seasonal Agricultural Worker Protection Act, the Employee Polygraph Protection Act, the Family and Medical Leave Act, wage garnishment provisions of the Consumer Credit Protection Act, and a number of employment standards and worker protections as provided in several immigration-related statutes.

5.0 Root and Contributing Causes

5.1 Root Causes

1. Kaltech did not develop or maintain a chemical hazard communication program in accordance with established OSHA standards.
 - There was no compiled list of hazardous chemicals present in the facility.
 - Containers of wastes and certain chemicals onsite were not labeled.
 - Employees received no formal training on the hazards of specific chemicals in the workplace.
 - Material safety data sheets were unavailable to the workforce.
2. Kaltech did not manage its hazardous waste in accordance with established EPA regulations.
 - Waste materials were mixed without being identified or characterized, and no effort was made to determine compatibility among materials.
 - Employees received no formal training on proper hazardous waste management practices.

5.2 Contributing Causes

1. New York City fire codes and regulations do not incorporate important general safety requirements for hazardous chemicals, such as:
 - Facility inventory statements and management plans
 - Container labeling
 - Material safety data sheets
 - Separation of incompatible materials.

2. Inadequate inspections by Federal, State, and local authorities allowed unsafe practices to go uncorrected.

- The New York State Department of Environmental Conservation had never inspected hazardous waste operations at Kaltech.
- OSHA had never conducted a workplace safety inspection of Kaltech.

6.0 Recommendations

The Mayor and Council
of the City of New York

1. Revise the Fire Prevention Code, Title 27, Chapter 4, of the New York City Administrative Code, to achieve more comprehensive control over the storage and use of hazardous materials, such as nitric acid, that could cause a fire or explosion when inadvertently mixed with incompatible substances. Base these revisions on model fire codes such as the International Code Council International Fire Code and the National Fire Protection Association Fire Protection Code. (2002-02-1-NY-R1). Require that:
 - All hazardous materials be identified and labeled.
 - Hazardous materials permit applications include the submission of a management plan and inventory statement.
 - Material safety data sheets be accessible to the workforce.
 - Personnel working with hazardous materials be trained on hazards and safe handling techniques in languages understood by the workforce.
 - Incompatible chemicals be adequately separated to improve safety in manufacturing facilities.
 - New York City fire inspectors receive sufficient training to meet the requisite skills and knowledge to verify code compliance and recognize problems regarding the storage, handling, and use of hazardous materials. Include in the training:
 - ◆ Hazard communication requirements.
 - ◆ Identification of hazardous materials storage and use areas.
 - ◆ Safe storage and handling practices, such as the need to separate incompatible chemicals and to limit quantities.
2. Amend the New York City Administrative Code § 27-4267 to require that (2002-02-1-NY-R2):
 - The owner or other person having charge of a mixed-occupancy building with a hazardous occupancy be required to develop a building hazardous materials safety plan and designate a responsible individual to ensure that the plan is implemented.

-
- The building hazardous materials safety plan incorporate information from the hazardous materials management plans, inventory statements, right-to-know facility inventory forms, and Fire Prevention Code permits of any tenants who use hazardous materials.
 - The building hazardous materials safety plan be distributed to all tenants.
3. Ensure that the New York City Fire Department (FDNY) and the Department of Environmental Protection (NYCDEP) establish a program to exchange facility information regarding hazardous chemical inventories to enhance inspection and enforcement activities. (2002-02-1-NY-R3)

New York State Department of
Environmental Conservation
(NYSDEC), Region 2

1. Raise the priority of inspections of large quantity generators located in mixed-occupancy facilities within densely populated areas. (2002-02-1-NY-R4)
2. Share data, such as the Resource Conservation and Recovery Act (RCRA) biennial report, with the New York City Fire Department (FDNY) and Department of Environmental Protection (NYCDEP) concerning the identity, location, and hazardous waste inventories of large quantity generators within the City to enhance inspection and enforcement activities. (2002-02-1-NY-R5)

Kaltech Industries Group, Inc.,
and Beyond Signs, Inc.

1. Develop and implement a written hazard communication program that includes the following requirements (2002-02-1-NY-R6):
 - Maintaining a list of hazardous materials used in the workplace.

-
- Labeling of hazardous materials.
 - Maintaining material safety data sheets and making them available to the workforce.
 - Training of employees on chemical hazards and their safeguards in languages understood by the workforce.
2. Implement hazardous waste management practices that include the following (2002-02-I-NY-R7):
- Characterization of unknown waste materials prior to mixing or disposal.
 - Labeling of all waste containers with the words “Hazardous Waste” and any other wording necessary to communicate the specific hazards associated with the material.
 - Formal hazardous waste management training program.

Occupational Safety and
Health Administration
(OSHA), Region II

1. Disseminate information on the requirements of the Hazard Communication Standard, 29 CFR 1910.1200, in the major languages spoken by workers in New York City with limited or no English speaking proficiency. (2002-02-I-NY-R8)
2. Establish a complaint and referral system with the New York City Fire Department (FDNY) to provide for a coordinated enforcement effort that addresses the following issues (2002-02-I-NY-R9):
- Policy and practice for referring to OSHA possible health and safety violations or unsafe conditions observed by FDNY personnel in the course of conducting inspections, but outside the scope of FDNY responsibility.
 - Periodic training programs for FDNY personnel on how to recognize and refer serious workplace safety and health problems.

New York City
Fire Department

Establish a complaint and referral system with the Occupational Safety and Health Administration (OSHA; Region II) to provide for a coordinated enforcement effort that addresses the following issues (2002-02-1-NY-R10):

- Policy and practice for referring to OSHA possible health and safety violations or unsafe conditions observed by FDNY personnel in the course of conducting inspections, but outside the scope of FDNY responsibility.
- Periodic training programs for FDNY personnel on how to recognize and refer serious workplace safety and health problems.

Association of State and
Territorial Solid Waste
Management Officials

Communicate the findings of this report to your membership.
(2002-02-1-NY-R11)

Building Owners and
Managers Association

Communicate the findings of this report to your membership.
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AFL-CIO

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National Conference of
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Safety and Health

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of Mayors and
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Real Estate Board of
New York

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APPENDIX A: Logic Diagram

