President’s Message…

Hello Folks,

We cancelled February’s meeting rather than drag you out in the bad weather. Hopefully winter is almost over and we won’t have to do that again.

Join us on March 3 when Anthony Gee of Fireway, Inc. will tell us about Condensed Aerosol Fire Suppression Systems.

Ed Armm and Rich Reitberger have been busy making arrangements for our annual joint technical seminar with AFAA. This year it will be held on April 17 at the Hanover Manor. Save the date and look for the official announcement.

Joe Janiga
President, NJ Chapter SFPE
Due to yet another snow storm there was no February meeting and thus, no minutes.

**A Word about our March 3rd technical presentation—**

**Condensed Aerosol Fire Suppression Systems**

Our speaker will be Anthony Gee who is the Chief Technology Officer of Fireaway Inc. He is responsible for the engineering services and technical & training support for the Stat-X condensed aerosol products.

Anthony is a mechanical engineer with 30 years of domestic and international engineering, project management. He has business development experience with fire detection and suppression systems as well as products for various well known fire protection manufacturers. Anthony has extensive experience in the design and supply of fire protection systems for special hazard applications including the development of state-of-art products for the fire protection market including gaseous, water-mist, and aerosol fire suppression systems. Anthony is an alternate member of the NFPA 2010 technical committee and a member of the SFPE.

His presentation will provide an overview of Condensed Aerosol Fire Suppression Systems, designed and listed to the requirements of NFPA 2010 “Standard for Fixed Aerosol Fire-Extinguishing Systems” (first published edition in 2006). This space age technology was recognized on the US EPA SNAP List as a Halon 1301 replacement system as early as 1995, however this highly effective environmentally friendly fire suppression technology still remains little known by the fire protection industry today. In 2008, UL published UL subject 2775, to category FWSA “Fixed Condensed Aerosol Fire Extinguishing System Units”, and several listed systems are now available on the market.

This presentation describes the technology, the mechanism by which it extinguishes flames, brief list of performance and qualification fire tests conducted by independent laboratories and agencies, and an overview of special hazard applications where this type of system is in actual use. By the end of the presentation the meeting participants will have an appreciation of the technical and economic benefits of this technology compared with current fire suppression technologies, and an understanding why and how this technology has the potential to revolutionize current fire protection practices based on gaseous and water based flooding systems.
The following is a study of sprinkler system effectiveness and cost benefit analysis of sprinklers in warehouses in the UK. For those that are always looking for additional statistics, there are some interesting statistics in the article below:

News from BRE

published: 29/1/2014

Study shows that, on average, fire sprinklers are a sound investment for larger warehouses

One in five warehouses in England, approximately 621 premises, will have a fire requiring the attendance of fire fighters each year. The total annual cost to the UK economy of fires in English warehouses without fire sprinklers is £232 million.

The main finding from a three-year study conducted independently by BRE Global and commissioned by the Business Sprinkler Alliance (BSA) has shown that sprinklers are, on average, a cost effective investment for warehouses with a floor area above 2,000 m², with the greatest benefit arising from the reduction in direct fire losses.

The study looked at the whole-life cost benefit analysis for fire sprinkler installation in three ranges of warehouse sizes.

Key findings from the BRE study include:

• The whole life costs for warehouse buildings larger than 2,000m² (around half a football pitch in size) with fire sprinklers are on average 3.7 times lower than ones without them
• Fire sprinklers were, on average, not cost-effective in warehouses with an area below 2,000m²
• Environmental benefits from sprinklers include a reduction in CO₂ emissions from fire, reduced size of fire and reduced quantities of water used to fight fire
• Only 20% of warehouses between 2,000 and 10,000m² are fitted with fire sprinklers. For warehouses above 10,000m², the estimated fraction with fire sprinklers is 67%
• If all warehouses above 2,000m² were fitted with sprinklers, the annual saving to businesses in England could be up to £210m.

The research will be launched in the House of Commons today alongside a new study on the financial and economic impact of warehouse fires from the Centre for Economics and Business Research.

Dr. Debbie Smith, Director of Fire Science and Building Products at the BRE, said: “Despite a year-on-year decrease in the number of commercial fires, the estimated annual cost of these fires is rising along with related societal and environmental impacts. This project has broken new ground in terms of evaluating these broader sustainability impacts of fire in warehouses and demonstrating that, on average, sprinklers can be shown to deliver a net benefit.”

Iain Cox, BSA Chairman and former Chief Fire Officer of Royal Berkshire Fire and Rescue Service, said: “The findings of this study scratch the surface in terms of the return fire sprinklers bring to business. In the future the BSA intends to look at the cost effectiveness fire sprinklers have on other sectors, such as manufacturing. What is clear from the current research is that insurance alone is not enough to fully protect companies from the long-term impacts of fire. We urge the government to do more to encourage the installation of fire sprinklers in commercial premises and promote a better understanding of the positive impacts of physical resilience.”
NOTES TO EDITORS
Key data findings in table format

Table 1: For warehouses that experience a fire, the costs for buildings without sprinklers versus buildings with sprinklers are as follows:

(Values quoted in 2010 prices, and based on best estimates of fire and smoke damage costs)

<table>
<thead>
<tr>
<th>Quantity</th>
<th>“Small” warehouse (&lt; 2,000 m²)</th>
<th>“Medium” warehouse (2-10,000 m²)</th>
<th>“Large” warehouse (&gt; 10,000 m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No sprinkler</td>
<td>Sprinkler</td>
<td>No sprinkler</td>
</tr>
<tr>
<td>Cost of total area damaged</td>
<td>£116,427</td>
<td>£37,540</td>
<td>£1,511,289</td>
</tr>
<tr>
<td>Cost of injuries</td>
<td>£658</td>
<td>£1,692</td>
<td>£2,217</td>
</tr>
<tr>
<td>Cost of fatalities</td>
<td>£6,602</td>
<td>£17,665</td>
<td>£23,228</td>
</tr>
<tr>
<td>Cost of CO₂ released in fire</td>
<td>£202</td>
<td>£20</td>
<td>£2,661</td>
</tr>
<tr>
<td>Cost of CO₂ embodied in replacement</td>
<td>£537</td>
<td>£52</td>
<td>£7,081</td>
</tr>
<tr>
<td>Cost of water used in firefighting</td>
<td>£5,017</td>
<td>£3,609</td>
<td>£8,376</td>
</tr>
<tr>
<td>Cost of CO₂ embodied in rebuild</td>
<td>£106</td>
<td>£13</td>
<td>£866</td>
</tr>
<tr>
<td>Cost of unemployment</td>
<td>£15,818</td>
<td>£1,822</td>
<td>£196,268</td>
</tr>
<tr>
<td>Total costs</td>
<td>£145,364</td>
<td>£62,410</td>
<td>£1,751,983</td>
</tr>
</tbody>
</table>

Table 2: Whole life costs of warehouse buildings with and without sprinklers are:

(Values quoted in 2010 prices, and based on best estimates of fire and smoke damage costs)

<table>
<thead>
<tr>
<th>Quantity</th>
<th>“Small” warehouse (&lt; 2,000 m²)</th>
<th>“Medium” warehouse (2-10,000 m²)</th>
<th>“Large” warehouse (&gt; 10,000 m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No sprinkler</td>
<td>Sprinkler</td>
<td>No sprinkler</td>
</tr>
<tr>
<td>Total cost of fire</td>
<td>£21,895</td>
<td>£16,059</td>
<td>£845,065</td>
</tr>
<tr>
<td>Cost of insurance over lifetime</td>
<td>£32,630</td>
<td>£16,315</td>
<td>£139,604</td>
</tr>
<tr>
<td>Total cost of sprinklers</td>
<td>£66,349</td>
<td>£184,551</td>
<td></td>
</tr>
<tr>
<td>Total Whole Life Costs</td>
<td>£54,525</td>
<td>£98,722</td>
<td>£984,669</td>
</tr>
<tr>
<td>Whole life costs ratio</td>
<td>&lt; 1</td>
<td>3.6 to 1</td>
<td>3.7 to 1</td>
</tr>
</tbody>
</table>

It is important to note that these cost data are averaged results for buildings in given size ranges. If a calculation is required for a particular building, the costs and benefits, investment return period etc., should be derived from data that is pertinent to the individual case.

The lifetime of a warehouse building is assumed as 45 years.

Cost and statistical data on fire consequences, sprinkler maintenance and installation, and associated insurance values were collected from Government, industry bodies, select businesses, academic studies on fire and other publicly available and relevant sources.
About BRE Global

BRE Global Limited (incorporating LPCB & BREEAM) is an independent third party approvals body offering certification of fire, security and sustainability products and services to an international market. BRE Global's product testing and approvals are carried out by recognised experts in our world renowned testing laboratories. BRE Global Limited is custodian of a number of world leading brands including: LPCB for the approval of fire and security products and services, listed in the Red Books and BREEAM the world’s leading environmental assessment method for buildings, sets the standard for best practice in sustainable design and has become the de-facto measure of a building’s environmental performance. www.bre.co.uk

The Business Sprinkler Alliance

The Business Sprinkler Alliance or ‘BSA’ is a coalition of fire safety professionals working to protect UK plc against fire. The BSA aims to highlight the true cost of fire and the business benefits of automatic fire sprinkler systems. Established in 2010, the BSA’s founding members include the Chief Fire Officer’s Association; the National Fire Sprinkler Network (NFSN); the European Fire Sprinkler Network (EFSN); the British Automatic Fire Sprinkler Association (BAFSA) and leading commercial property insurer FM Global. www.business-sprinkler-alliance.org

For further information please contact Linda McKeown, BRE, tel 01923 664569, email mckeownl@bre.co.uk or BSA media enquiries 0207 309 1014 or bsa@uk.ogilvypr.com

JOB OPENING

AM & Associates

Alan Margolin & Associates, Consulting Engineers has an immediate opening for a NYC Special Inspector. Special inspections would be performed on mechanical systems, sprinkler systems, standpipe, firestopping, spray-fire resistant materials, fire dampers, fire/smoke dampers, fire resistant rated construction, energy conservation code, and other building systems. PE preferred but will consider BSME with experience and certifications. For fast-tracked consideration, email me the candidate’s full resume with contact information. Base comp between 85-115k, with time and a half OT, bonuses, benefits, etc. http://www.amaa-eng.com/

Interested parties should contact:

John P. Stoppi Jr., PE, FPE
Alan Margolin & Associates, Consulting Engineers
420 Lexington Avenue - Suite 2738
New York, NY 10170
T: 212-867-6720
F: 212-867-6724
Cow Flatulence Blamed For Germany Barn Fire
1/28/2014 3:18 PM ET

A barn fire in Germany was caused by cow farts, according to Emergency Responders. Police and firefighters said Monday they were called to a barn in Rasdorf, Hesse to extinguish flames sparked when methane from the flatulent cows reacted with static energy from a massaging machine designed to increase milk production, local media reports.

One cow was treated for burns and the roof of the barn was damaged in the fire, police said.

Egg farm fire that killed 300,000 hens still smoldering days later

Firefighters in the Town of La Grange in Walworth County were back on the scene Sunday morning pouring more water on the remains of a huge fire Friday night at the S&R Egg Farm that killed more than 300,000 hens.

La Grange Fire Chief John Duerst said the fire began about 7:30 p.m. Friday night in one building. The family-run operation, with 14 barns, normally has 2 million hens on site.

Duerst said the fire became so large that 150 to 200 firefighters from at least five nearby counties representing as many as 55 departments helped fight the blaze. The building, which Duerst estimated was 300 feet long, 80 to 90 feet wide and three stories tall, was a total loss.

Duerst, who has been chief for 11 years and on the La Grange volunteer force for 35 years, said he could not recall fighting a bigger blaze. Firefighters had to haul in water from seven miles away to fight the fire, he said.

"We're very thankful for the other departments," Duerst said Sunday. "It's like the brotherhood of firefighters. If you call for help, they come."

The fire was brought under control by late Saturday morning, but firefighters showed up again Sunday morning to douse any remaining embers. A cause has not been determined, Duerst said.

The Schimpf family runs the egg farm, Duerst said, and employs 155 people. A family member could not be reached for comment, but a statement on the company's website said no one was injured in the blaze and all other barns were still in production.

The company plans to rebuild.

"S&R Egg Farm would like to thank and acknowledge the efforts of all the fire departments deployed and appreciates those sending compassionate regards," the company said.
SigniFire Monthly Minute
January 2014

The SigniFire Monthly Minute is an informational series discussing the Fike Video Image Detection UL/FM/CE/CSFM approved and server based video image flame and smoke detection systems.

Video Analytics for Engine Rooms/Thermal Oil Heaters

Oil/fuel aerosol is highly flammable. Given the right concentration it can become highly explosive. In fact, most powerful non-nuclear explosives, so-called fuel-air explosives (FAE) that are used to destroy underground bunkers use the exact same principle. Accidental release of fuel/oil spray may lead to potential fire or even explosive conditions. Any machinery using pressurized oil or fuel is a potential hazard. This includes engines (particularly diesels), pumps, hydraulics, heating equipment, etc. All have pipes filled with flammable liquid under extreme pressure. Combined with thermal stresses and vibrations, even under ideal maintenance, microscopic cracks will evidently develop causing fuel spray. Given that such installations have many hot surfaces, the probability for a FAE is high once an oil mist develops. Therefore, detecting aerosol mixtures before they reach critical concentration and size is crucial for disaster prevention.

Video Image Detection is a unique method that can visually detect sprays from a distance and give critical personnel an early warning with the ability to assess the situation and make an informed decision. As an added benefit, it also will alarm on open flames in the area, ordinary smoke from electric wiring or overheated equipment.

System Setup
Setting up VID begins with identifying the areas of potential hazard. The placement of cameras should be chosen to overlook large equipment. Sprays typically expand over the equipment where they can be detected. With these areas in mind, camera location is determined with a field of view of approximately a 45 degree angle looking down and 20ft from the hazard.

When the camera is installed and connected to the server, the analytics settings can be modified to target specific hazard areas for highest sensitivity with lowest false alarm rate. "Detect" (alarm) zones can be configured for each algorithm by drawing a polygon above and over the equipment so that an alarm will occur inside the zone. Areas with low potential for origination of smoke, mist or flame, such as the walkways will be excluded from the detect zones to avoid unwanted detections.

Operational Considerations
The video analytics sensitivity is set as high as possible in the “detect zones” for early detection of the slight vapor from atomized fuel or mist that can cause explosion.

SigniFire Equipment
SigniFire IP UL/FM approved cameras may be used, or off the shelf, ONVIF IP cameras connected to the SigniFire server-based analytics software.

Please let us know if we can help with site evaluations for the SigniFire solution for these and other potential applications.
CSB Investigation Finds 2010 Tesoro Explosion Resulted from "High Temperature Hydrogen Attack"

Seattle, Washington, January 29, 2014—The April 2010 fatal explosion and fire at the Tesoro refinery in Anacortes, Washington was caused by damage to the heat exchanger, a mechanism known as “high temperature hydrogen attack” or HTHA, which severely cracked and weakened carbon steel tubing leading to a rupture, according to a CSB draft report released today. The draft report makes far-reaching recommendations to the federal Environmental Protection Agency and the Governor and State Legislature of the State of Washington to more rigorously protect workers and communities from potentially catastrophic chemical releases.

The draft report is available at www.csb.gov for public comment until Sunday, March 16, 2014. Comments should be sent to tesorocomments@csb.gov. All comments received will be reviewed and published on the CSB website.

“Seven lives were tragically lost at the Tesoro refinery in 2010,” said Dr. Rafael Moure-Eraso, CSB chairperson. “I believe the draft report does an outstanding job of tracing this complex accident to its roots: a deficient refinery safety culture, weak industry standards for safeguarding equipment, and a regulatory system that too often emphasizes activities rather than outcomes. The report is a clarion call for refinery safety reform.”

Using sophisticated computer models, the investigation found the industry-wide method used to predict the risk of HTHA damage to be inaccurate, with equipment failures occurring under conditions deemed to be safe from HTHA. It cited deficiencies in the company’s safety culture that led to a “complacent” attitude toward flammable leaks and occasional fires. Investigators also determined that during the unit startup, Tesoro did not correct the history of hazardous conditions or limit the number of people involved in the hazardous non-routine startup of the heat exchangers. But because of the reoccurring leaks and the need to manually open a series of long-winded valves that required over one hundred turns by hand to fully open, a supervisor requested five additional workers to help. All seven lost their lives as a result of the blast.

CSB Chairperson Dr. Rafael Moure-Eraso said, “The accident at Tesoro could have been prevented had the company applied inherent safety principles and used HTHA resistant construction materials to prevent the heat exchanger cracking. This accident is very similar to the one that occurred at the Chevron refinery in Richmond, California in August 2012, where corrosion of piping went undetected for decades until it ruptured, endangering the lives of 19 workers caught in a vapor cloud and sending 15,000 community members to the hospital. Companies must do a better job of preventing refinery accidents, which occur all too frequently.”

The draft report notes that recommended practices of the American Petroleum Institute, the leading industry association, are written “permissively” with no minimum requirements to prevent HTHA failures. For example, API Recommended Practice 941 – Steels for Hydrogen Service – uses the term “should” 27 times and “shall” only once. It also does not require users to verify actual operating conditions in establishing operation limits of the equipment or to confirm that the materials of construction selection will prevent the damage. An inspection strategy that relied on design operating conditions rather than verifying actual operating parameters contributed to the accident.

The investigation found Tesoro, like others in the industry, use published data from the American Petroleum Institute, called the Nelson Curves, to predict the susceptibility of the heat exchangers to HTHA damage. The CSB found these curves unreliable because they use historical experience data concerning HTHA that may not sufficiently reflect actual operating conditions. For example, a CSB computer reconstruction of the process conditions in the exchangers determined that the portion of the carbon steel exchanger that failed likely operated below the applicable Nelson curve—indicating it was “safe.”

The CSB determined that inspections for such damage are unreliable because the microscopic cracks can be localized and difficult to identify. The report concludes, “Inherently safer design is a better approach to prevent HTHA.” It notes that API has identified high-chromium steels that are highly resistant; these were not installed by Tesoro. The CSB has called for the adoption of inherently safer technology, design and equipment in other reports, notably the Richmond, California, Chevron refinery fire of August 2012.

Chairperson Moure-Eraso said, “We need a national mandate for state and federal regulators to require chemical facilities utilize inherently safer technology to the greatest extent practicable. For example, storing or utilizing less hazardous materials, making the process safer by lowering temperatures and pressures, and installing the most reliable equipment available are critical to lowering the industry’s accident rate.”
The report stresses that the accident occurred during a startup of the naphtha hydrotreater unit, considered hazardous non-routine work, particularly due to the reoccurring leaks of flammable liquid. Despite this, required Process Hazard Analyses (PHA) at the refinery repeatedly failed to ensure that these hazards were controlled and that the number of workers exposed to these hazards was minimized. In addition, past PHA’s, including those done by the preceding owner, Shell Anacortes Refining Company, cited only judgment-based safeguards and did not verify whether safeguards listed in the PHA’s were actually effective.

Data for actual operating conditions was not readily available and technical experts were not required to prove safety effectiveness. “The refinery process safety culture required proof of danger rather than proof of effective safety implementation,” the report concluded.

As with the Chevron accident investigation, the Tesoro report notes the “considerable frequency of significant and deadly incidents at refineries over the last decade.” It states that in 2012 alone, the CSB tracked 125 significant incidents at U.S petroleum refineries. The draft report examines the effectiveness of refinery and chemical facility regulatory oversight, noting that Washington State’s Department of Labor and Industries (L&I) does not have sufficient personnel resources to verify that process safety management requirements are being implemented adequately. The report states that the agency audited the Tesoro refinery in March 2009 but found no deficiencies related to the heat exchanger that ruptured.

The regulatory findings in the report also concluded that under the existing U.S. and Washington State regulatory systems, there is no requirement to reduce risks to a specific target, for example as low as reasonably practicable, or ALARP, which is a hallmark of the safety case regime adopted successfully in Europe and Australia in the refinery and chemical sectors, as well as the nuclear and space sectors in the U.S. The safety case model is the subject of the draft regulatory report on the Chevron accident, released on December 16 of last year. The draft is still being considered by the Board.

The draft report states in one of its 40 key findings: “It is essential that regulators of high-hazard facilities are independent, well-funded, well-staffed, and technically qualified. These individuals must be able to effectively communicate with refinery personnel and monitor the adequacy of refinery process safety practices.”

The draft report – subject to a future vote by the board – includes numerous proposed safety recommendations to Washington’s legislature and governor, to its regulatory agency, Tesoro, and the American Petroleum Institute. These include a recommendation to the state to establish a more rigorous regulatory model, possibly based on the safety case regime, revise the state’s process safety management regulations to ensure the prevention of catastrophic releases, perform a safety verification audit at all refineries in the state.

The report found that both the Tesoro and Chevron incidents could have been prevented if inherently safer equipment materials of construction had been used. Although the use of inherently safer technology (IST) is the most effective approach to preventing major chemical accidents, it is not enforced by the EPA through the General Duty Clause or EPA’s Risk Management Program. The report concludes that EPA has the authority to require the use of IST and recommends that it should do so.

Other proposed recommendations would urge API to clearly establish the minimum necessary “shall” requirements to prevent HTHA equipment failures. Recommendations to Tesoro were aimed among other things at revising and improving its Process Hazard Analysis and damage mechanism hazard review programs for all Tesoro refineries in order to validate damage mechanism hazards and safeguards. The company was also urged in the draft to implement a program to perform periodic process safety culture surveys among the work force at the Tesoro Anacortes refinery to be conducted by a third party.

The CSB is an independent federal agency charged with investigating industrial chemical accidents. The agency’s board members are appointed by the president and confirmed by the Senate. CSB investigations look into all aspects of chemical accidents, including physical causes such as equipment failure as well as inadequacies in regulations, industry standards, and safety management systems.

The Board does not issue citations or fines but does make safety recommendations to plants, industry organizations, labor groups, and regulatory agencies such as OSHA and EPA. Visit our website, www.csb.gov. For more information, contact Communications Manager Hillary Cohen, cell 202-446-8094 or Sandy Gilmour, Public Affairs, cell 202-251-5496.
MEETING NOTICE

Date: March 3, 2014
Place: Hanover Manor
16 Eagle Rock Avenue
East Hanover, NJ 07936
Price: $30.00
Dinner: 5:00-6:00 (Cash bar for mixed drinks)
Dinner at 6 PM
Topic: Aerosol Suppression
Speaker: Anthony Gee—Fireaway

PLEASE COMPLETE AND RETURN WITH YOUR CHECK PAYABLE TO “SFPE NJ CHAPTER” TO:

Vicki Serafin
Affiliated FM
400 Interpace Parkway, Bldg C - 3rd Floor
Parsippany, NJ 07054-1196
vicki.serafin@affiliatedfm.com

OR PAY AT THE DOOR

NAME: ________________________________________________________________

COMPANY: ___________________________________ TELEPHONE: __________________________
# Meeting Dates/Programs 2013-2014

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 3</td>
<td>Aerosol Suppression by Anthony Gee—Fireaway</td>
</tr>
<tr>
<td>April 17</td>
<td>Chapter Seminar</td>
</tr>
<tr>
<td>May 5</td>
<td>NOVEC Fire Suppression Agent Update—Larry Lussier, 3M</td>
</tr>
<tr>
<td>June 2</td>
<td>Research projects which are being presented to SUPDET involving droplet characterization, deluge nozzles and a floor based extinguishing system for Class B fires.— Andy Lynch of Amped I R&amp;D</td>
</tr>
<tr>
<td>June</td>
<td>Joint NY/NJ Chapter Golf Outing – details and date to follow</td>
</tr>
</tbody>
</table>

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[JMCC](http://www.jmcholinconsultants.com)  
[Survivor Fire & Security Systems](http://www.survivorfire.com)  
[Oliver Fire Protection & Security](http://www.oliverfireprotection.com)  
[Associated Fire Protection](http://www.associatedfire.com)
Helpful links

ADAAG [http://www.access-board.gov/adaag/about/index.htm]
AFAA National [http://www.afaa.org/]
AFSA [http://www.firesprinkler.org/]
ANSI [http://web.ansi.org/]
ASHRAE [http://www.ashrae.org/]
Campus-Firewatch [http://www.campus-firewatch.com/]
Coffee Break Training [http://www.usfa.dhs.gov/nfa/coffee-break/]
CPSC [http://www.cpsc.gov/]
CSAA [http://www.csaaul.org/]
Municipal Codes (E Codes) [http://www.generalcode.com/Webcode2.html]
FM Global [http://www.fmglobal.com/]
FSDANY [http://www.fsdanv.org/regs.htm]
FSI [http://www.firesprinklerinitiative.org/]
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The Joint Commission (JCAHO) [http://www.jointcommission.org/www.JointCommission.org/]
Material safety data Sheets (MSDS-OSHA Site) [http://www.osha.gov/SLTC/hazardcommunications/index.html]
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