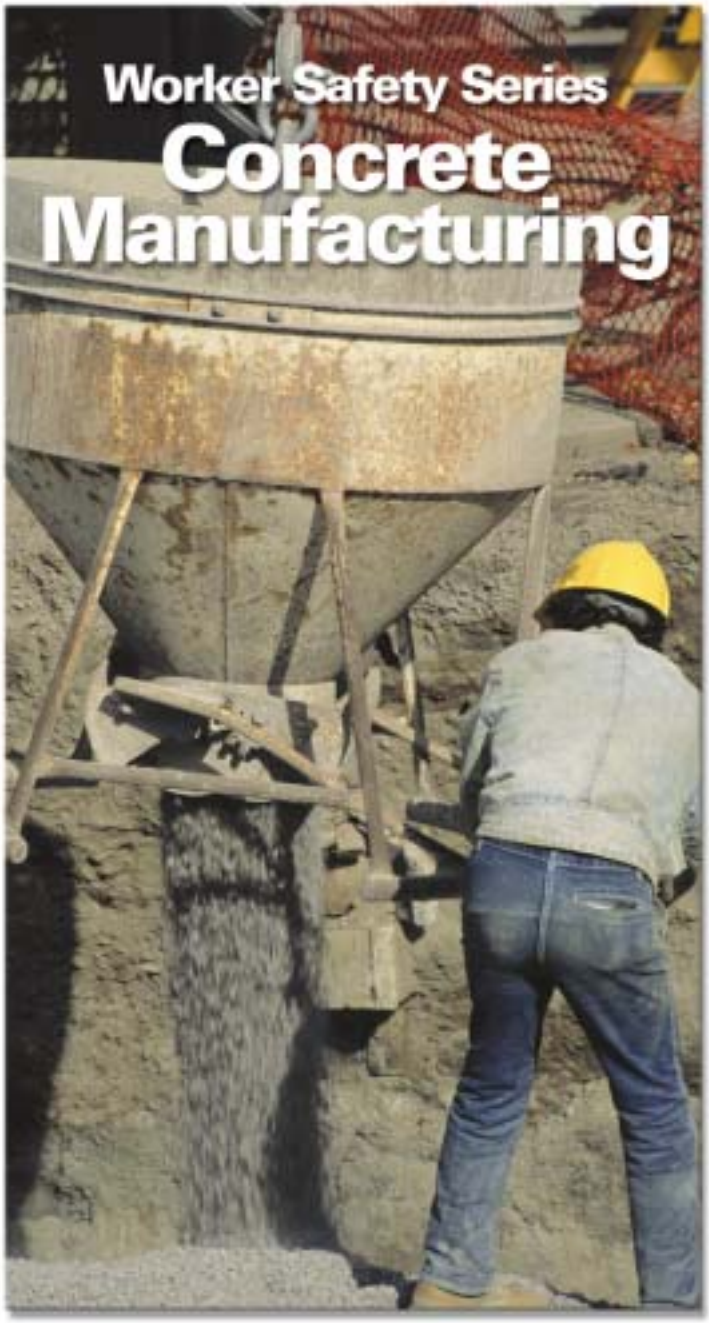
OSHA POCKET GUIDE

Occupational Safety and Health Administration

www.osha.gov



OSHA 3221-12N 2004

Concrete Manufacturing

- More than 250,000 people work in concrete manufacturing.
- Over 10 percent of those workers — 28,000 — experienced a job-related injury or illness and 42 died in just one year.
- Potential hazards for workers in concrete manufacturing:
  - Eye, skin and respiratory tract irritation from exposure to cement dust;
  - Inadequate safety guards on equipment;
  - Inadequate lockout/tagout systems on machinery;
  - Overexertion and awkward postures;
  - Slips, trips and falls; and
  - Chemical burns from wet concrete.

OSHA
Occupational Safety and Health Administration

Hazards & Solutions

Manufacturing concrete can pose health and safety risks for the worker. For concrete manufacturing, the 10 OSHA standards most frequently included in the agency's citations were:

1. Hazard communication
2. Lockout/tagout
3. Confined spaces
4. Respiratory protection
5. Guarding floor & wall openings and holes
6. Electrical wiring methods
7. Noise exposure
8. Forklifts
9. Electrical systems design
10. Machine guarding

OSHA
Occupational Safety and Health Administration

Cement Dust

Hazard: Exposure to cement dust can irritate eyes, nose, throat and the upper respiratory system. Skin contact may result in moderate irritation to thickening/cracking of skin to severe skin damage from chemical burns. Silica exposure can lead to lung injuries including silicosis and lung cancer.

Solutions:

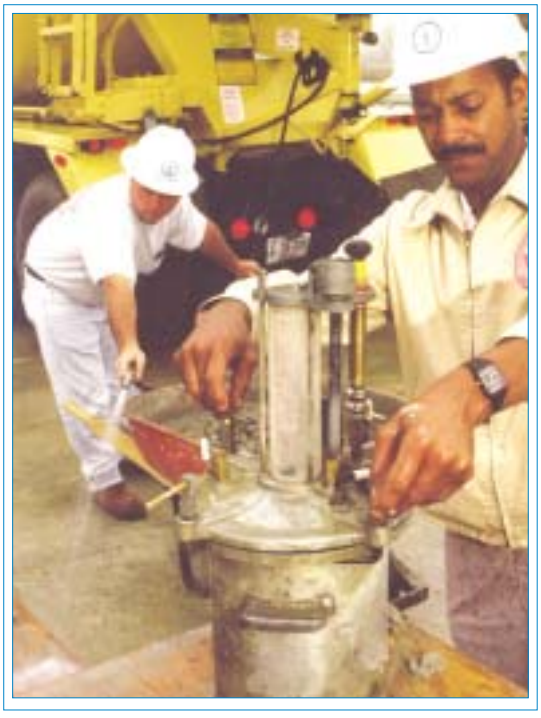
- Rinse eyes with water if they come into contact with cement dust and consult a physician.
- Use soap and water to wash off dust to avoid skin damage.
- Wear a P-, N- or R-95 respirator to minimize inhalation of cement dust.
- Eat and drink only in dust-free areas to avoid ingesting cement dust.

Wet Concrete

Hazard: Exposure to wet concrete can result in skin irritation or even first-, second- or third-degree chemical burns. Compounds such as hexavalent chromium may also be harmful.

Solutions:

- Wear alkali-resistant gloves, coveralls with long sleeves and full-length pants, water-proof boots and eye protection.
- Wash contaminated skin areas with cold, running water as soon as possible.
- Rinse eyes splashed with wet concrete with water for at least 15 minutes and then go to the hospital for further treatment.



OSHA
Occupational Safety and Health Administration

Machine Guarding

Hazard: Unguarded machinery used in the manufacturing process can lead to worker injuries.

Solutions:

- Maintain conveyor belt systems to avoid jamming and use care in clearing jams.
- Ensure that guards are in place to protect workers using mixers, block makers, cubers and metalworking machinery such as rebar benders, cutters and cage rollers.
- Establish and follow effective lockout/tagout procedures when servicing equipment.
- Be sure appropriate guards are in place on power tools before using them.

Falling Objects

Hazard: Workers may be hit by falling objects from conveyor belt systems, elevators or concrete block stacking equipment.

Solutions:

- Avoid working beneath cuber elevators, conveyor belts and stacker/destacker machinery.
- Stack and store materials properly to limit the risk of falling objects.
- Wear eye protection when chipping and cleaning forms, products or mixers.

Poor Ergonomics

Hazard: Improper lifting, awkward postures and repetitive motions can lead to sprains, strains and other musculoskeletal disorders.

Solutions:

- Use handtrucks or forklifts when possible.
- Lift properly and get a coworker to help if a product is too heavy.
- Avoid twisting while carrying a load. Shift your feet and take small steps in the direction you want to turn.
- Keep floors clear to avoid slipping and tripping hazards.
- Avoid working in awkward postures.

OSHA
Occupational Safety and Health Administration

Confined Spaces

Hazard: Mixers and ready-mix trucks have confined spaces that pose safety risks for workers.

Solutions:

- Follow established procedures for confined space entry and work to assure safety.
- Guard against heat stress when cleaning truck mixer drums.
- Wear appropriate protective equipment to avoid silica exposure when removing concrete residues from inside truck mixer drums.

Vehicles

Hazard: Poorly maintained or improperly handled vehicles can lead to crushing injuries at the plant site or other injuries for truck drivers.

Solutions:

- Make sure back-up alarms on all vehicles are functioning.
- Avoid overloading cranes and hoists.
- Use care with the load out chute on concrete mixers to avoid injuries to hands and fingers.
- Beware of hot surfaces on equipment and truck components.
- Guard eyes against splashes of aggregate materials during loading and unloading.
- Use hearing protection if needed to guard against excessive noise exposure during cement loading/unloading and while using pneumatic chippers inside truck mixer drums.

Other Hazards

- Welding operations can lead to flash burns.
- Makeshift ladders, platforms and stairs with improper or no guardrails make falls more likely.
- Workers can also be injured by falling concrete forms if the forms are improperly chocked, braced or cribbed.

Worker Safety Tips

General Precautions

- Be sure you understand how to perform all your tasks and how to use tools and equipment safely.
- Follow confined space procedures when cleaning and working in mixer drums, hoppers, tanks and other places with potentially serious mechanical hazards, such as blades or sloping sides which may entrap employees, or atmospheric hazards, such as oxygen deficiency.
- Wear appropriate personal protective equipment to avoid being injured by flying or falling objects.

Vehicle Safety

- Be sure that trucks and other vehicles are in good working order, including audible back-up warning signals, before operating them.
- Avoid overloading hoists, cranes and forklifts.

Machine Safety

- Use lockout/tagout procedures to de-energize conveyors and other machinery before attempting to free any jams.
- Secure chutes and hatches to reduce injuries from swinging parts.
- Make sure guards are in place to protect you from moving parts of machinery and tools before you operate the equipment.

Overhead Hazards

- Be sure that form work, casting and stressing operations are adequately braced and chocked to avoid sudden release of materials.
- Make certain that rigging is in place to protect against falling objects and materials during hoisting and stacking procedures.
- Do not walk or work under overhead loads.

Think Safety Checklists

The following checklists may help you take steps to avoid hazards that cause injuries, illnesses and fatalities. As always, be cautious and seek help if you are concerned about a potential hazard.

General Safety

- ☐ Implement a comprehensive safety and health management system to find and fix all hazards at the worksite.
- ☐ Establish a written hazard communication program to inform all employees about chemical hazards and hazardous substances, reporting of hazards, appropriate personal protective equipment and what to do in emergency situations.
- ☐ Train workers in safe work practices and methods for all work activities, procedures and equipment as well as how to recognize and respond to potential workplace hazards, including rendering first aid.
- ☐ Put in place personal protective equipment programs. Train workers in selecting, cleaning and maintaining equipment such as respirators, protective clothing and goggles.
- ☐ Use safe work practices and appropriate personal protective equipment for all welding, cutting and burning; handling of chemicals (e.g., moist concrete, epoxies, form release agents); and during grinding, chipping, wire brushing, scraping and cleaning.

- [ ] Ensure that all tools and equipment -- including forklifts, cranes, hoists and rigging -- are maintained in good working condition, are inspected regularly and are operated by thoroughly trained, tested and competent workers.

Physical Hazards

- [ ] Set up a noise control program to reduce noise sources. Include sound-level measurements, audiometric testing, training and/or hearing protection equipment.
- [ ] Implement machine guarding and lockout/tagout procedures for all equipment and machinery servicing and/or maintenance work to prevent workers from being injured.
- [ ] Establish a confined-space entry program to protect workers cleaning the inside of mixer drums, storage bins, hoppers and other confined spaces.

Health Hazards

- [ ] Avoid exposure to cement dust to prevent bronchitis and silicosis.
- [ ] Prevent burns and skin and eye irritation by avoiding skin contact and eye contact with cement dust or wet cement.
- [ ] Wear the appropriate personal protective equipment, such as gloves, boots, goggles or HEPA-filter respirators.
- [ ] Avoid dusty areas and wet down work areas, as appropriate, to reduce or eliminate dust.

- [ ] Use special HEPA vacuums to clean up dust instead of dry sweeping.
- [ ] Reduce silica exposures during chipping, drilling and sawing of concrete materials with engineering controls, such as wet methods and local exhaust ventilation.

Fall Hazards

- [ ] Identify and fix fall hazards, such as slippery surfaces, damaged ladders and walkways, and any loose or unsteady hand- or footholds used to climb up and down on trucks and other equipment.
- [ ] Make sure all portable ladders have safety feet and are the proper length for the specific task. Secure them or tie them off to prevent movement.
- [ ] Ensure scaffolding and walking/working surfaces have adequate guardrails, safe accessibility and no tripping hazards or holes.

Ergonomics

- [ ] Implement appropriate work practices and/or controls to help reduce or eliminate potential back injuries from twisting, turning, lifting, awkward postures and whole body vibration.
- [ ] Train workers in appropriate mechanical and manual materials handling techniques and safety procedures to help reduce or eliminate musculoskeletal injuries.
- [ ] Provide dollies, handtrucks and conveyors to help minimize, reduce or eliminate the need to bend and lift.

OSHA
Occupational Safety and Health Administration

Concrete Safety & Health Resources

Most resource materials can be found on the OSHA website at www.osha.gov

Physical Hazards

Confined Space
Downloadable electronic advisor software (1997), 2MB.
This software guides the user in identifying confined spaces and protecting workers who enter them.
http://www.osha.gov/dts/osta/oshasoft/csa.html

Control of Hazardous Energy (Lockout/Tagout)
OSHA Publication 3120 (2002), 174KB PDF, 45 pages.
This booklet provides guidance on protecting workers against unexpected energy releases from mechanical and electrical equipment.
http://www.osha.gov/Publications/osha3120.pdf

Lockout/Tagout e-Tool
Interactive online training program (1999).
This e-Tool offers an overview of OSHA's Lockout/Tagout standard, including interactive case studies.
http://www.osha.gov/dts/osta/lototraining/index.htm

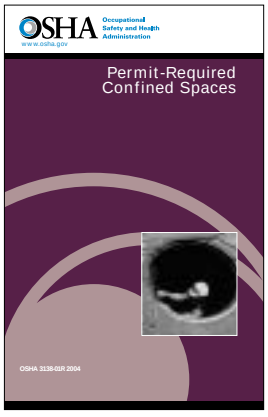
Materials Handling and Storage
OSHA Publication 2226 (2002), 559KB PDF, 41 pages.
This booklet outlines OSHA requirements covering handling and storing materials, focusing on forklift safety and ergonomics.
http://www.osha.gov/Publications/osha2236.pdf

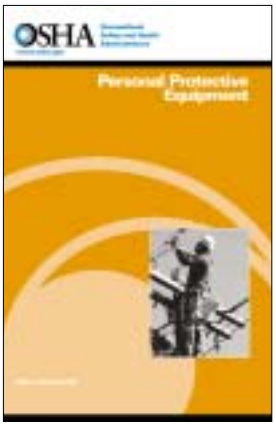
Permit-Required Confined Spaces
OSHA Publication 3138 (2004), 486KB PDF, 22 pages.
This booklet covers highlights of the OSHA standard for confined spaces.
http://www.osha.gov/Publications/osha3138.pdf

Safeguarding Equipment and Protecting Workers from Amputations
OSHA Publication 3071 (2001), 1.2MB PDF, 78 pages.
This booklet offers guidance on machine guarding and other safe practices to reduce the risk of amputations.
http://www.osha.gov/Publications/osha3170.pdf

Sling Safety
OSHA Publication 3072 (1996), 866KB PDF, 28 pages.
This booklet covers all aspects of sling safety.
http://www.osha.gov/Publications/osha3072.pdf

Stairways and Ladders
OSHA Publication 3124 (2003), 155KB PDF, 15 pages.
This booklet covers safety issues related to both fixed and movable stairs and ladders.
http://www.osha.gov/Publications/osha3124.pdf





Health Hazards

Crystalline Silica Exposure Card for General Industry
OSHA Publication 3176 (2003), 37KB PDF; OSHA Publication 3178 (Spanish) (2003), 42KB PDF.
This laminated pocket card offers workers a concise summary of silica health hazards and lists precautions to take to limit exposure.
http://www.osha.gov/Publications/osha3176.pdf
and
http://www.osha.gov/Publications/osha3178.pdf

Crystalline Silica
OSHA Fact Sheet (2002), 52KB PDF, 2 pages, also in Spanish (2003).
This Fact Sheet highlights the hazards of silica and provides guidance on preventing exposures.
http://www.osha.gov/OshDoc/data_General_Facts/crystalline-factsheet.pdf
and
http://www.osha.gov/OshDoc/data_General_Facts/crystalline-spanish.pdf

Silica e-Tool
Downloadable electronic software (1998).
This e-Tool describes the hazards of silica and offers guidance on protecting workers.
http://www.osha.gov/SLTC/etools/silica/index.html

Hazard Communication Guidelines for Compliance
OSHA Publication 3111 (2000), 112KB PDF, 33 pages.
This booklet provides an overview of OSHA's Hazard Communication standard and gives specific guidance on compliance.
http://www.osha.gov/Publications/osha3111.pdf

Hearing Conservation
OSHA Publication 3074 (2002), 157KB PDF, 32 pages.
The booklet explains how to establish an effective hearing conservation program that meets OSHA requirements.
http://www.osha.gov/Publications/osha3074.pdf

Personal Protective Equipment
OSHA Publication 3151 (2004), 629KB PDF, 46 pages.
This booklet offers guidance on when and how to use personal protective equipment to guard against occupational injuries and illnesses.
http://www.osha.gov/Publications/osha3151.pdf

Respiratory Protection
OSHA Publication 3079 (2002), 273KB PDF, 42 pages.
This booklet outlines OSHA requirements on respiratory protection and offers guidance on establishing an effective respiratory protection program.
http://www.osha.gov/Publications/osha3079.pdf

Respiratory Protection e-Tool
Downloadable electronic software (1998).
This e-Tool enables users to determine whether they need to establish a respiratory protection program and what type of respirators to use.
http://www.osha.gov/SLTC/etools/respiratory/index.html

Small Entity Compliance Guide for OSHA's Respiratory Protection Standard
OSHA (1999), 706KB PDF, 149 pages.
This booklet provides help for small businesses seeking to meet OSHA requirements for respiratory protection programs.
http://www.osha.gov/Publications/secgrev-current.pdf

OSHA
Occupational Safety and Health Administration

NIOSH Materials

The National Institute for Occupational Safety and Health (NIOSH) offers many useful publications available on its website at http://www.cdc.gov/niosh

Comprehensive Safety Recommendations for the Precast Concrete Products Industry. DHHS (NIOSH) Publication No. 84-103 (1984).

Elements of Ergonomics Programs: A Primer Based on Workplace Evaluations of Musculoskeletal Disorders. DHHS (NIOSH) Publication No. 97-117 (1997).

NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica. DHHS (NIOSH) Publication No. 2002-129 (April 2002).

NIOSH Alert – Preventing Worker Deaths from Uncontrolled Release of Electrical, Mechanical, and Other Types of Hazardous Energy. DHHS (NIOSH) Publication No. 99-110 (August 1999).

Other Sources

Ready Mixed Concrete Truck Drivers: Work-Related Hazards and Recommendations for Controls, Nancy Clark, Jonathan Dropkin and Lee Kaplan, Mt. Sinai – Irving J. Selikoff Center for Occupational and Environmental Medicine (Sept. 2001), available at http://www.elcosh.org

Concrete Industry Cooperative Programs

Voluntary Protection Programs

OSHA recognizes worksites with excellent safety and health management systems through its Voluntary Protection Programs (VPP). These model worksites are willing to share their expertise and many are available to mentor other businesses. For further information on how VPP participants can help you, contact the VPP manager in your OSHA Regional Office (see www.osha.gov for listings) or the Voluntary Protection Programs Participants' Association, 7600-E Leesburg Pike, Suite 440, Falls Church, VA 22043, telephone (703) 761-1146.

Alliance Program

Alliances enable organizations committed to workplace safety and health to collaborate with OSHA to prevent injuries and illnesses in the workplace. Two of OSHA's national Alliances have an impact on the concrete manufacturing industry.

OSHA
Occupational Safety and Health Administration

Mason Contractors Association of America
Reducing hazards related to wall bracing, falls, scaffolding and forklifts is the focus of OSHA's Alliance with the Mason Contractors Association of America. The joint effort will include developing education and training programs on these issues as well as developing and disseminating case studies illustrating the business value of safety and health.

American Concrete Pipe Association
OSHA's Alliance with the American Concrete Pipe Association (ACPA) focuses on reducing and preventing exposure to confined space hazards. Under this Alliance, OSHA and ACPA will develop and disseminate outreach materials, work together on eTools and participate in other efforts to reduce injuries or illnesses associated with confined space hazards.

Consultation

Every state offers a free, onsite consultation program to help small employers find and fix hazards and establish effective safety and health management systems. Funded primarily by OSHA, consultation is provided at no cost to small employers and is delivered by state authorities through professional safety and health consultants. More information on OSHA's Consultation Program appears on the agency's website at www.osha.gov.

A Success Story

NY Concrete Maker Improves Safety, Cuts Costs

Precast concrete manufacturer Oldcastle Precast's Manchester New York Division reduced its occupational injury and illness rate by 75 percent in three years. The Manchester facility cut its recordable injuries from 12 in the first year to just one in the third year.

Oldcastle experienced this incredible success by establishing a safety and health management system good enough to make it the first precast concrete facility to join OSHA's Merit Voluntary Protection Program (VPP).

Changing Culture

The process began when CRH, a multinational conglomerate that manufactures construction materials worldwide, sent new managers to the Building Systems Division of Oldcastle. The new managers brought cultural change and a renewed commitment to safety and health to the Manchester site.

Managers came to know all employees on a first-name basis. They encouraged employees to ask questions and voice any safety concerns so that management could address them immediately. The managers emphasized the importance of employees as a company asset and made clear that employee

participation is key to eliminating hazards and reducing employee injuries and illnesses.

"Having a safe work environment is just good business," according to the division's general manager. "We need to make the necessary commitment to safety at all levels of the company, and we are responsible to follow through with the safest route, no matter what the cost," he explained. In the process, Oldcastle learned that safety investments pay for themselves, time and again.

Aiming for VPP

Oldcastle decided to aim for VPP recognition, knowing that working toward this goal would drive the facility toward excellence. Typically, injury and illness rates for VPP sites are 51 percent below industry norms. To qualify, Oldcastle had to submit an application explaining the site's safety and health management system. Then OSHA examined the company's safety records, programs and history, and conducted a detailed onsite review. Once in the program, Oldcastle had to undergo periodic reviews to maintain its status.

To improve its safety program to qualify for VPP, Oldcastle set objectives and provided the necessary resources to accomplish them; they performed daily facility inspections and corrected any problems; and they informed employees, vendors and contractors of the program's status throughout the process. "We knew we had to boost existing programs and initiate new ones to comply. We knew our efforts would make our company a safer place to work and that was our goal," noted Oldcastle's safety manager.

Applying for VPP

After two years of preparation, Oldcastle applied for VPP recognition. OSHA evaluators spent four days assessing the facility. Their onsite visit included an opening and closing conference, employee interviews, industrial hygiene surveys and a complete evaluation of the site's safety and health management system.

One of the highlights of Oldcastle's program, according to Norman R. Deitch, OSHA's New York VPP Manager and the VPP Team Leader, was the company's effort to involve Spanish-speaking employees. Oldcastle also received high marks for its extensive use of digital photos to record unsafe conditions and the results of corrective actions for worker training.

Continuing to Improve

For the precast concrete industry (SIC 3272) in 2000, the nonfatal occupational injury and illness incidence rate was 13.7 per 100 full-time workers. When Oldcastle applied for VPP, its rate was 13.4. Now it is 2.0. Oldcastle found

that reducing worker injuries and illnesses is not only the moral and humanitarian thing to do, but it also reduces costs associated with workplace accidents while increasing the division's competitiveness.

Oldcastle's Accident Prevention Program remains effective because everyone—the general manager, department managers, supervisors, employees and the safety manager—takes a personal interest in accident prevention. Every effort is made to ensure that every worker knows, understands and observes the requirements of applicable laws, regulations and standards.

Giving Employees Credit

Oldcastle's plant manager credits employees on the shop floor. "We could be the best managers in the world, but the men on the front line need to embrace the safety culture," he observed.

The Manchester facility manufactures and installs hollowcore plank and precast concrete structural systems throughout Western New York. Some of the more than 2.58 million square feet of precast products weigh in excess of 25 tons each. The facility's sales manager related, "Either you make precast concrete pieces safely, or you don't make them for very long."

Oldcastle's safety manager spearheaded the division's commitment to safety and took charge of the VPP application process. She credits the plant employees for their hard work and continued dedication to their safety program.

Reaching for Star

Under the VPP, Merit worksites are recognized as having the potential and commitment to achieve Star status within three years. Oldcastle's goal is to reach Star status within twelve months. According to the safety manager, "This achievement is looked upon by Oldcastle as a positive step in achieving a safe workplace for our employees and will only further aid us in ensuring the complete safety of our workplace."

Additional information about OSHA's Voluntary Protection Programs is available on the agency's website at www.osha.gov, from regional OSHA VPP managers or local OSHA offices. The Voluntary Protection Programs Participants' Association (www.vpppa.org) administers a mentoring program for those worksites considering participation.

Oldcastle Precast's Manchester New York Division.

Employers are responsible for providing a safe and healthful workplace for their employees. OSHA's role is to assure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.

This informational booklet provides a general overview of a particular topic related to OSHA standards. It does not alter or determine compliance responsibilities in OSHA standards or the *Occupational Safety and Health Act of 1970*. Because interpretations and enforcement policy may change over time, you should consult current OSHA administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the Courts for additional guidance on OSHA compliance requirements.

This information is available to sensory impaired individuals upon request. Voice phone: (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

OSHA
Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov