PDHonline Course M342 (4 PDH)

Emergency Showers and Eyewashes

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2020

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Emergency Showers and Eyewashes

John M. Rattenbury, PE, LEEDap

Course Content

Purpose

This paper provides some guidance to architects and engineers regarding the installation of emergency eyewash and shower equipment for laboratories, factories and similar facilities. Not every specific situation can be anticipated, so any determination of the need for, location of, maintenance of, and any other aspect of plumbed emergency first aid equipment (i.e. showers and eyewashes) can only be made by a responsible occupational hygienist, employer safety officer or medical professional. The following information is based on the published standards and regulations guiding designers to provide a basis for making informed design recommendations.

Introduction

Emergency showers, eye/face washes and drench hoses are the primary means of rendering first aid in the event of an accident involving thermal burns, or hazardous or corrosive chemicals (with the exception of certain chemical agents that are adversely reactive to water). Many projects in which designers are involved include the placement of and piping of water to this emergency equipment. Traditionally, architects have been responsible for working directly with an Owner's Environmental Health and Safety (EH&S) department to determine the need for and placement of emergency showers and eyewashes. However, not all owners have safety officers on staff and architects and engineers are left with making the best recommendations based on experience and assessment of the potential hazards in a space.

Over many years the interpretation of OSHA regulations as to what constitutes required and “suitable facilities” in the event of a chemical mishap has evolved through experience and development of technology. Unfortunately for designers, there is no one reference we can turn to for exact requirements on what is considered “suitable” for all aspects of emergency drenching equipment. Many sources even recommend a physician be consulted when determining what is appropriate.

References are available for verifying proper installation and performance criteria. There is no reference, however, that says unilaterally and exactly where emergency showers or eyewashes are required in any hypothetical case. Where is an eyewash needed? When is an eyewash **and** shower needed? Some interpretation and evaluation is involved.

Regulations and Standards

Requirements concerning the installation of emergency eyewash and shower equipment are based on two main references.

The first reference is the Occupational Safety & Health Administration (OSHA) Regulation 29 CFR, 1910.151 "Medical Services and First Aid." This federal regulation establishes the legal responsibility of employers to provide "suitable facilities for quick drenching or flushing of the eyes and body" where "the eyes and body of stipulates that such facilities "shall be provided within the work area for immediate emergency use." The language of this regulation is very general, generic and open to interpretation with regard to what is "suitable" and what is considered to be "within the work area."

The second reference is the American National Standards Institute (ANSI) consensus standard ISEA Z358.1 "Emergency Eyewash and Shower Equipment." This voluntary standard was originally published in 1981 and revised over the years. The most current edition was published in 2009. This reference is "intended to provide uniform minimum requirements for equipment performance, use, installation test procedures, maintenance and training." This reference holds no statutory authority and the contents of this standard are in no way legally binding to employers. In fact, OSHA states that the ANSI standard has not been adopted as a reference by the Administration. The 2006 Edition of the International Plumbing Code, does, however, incorporate by reference ANSI/ISEA Z358.1 (Section Chapter 4, Section 411.1).

While OSHA reserves the right to render final interpretation of its own standards, it is the administration's general practice to refer employers to the consensus body (ANSI) for interpretive guidance regardless of its lack of official incorporation. Model plumbing codes appear to be incorporating ISEA Z358.1 as part of general fixture approvals. In short, OSHA establishes the legal requirement to provide first aid flushing equipment while ANSI provides minimum recommendations on safety equipment configuration and performance based on accepted industry practice. Even though complying with ANSI is not mandatory (unless incorporated by Code), deviations from this standard may have to be justified in the eyes of OSHA in order for the administration to accept such deviations as "suitable." More information on OSHA interpretations is included as Attachment A.

Other regulations may be maintained by State OSHA bodies. Always obtain any specific regulations that may apply to your specific State. A sample regulation adopted by California is included in Attachment C.

With respect to State regulations, Massachusetts is an example where State regulations govern the placement and performance of plumbed emergency equipment in schools, universities and laboratories. Specific requirements for emergency showers and eyewashes are provided in 527 CMR 10.00 “Fire Prevention,” Section 10.02. This section is titled “Fire Extinguishers” and the original premise behind this law appears to be for personnel protection of students

and faculty in schools and university labs where flammable liquids and/or open flames may be present, but has also been adapted to apply to corrosive chemical agents. Its application is generally not limited to academic settings but any other "similar" work area with such hazards. Additionally, plumbed emergency equipment is regulated in 248 CMR 10.00 "Uniform State Plumbing Code," Section 10.13(L) "Piping and Treatment of Special Hazardous Wastes." One of the notable differences between these State regulations and ANSI is in the minimum flow rate for emergency showers. In Massachusetts it is stipulated to be 30 gpm, whereas in ANSI it has been reduced to 20 gpm.

ANSI Compliance Checklist for Equipment

The some of the applicable requirements of ANSI/ISEA Z358.1 (2009) are summarized as follows:

1. The height of an emergency showerhead shall be between 82 and 96 inches above the floor and the spray pattern shall be 16 inches away from any obstruction.

2. Emergency showers shall provide a minimum of 20 gpm of flushing fluid for 15 minutes.

3. Emergency shower and eyewash actuating valves shall remain open when activated until intentionally shut off.

4. Activation time for actuation valves shall be one second or less.

5. The shower valve actuator shall be not more than 69 inches above the floor.

6. Emergency showers and eyewashes shall be in accessible (unobstructed) locations that can be reached in not more than 10 seconds.

7. Emergency eye/face washes shall provide a minimum of 3 gpm of flushing fluid for 15 minutes.

8. Emergency eyewashes shall be "hands free" and allow the user to hold both eyelids open while the eyes are in the flushing fluid stream.

9. Hand-held drench hoses may supplement emergency shower and eyewash units but shall not replace them.

10. Flushing fluid as defined in the standard is considered potable water, that is, water suitable for drinking. This is regarded in the industry to exclude the central water supply feeding laboratory sinks, hoods and equipment.

11. The pressure of the water supply shall be a minimum of 30 psig at the equipment while activated.

Another unwritten but salient consideration in the placement of plumbed emergency equipment is proximity to electrical devices, equipment and panels that may pose an electrical hazard if sprayed with water. Therefore, it is recommended that the placement of this equipment be coordinated with electrical engineers to mitigate such hazards and whether or not the use of ground fault circuit (GFC) is required as it would be for electrical outlets near sinks and other plumbing.

Equipment Proximity

Item 6 above addresses travel time to the equipment. As an estimate, the average walking pace of a person over 10 seconds comes to about 40 feet of travel distance (Massachusetts stipulates a distance of 50 feet maximum). The equipment must be located on the same level as the hazard. Therefore, a person should not have to go up or down stairs, ladders or ramps to reach the equipment.

Additionally, if the chemical being handled is a strong acid or alkali or other highly corrosive agent, then the drenching equipment needs to be in the immediate area. Sometimes a ten second travel time would be too much, especially if the worker's eyes are injured. Such equipment may need to be within 10 feet or so.

Placement in a room, where a ten second travel time can be used should be based on where a worker would naturally tend to go or know by habit in an emergency. One such place is the room's exit. As people enter and exit the room, they are reminded frequently of the presence of the equipment and its signage and will know faster where to go in a panic situation.

Tempered (Tepid) Water

Probably the most significant change to the ANSI standard occurred in the 1998 edition where, for the first time, specific recommendations were made for emergency showers and eyewash equipment to deliver "tepid" water (i.e. moderately warm or lukewarm). The recommendations for providing tempered water to drenching equipment have been debated for many years.

The consensus among industrial safety professionals and medical experts is that using water to flush the skin that is of the same temperature as you would use to shower with at home is not recommended. Hot water on the skin and the transfer of the heat to the body will cause the pores of the skin to open. This may be good at home, but opening of the pores when you may have a corrosive or toxic chemical on you is to be avoided. However, it has been long understood by safety experts that providing only cold water to emergency showers and eyewashes is problematic. Consider the discomfort of taking a cold shower at home. A typical household shower head flows at a rate of 2.5 gallons per minute. An emergency shower flows at a rate of 20 gallons per minute at a minimum. The latest edition of ANSI indicates that prolonged exposure to cold water can result in hypothermia and

the "premature cessation of first aid treatment." In other words, ANSI warns that if the water is too cold, the user may not be able to remain under the shower for as long as needed. Cases have been documented where the injured worker had to be physically held under the shower to maintain flushing. The same is true for eyewashes, where cold water can feel painful when flushing for more than a few seconds.

This issue generated a response by the manufacturers of emergency shower and eyewash equipment to provide specialized tempering valves to maintain a tepid flushing fluid temperature (generally 60 to 95 degrees). This range may be specified differently in local plumbing codes. For example, in Massachusetts the State plumbing code specifies a range of 70°F to 90°F. In cases of thermal burns to the skin, the American Heart Association has noted that optimal healing and lowest mortality rates occur at water temperatures of 68°F to 77°F. However, the language of this standard does not give guidance as to whether tempered water is recommended or when it is inappropriate. There are circumstances where a specific chemical may be activated by warm water thereby causing further injury. Ultimately, it is up to the employer to determine what temperature is appropriate with the guidance of appropriate medical advice.

In most circumstances, the ideal condition seems to be an initial flow of water that would feel cool to the skin (i.e. less than average skin temperature) to provide some cooling sensation in the initial flushing of a thermal or chemical burn. Then, as the water continues to flow, it warms to a “tepid” condition near average skin temperature to allow prolonged flushing of the body until medical responders arrive.

Providing tempered flushing water has two main influences on the design of building water systems. First, the tempered water system must be piped separately from any other potable water system if only a central tempering valve is installed. Otherwise, each shower and/or eyewash must have its own local tempering valve installed. Second, the energy required to provide instantaneous heating of cold water from an assumed cold temperature of 40°F to a temperature of 80°F at 23 gpm (a shower and eyewash running simultaneously) is about 460,370 BTU’s per hour (135 Kilowatts). A gas fired storage water heater, for example, with a gas input rating of 200 CFH (200,000 BTU/Hr), 140° F storage temperature, and 200 gallons of storage capacity would provide just enough water for the minimum 15 minute flushing period at 23 gpm. But in many cases, such a water heater would not otherwise be required for the normal potable water load. Where semi-instantaneous steam or gas water heaters are used, the heater would need to be sized to provide for the emergency shower demand or the potable water peak load, whichever is greater. The bottom line is, always check the emergency shower load when making domestic water heater sizing calculations.

Thermostatic Valves

To maintain safe water temperature, emergency showers and eyewashes must be fed through a thermostatic mixing valve. The valve receives potable hot and cold

water and produces a consistent output temperature even though the hot and cold supply temperatures might vary. In addition such valves have two safety features. First, if there should be an interruption of cold water pressure to the valve, the valve will shut off the hot water supply to prevent scalding. Second, if there should be an interruption of hot water pressure, an internal bypass valve will open to allow the uninterrupted flow of cold water to the fixture.

Pipe Sizing

Emergency eye/face wash stations require at least a ½ inch supply connection, although a ¾ inch supply is better. Emergency showers require a minimum 1 inch supply connection and a combined emergency shower and eyewash station requires at least a 1 ¼ inch connection.

Designers need to decide how to size the supply piping. To size domestic water distribution systems to sinks and toilets, designers use what is called a “fixture unit” methodology that helps determine the likely simultaneous use of the connected fixtures and therefore the probable flow rate. Is there a similar method for emergency showers and eyewashes?

Ultimately the sizing method is the responsibility of the designer. However, the nature of emergency shower and eyewash equipment use does not lend itself to a fixture unit sizing methodology. It is not unreasonable to assume that the greatest simultaneous use of emergency showers would be not more than two. It is conceivable that one or two persons may be affected by a spill, fire or explosion in a localized area of a workspace, but such events occurring simultaneously throughout a building would be inconceivable.

The other design criterion is delivery pressure. ANSI requires a minimum of 30 psig at the shower or eyewash. There will be losses through water heaters, thermostatic valves, static losses, etc. that have to be taken into consideration. Distance traveled to the fixture must also be accounted for to determine the overall pressure loss from the water source to the equipment.

As a general rule, a central supply main of 2 inches in diameter to equipment is adequate to deliver the volume of water for two showers with reasonable pressure drop. However, each design condition needs to be evaluated.

Recirculation and Insulation

There is some debate among designers as to the necessity to maintain a set temperature in a central tempered water distribution system. If a central thermostatic valve is set at, say, 85 °F (about human skin temperature), is it necessary to maintain that temperature throughout the system at all times? Is it necessary to insulate the piping to minimize heat loss? It may not.

The generally accepted temperature range for “tepid” water is 60 °F to 100 °F according to ANSI Z358.1-2009. In other words, if a central distribution system

were to be uncirculated, the temperature of the water and piping will assume ambient temperature. In a building, this may be 72 to 78 degrees, which is within the range of tempered water. In fact, since this temperature is below skin temperature, the initial flush offered by this water in the piping would feel cool and offer relief from a thermal or chemical burn. It is therefore not necessary to insulate the piping either. However, if all or part of the piping is exposed to colder temperatures (i.e. run outdoors), then measures to prevent freezing need to be employed. It should also circulate to maintain the internal temperature within the tempered delivery range. Heat tracing and insulation of the piping exposed to freezing may be required.

Stagnation and Flushing

There has been some debate as to the water quality within a water piping system that normally sits stagnant at room temperature for most of the time. If a person were to need to use an emergency shower or eyewash, could this water pose a health threat with respect to bacterial contamination in the water supply especially if the water is to be applied to injured skin or eyes? Many facility managers have noted often that the initial flush of water from this equipment during testing is brownish.

One method sometimes employed is recirculation of the water through the piping system with a pump in the same manner as domestic hot water systems are to maintain temperature. However, circulation alone can not discourage the growth of bacteria. Bacteria will typically establish itself on the pipe walls and no amount of water flow will affect growth rate. Water can be circulated through an ultra-violet light, but again such treatment only affects bacteria passing by the light and does not affect bacteria established throughout the system.

The only reasonable means of maintaining fresh water relatively free of bacteria is to maintain the level of chlorination provided with the potable water supply. When water sits stagnant in a pipe, the initial concentration of chlorination will diminish. Therefore, a plumbed emergency shower and eyewash system should be used regularly during the course of a day as much as a potable water system would. By consuming the water in useful ways, the chlorination level will be maintained and stagnation will be avoided. There are different ways that this can be accomplished.

1. Each emergency shower and eyewash should be tested weekly according to ANSI. Therefore, a maintenance program based on this frequency may be regarded as a means of maintaining fresh water in the system. However, this is a decision that needs to be made by the owner, and is sometimes not accepted by some code and safety officials as adequate.
2. The ends of long branch runs of tempered water systems can be provided with an automatic solenoid valve. This valve can be set to open for a set period at a set frequency to keep the piping system flushed. Such frequency and duration will depend on the size of the distribution system. This method is not favored, however, due to the dumping of water to drain. It is also not considered acceptable in Massachusetts.

3. Pipe the end(s) of long branch runs to a flushing plumbing fixture or set of fixtures (toilet or urinal flush valves). The regular use of the fixtures during the course of a day will draw water from the system and help keep the tempered water system from being stagnant.
4. Pipe the ends(s) of long branch runs to hose bibs, wall hydrants, trap primers, janitor sink faucets and washdown hoses where available to create draw from the system.
5. Where available, pipe the flushing water system back to the inlet of a water purification system (i.e. RO machine) to create draw and circulation through the system.

Even when (or especially when) emergency showers and eyewash equipment is provided with local, individual thermostatic mixing valves, such similar measures still need to be employed to prevent the stagnation of the potable hot and cold water supply piping by piping the supplies to such valves to other plumbing fixtures that are used regularly.

Floor Drains and Plumbed Connections

ANSI does not address the disposal or drainage of the emergency shower or eyewash water. However, eyewash units are typically intended to be hard plumbed to a sanitary waste or laboratory waste system. The International Plumbing Code does not require waste connections, so check your local plumbing code. This waste connection greatly facilitates the regular testing of the equipment without having to worry about the discharge of the water. However, emergency showers pose a bigger problem. The discharge rate of 20 to 30 gallons per minute (about ten times the rate discharge by a household shower head) is difficult to drain to a floor drain without the spread of water across the floor. The only purpose of a local floor drain would be to provide a place to squeegee the water after the use of the shower.

Also, the presence of an emergency shower in a work space that contains hazardous or injurious chemicals may preclude the placement of a floor drain in the space. If chemicals were spilled in the space or exposed to the skin and then flushed with an emergency shower, such chemicals may have to be collected and held if they are otherwise prohibited from discharge to the city sewer system. If a facility has a waste treatment system, keep in mind such systems treat waste only for pH level and do not remove any particular chemicals from the waste stream. Not all situations involve acid and alkali solutions. Other injurious chemicals may be present that must be contained in the event of a spill. Therefore, a floor drain is typically not recommended with an emergency shower to maintain containment of a possible chemical spill. If a drain is provided, then the installation of a waste containment tank may be needed to contain over of 500 gallons of water.

Distribution Valving

The flushing water distribution system for emergency showers and eyewash stations should have as few isolation valves as possible. It is sometimes necessary to isolate sections of a system to allow for maintenance or alteration without

disrupting the entire facility. However, precautions should be taken to ensure such isolation valves are not left in the closed position unintentionally. Although regular testing of the equipment would identify the disruption of water supply due to a closed valve, the period of time between such valve closure and the next test could be a week or more. If someone were required to use the equipment, the loss of water supply could have dire consequences.

Therefore, any valves placed in a flushing water distribution should be capable of being physically locked in the open position. The closing of the valve should be made through the use of the facility “lock-out, tag-out” protocol as any life safety system. Alternatively, valves with supervisory tamper switches like those used in fire protection sprinkler systems could be used to provide an alarm indication of a valve closure. The advantage is that if the valve is left closed unintentionally, the alarm status will remain thereby prompting for its opening to clear the alarm condition. If this is not practical, then the valve handle should be removed in order to require maintenance personnel to provide a handle to close the valve. However, this is not ideal as it also allows the valve to be left closed without a visual indication by the handle orientation as to the position of the valve.

Activation Alarms

ANSI does not address any requirements for the activation of alarms either locally or remotely upon the activation of an emergency shower or eyewash. However, there are certain circumstances where such notification may be necessary from a first response perspective. In most situations, workers may work together. If there is a mishap that requires the use of an emergency shower or eyewash station, generally notification can be provided by someone in the area to call for medical help.

Sometimes, a hazard may be located remotely or a worker may otherwise be alone when a mishap occurs. Even if a “buddy system” is used for some procedures, the buddy may have to stay with the injured worker to assist in the flushing process and immediate notification may not be possible. In this case, a flow switch or panic button at the local equipment is recommended to provide electronic notification to the building alarm system to inform someone of the activation of an emergency shower or eyewash so a call for medical assistance can be made immediately. Manufacturers of laboratory safety equipment offer flow switches, panic buttons and beacons for this application. At a minimum, a single activation switch at a central tempered water valve is a good policy. Not only would such a switch provide immediate notification of the activation of a shower or eyewash in the facility, such notification can alert and unauthorized activation of the equipment due to accident or vandalism.

Identifying a Hazard

While ANSI gives some specific guidelines about emergency drenching equipment installation and performance, OSHA is very vague as to where such equipment should be provided. This conundrum would be analogous to trying to apply a

standard like NFPA 13 "Installation of Sprinkler Systems" with a building code that says only, "provide adequate sprinkler coverage where fire may occur and people might get hurt by it." NFPA 13 tells an engineer how to correctly design a sprinkler system, but it doesn't specify where such systems are required. Building codes tell us where. Deciding where to provide emergency drenching equipment takes more than just ANSI and OSHA. ANSI says that emergency showers and eyewashes must be within 10 seconds of travel time. Ten seconds from what? How do you identify a hazard? In the case of emergency equipment, more information is needed do make an informed decision.

Fortunately, there is an excellent source of information to guide owners, engineers and architects. According to OSHA, manufacturers of hazardous chemicals are required to prepare safety data sheets for each chemical and to provide these sheets with every delivery to end users. These data sheets are known as Material Safety Data Sheets (MSDS). The information they include is governed by ANSI Z400.1 “Hazardous Industrial Chemicals - Material Safety Data Sheets - Preparation." Such information includes the chemical name, physical properties, spill containment procedures and first aid measures. A typical MSDS for Sodium Hydroxide is included as Attachment B. The need for emergency drenching equipment is defined by the hazard present. If the MSDS of a given chemical to be used by an owner indicates to "immediately flush with water for at least 15 minutes" upon skin contact, then an emergency shower would be required in the areas where the substance is stored, handled and used. If the same sheet says to "immediately flush eyes with plenty of water for at least 15 minutes" upon eye contact, an emergency eye/face wash is also required. The words “flush” for “at least 15 minutes” are the triggering words.

In addition to the MSDS system, NFPA 704 “Standard System for the Identification of the Hazards of Materials for Emergency Response” is a good resource. NFPA 704 is a standard that defines the so-called "fire diamond" used by emergency personnel to quickly and easily identify the risks posed by nearby hazardous materials.

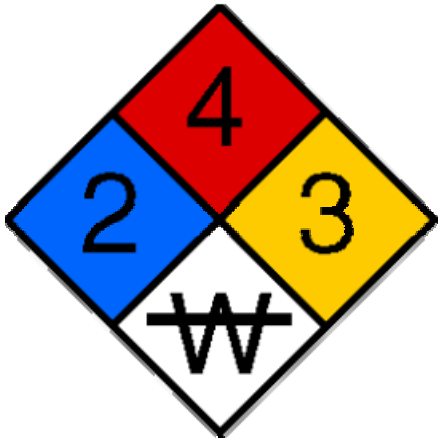

Figure 1: Sample NFPA 704 “Fire Diamond”

The labeling helps determine what, if any, special equipment should be used, procedures followed, or precautions taken during the first moments of an emergency response. Note that a W with the bar through it in the white field indicates avoid use of water, which may prompt for the evaluation of what if any first aid is required for that material in lieu of the flushing with water.

Another similar labeling system is the Hazardous Materials Identification System (HMIS) developed by the National Paint & Coatings Association which has a similar color coding to identify hazards but has a linear bar configuration instead of the NFPA diamond shape.

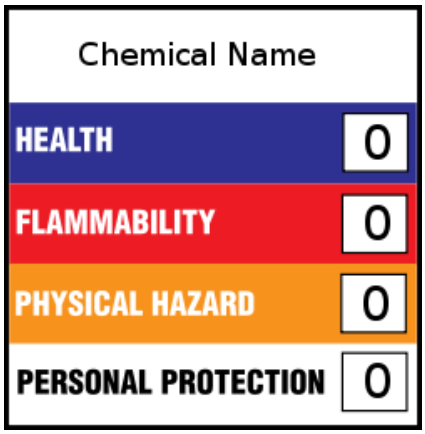

Figure 2: HMIS Identification Color Bar

The meanings of each of these two labeling systems differ slightly. The NFPA “fire diamond” is intended for firefighters to evaluate hazards in an emergency response situation while the HMIS labeling is intended for facility managers and workers to identify occupational hazards of handling, exposure and required personnel protection apparatus required for handling. For either label, any rating above zero should be investigated further (such as reference to the MSDS) to identify recommended first aid response to exposure.

What about quantity of chemicals? Is there a lower threshold at which emergency shower or eyewash equipment is not required in a work space? In other words, is there a quantity of corrosive chemical that triggers the requirements of 29 CFR 1910.151(c)? According to OSHA’s interpretation, the answer is no. “There is no threshold quantity of corrosive material that triggers the requirement. The determining factor for the application of the standard is the possible exposure of an employee to injury from contact with a corrosive material.”

Summary

1. Be aware of the relationship between OSHA and ANSI. OSHA is a law but it doesn't say much. ANSI is a voluntary consensus standard, not a code (unless it is adopted as such by a state or local jurisdiction). OSHA does not reference ANSI to

incorporate it into a law. Neither ANSI nor OSHA says exactly when emergency drenching equipment is needed. This is the responsibility of an employer.

2. MSDS sheets, NFPA 704 labeling and HMIS labeling are excellent sources of information for making an informed decision on where the equipment is needed. MSDS gives specific guidance on first aid measures, including the need for flushing water and the duration of treatment.

3. When in doubt, request a copy of the MSDS sheets for all of the chemicals intended to be present. If, as a designer, you introduces hazardous chemical systems (such as pH adjustment systems, boiler feed water treatment chemicals, cooling tower treatments, etc.) the designer should provide for the appropriate emergency shower and eyewash equipment.

4. Feed tempered water (i.e. water between 60° F and 95° F) to all emergency showers and eyewash installations in normal circumstances. A target prolonged flushing temperature of 85°F is recommended (about human skin temperature). However, if using tempered water will pose a hazard with a chemical (or when in doubt), the appropriate chemical manufacturer or a medical professional should be consulted to determine the appropriate flushing water temperature.

5. Typically, provisions must be made to prevent prolonged stagnation of the water in the supply piping system. Regular flushing or use of the system through other plumbing fixtures or equipment is recommended. Circulation and insulation to maintain a set temperature is normally not required unless the piping system is subject to ambient temperatures below the tempered water recommended range.

References

Occupational Safety & Health Administration (OSHA) Regulation 29 CFR, 1910.151 "Medical Services and First Aid"

OSHA Standards Interpretation and Compliance Letters

American National Standards Institute (ANSI) Z358.1-1998 "Emergency Eyewash and Shower Equipment"

American National Standards Institute (ANSI) Z400.1-1998 "Hazardous Industrial Chemicals - Material Safety Data Sheets - Preparation"

National Fire Protection Association 704 “Standard System for the Identification of the Hazards of Materials for Emergency Response”

Attachment A: OSHA Interpretation Letters

The following is a sample of interpretation letters issued by OSHA that provide some more information about the enforcement of 29 CFR 1910.151:

March 28, 2002

Mr. Scott King
Manager-Technical Services
NorFalco LLC - US Operations
Independence, Ohio 44131

Dear Mr. King:

Thank you for your letter to the Occupational Safety and Health Administration (OSHA). You requested an interpretation of 29 CFR 1910.151, Medical Services and First Aid, specifically, section (c) regarding, "suitable facilities for quick drenching or flushing of the eyes and body." Your question has been restated below for clarity. Please accept our apology for the delay in this response.

Background: Your company, a large manufacturer and distributor of sulfuric acid, requires the services of many third party terminals and distributors to assist with the handling of your product. You have specific criteria when acquiring a new terminal that it must meet before a contract is signed. One of these requirements is the need for safety showers that meet or exceed OSHA requirements; OSHA has quoted ANSI Z358.1-1990 in several letters of interpretation. However, there is a new ANSI Z358.1-1998 standard that goes into much more detail and would require some facilities to make a significant capital expenditure to comply.

Question: Which ANSI standard does OSHA enforce?

Answer: ANSI standards become mandatory OSHA standards only when, and if, they are adopted by OSHA; ANSI Z358.1 was not adopted by OSHA. In comparison with the OSHA standard at 29 CFR 1910.151(c), however, ANSI Z358.1 provides detailed information regarding the installation and operation of emergency eyewash and shower equipment. OSHA, therefore, has often referred employers to ANSI Z358.1 as a recognized source of guidance for protecting employees who are exposed to injurious corrosive materials.

OSHA would also take the ANSI standard into consideration when evaluating the adequacy of the protection provided by an employer. OSHA recognizes that there are differences between the 1990 and 1998 versions of ANSI Z358.1, and is planning to develop a compliance directive addressing this issue to ensure uniform and consistent enforcement of 29 CFR 1910.151(c). In the meantime, employers should assess the specific conditions in the workplace and determine whether compliance with the 1998 version of the ANSI Z358.1 will provide protection for employees that compliance with the 1990 version would not.

Thank you for your interest in occupational safety and health. If you have further questions, please feel free to contact the [Office of General Industry Enforcement] at (202) 693-1850.

Sincerely,

John L. Henshaw
Assistant Secretary

February 27, 2007

Robin Bolte
Regulatory Affairs Manager
Allied Universal Corporation
3901 NW 115th Avenue
Miami, FL 33178

Dear Ms. Bolte:

Thank you for your June 30, 2006, letter to the Occupational Safety and Health Administration's (OSHA's) Atlanta Regional Office. Your letter has been transferred to OSHA's Directorate of Enforcement Programs (DEP). You had questions regarding OSHA's *Medical services and first aid* standard, 29 CFR 1910.151, and the requirements for emergency drenching and flushing facilities. Your scenario, paraphrased questions, and our responses follow.

Scenario: We are a manufacturer and transporter of corrosive materials, specifically 10.5% and 12.5% sodium hypochlorite. Our employees will transport and unload bulk sodium hypochlorite into above-ground storage tanks, either owned or leased by the customer. The customer then dispenses the bulk product into 2.5-gallon jugs for sale to retail customers.

Question 1: We, as a company, have recommended to our customers that they comply with the requirements of ANSI Z358.1-2004, American National Standard for Emergency Eyewash and Shower Equipment. If a customer does so and the equipment is provided within the work area for immediate use by our own employees, have we made a reasonable effort to comply with 29 CFR 1910.151(c)?

Response: Paragraph (c) of 29 CFR 1910.151 requires that suitable facilities for quick drenching or flushing be provided within the work area for immediate use if an employee's eyes or body may be exposed to corrosive materials. The OSHA standard does not set specifications for emergency eyewash and shower equipment, but we agree that equipment that complies with ANSI requirements would usually meet the intent of the OSHA standard. It should also be noted that,

in addition to the requirement for emergency flushing and drenching facilities, there are also requirements for personal protective equipment (PPE) when employees are exposed to the hazards which corrosive chemicals present. PPE requirements are found in Subpart I, *Personal Protective Equipment*, of 29 CFR §1910 and may include, but are not limited to, protection for the eyes, face, and hands, as well as protective clothing. The purpose of PPE is to prevent injury, whereas the purpose of the eye wash or shower is to minimize injury, should that first line of defense fail.

Question 2: Deliveries often occur at night or when the retail location is closed. When our driver arrives at the facility under these circumstances, he or she must use a key to enter the facility and the unloading area. The quick drenching facilities are located in the unloading area. Does the necessity of a key violate the accessibility requirement of the ANSI standard?

Response: Although OSHA often refers employers to ANSI Z358.1-2004 for guidance in the installation and operation of quick drenching and flushing equipment, OSHA does not interpret ANSI standards; OSHA may only provide interpretations of its own regulations. OSHA has its own requirements for the location and accessibility of quick drenching or flushing facilities. 29 CFR 1910.151(c) states that "[w]here the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided *within the work area for immediate emergency use"* (emphasis added). While the need to use a key to unlock a door to reach the quick drenching or flushing facilities would ordinarily pose a problem, it appears that in your case your employee would already be *inside* the unloading area where the quick drenching facilities are located and where presumably any exposure to the injurious corrosive materials would occur.

Question 3: Who is responsible for providing the quick drenching and flushing facilities?

Response: Every employer with employees exposed to the corrosive chemicals is responsible for the safety and health of their employees. A delivery company may comply with the requirement to provide quick drenching and flushing facilities in a number of ways. The delivery company may elect to provide self-contained, portable equipment on the delivery vehicle. A possibly more convenient option for compliance would be to use the facilities provided by the retail employer for the retail employees. We envision that, in the majority of cases, the retail employer will have employees similarly exposed to the corrosive chemicals and thus would be required to provide quick drenching and flushing facilities for their employees. The delivery and retail employers coordinate other elements of their business relationship, such as delivery time, location, and quantity; the coordination of safety and health responsibilities can and should be included in this process. If the retail employer does not provide these facilities or if facilities are provided but are not appropriately selected and located for immediate emergency use by the delivery employees, then the delivery employer would still be required to provide suitable quick drenching and flushing facilities for its employees. The delivery employer needs to evaluate the work process, assessing factors such as

configuration of the work area, the corrosivity of the materials, and the potential created by the work process for the corrosive chemical to come into contact with the employee. The delivery employer would then train employees as to the hazards presented, select and require appropriate PPE, and provide suitable quick drenching and flushing facilities for immediate use by their employees.

Question 4: Are small businesses (e.g., retail stores) subject to 29 CFR 1910.151(c), if they handle corrosive liquid materials?

Response: Yes. All employers, regardless of size, that have employees whose eyes or body may be exposed to injurious corrosive materials must provide quick drenching and flushing facilities.

Question 5: Is there a quantity of corrosive chemical that triggers the requirements of 29 CFR 1910.151(c)?

Response: No, there is no threshold quantity of corrosive material that triggers the requirement. The determining factor for the application of the standard is the possible exposure of an employee to injury from contact with a corrosive material.

As you may know, a number of states administer their own occupational safety and health programs under plans approved and monitored by Federal OSHA. It is possible that some of your customers are located in these State Plan States. Therefore, employers in these states must comply with their own State's occupational safety and health requirements. As a condition of plan approval, States are required to adopt and enforce occupational safety and health standards and interpretations that are at least effective as those promulgated by Federal OSHA. However, some states may have different or more stringent requirements. Information about contacting the State Plans can be found on OSHA's website at http://www.osha.gov.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director
Directorate of Enforcement Programs

April 18, 2002

Mr. Paul Hagmann
5877 Sand Drive
West Bend, Wisconsin 53095

Dear Mr. Hagmann:

Thank you for your October 2, 2001 letter to the Occupational Safety and Health Administration's (OSHA's) Directorate of Compliance Programs. You requested clarification of OSHA standard 29 CFR 1910.151 (Medical Services and First Aid). This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any questions not delineated within your original correspondence. Your questions have been restated below for clarity. We apologize for the delay in your response.

Question 1: Will OSHA cite a facility for not following the recommendations as stated in ANSI standard Z358.1-1990? Specifically, will an OSHA inspector cite a facility for not supplying tempered water to an emergency eyewash and shower?

Reply: Paragraph (c) of 29 CFR 1910.151 requires the employer to provide suitable facilities for quick drenching or flushing of the eyes and body when employees may be exposed to injurious corrosive materials. ANSI standards become mandatory OSHA standards only when, and if, they are adopted by OSHA; ANSI Z358.1 was not adopted by OSHA. In comparison with the OSHA standard at 29 CFR 1910.151(c), however, ANSI Z358.1 provides detailed information regarding the installation and operation of emergency eyewash and shower equipment. OSHA, therefore, has often referred employers to ANSI Z358.1 as a source of guidance for protecting employees who may be exposed to injurious corrosive materials.

As you may know, 29 CFR 1910.151(c) does not provide specific instruction regarding the installation and operation of emergency eyewash and shower equipment. Therefore, it is the employer's responsibility to assess the particular conditions related to the eyewash/shower unit, such as water temperature, to ensure that the eyewash/shower unit provides suitable protection against caustic chemicals/materials to which employees may be exposed.

Question 2: Would the citation (in the situation described above) be written under 29 CFR 1910.151 or under the General Duty Clause, Section 5(a)(1)?

Reply: Since OSHA has a standard related to drenching/flushing facilities, any citation for the failure to provide suitable drenching/flushing facilities must be issued pursuant to 29 CFR 1910.151(c).

Question 3: While reading product literature on emergency shower units, it stated that 30 gpm was fairly standard among drench showers; are there specific requirements for the rate of flow for an emergency eyewash or shower unit?

Reply: OSHA has adopted no specific requirements regarding flow rates for drenching/flushing facilities. ANSI Z358.1 provides detailed information regarding the installation and operation of emergency eyewash and shower equipment, including the requirements for flow rate. Section 4.1 of ANSI Z358.1 specifies that emergency shower heads shall be capable of delivering a minimum of 75.7 liters per minute (20 gpm) of flushing fluid at a velocity low enough to be non-injurious to the user. A sufficient volume of flushing fluid shall be available to supply the flow rate for a minimum fifteen minute period.

Question 4: If OSHA is using the ANSI standard Z358.1-1990 for the basis of the OSHA standard 1910.151, doesn't OSHA need to make the ANSI standard available to the general public and/or industry? Where can I obtain a copy of the ANSI standard Z358.1-1990?

Reply: You may obtain copies of ANSI standards by contacting ANSI at:

American National Standards Institute, Inc.
11 West 42nd Street
New York, New York 10036
Phone: (212) 642-4900

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov. If you have any further questions, please feel free to contact the Office of General Industry Compliance Assistance at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director
Directorate of Compliance Programs

Attachment B: Sample MSDS Sheet

SODIUM HYDROXIDE

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1. Product Identification

Synonyms: Caustic soda; lye; sodium hydroxide solid; sodium hydrate
CAS No.: 1310-73-2
Molecular Weight: 40.00
Chemical Formula: NaOH
Product Codes:
J.T. Baker: 1508, 3717, 3718, 3721, 3722, 3723, 3728, 3734, 3736, 5045, 5565
Mallinckrodt: 7001, 7680, 7708, 7712, 7772, 7798

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2. Composition / Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Hydroxide	1310-73-2	99 - 100%	Yes

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3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White Stripe (Store Separately)

Potential Health Effects

Inhalation:
Severe irritant. Effects from inhalation of dust or mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.
Ingestion:
Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appear days after exposure.
Skin Contact:
Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.
Eye Contact:
Corrosive! Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.
Chronic Exposure:
Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also required.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. Hot or molten material can react violently with water.
Can react with certain metals, such as aluminum, to generate flammable hydrogen gas.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Adding water to caustic solution generates large amounts of heat.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal.
US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Always add the caustic to water while stirring; never the reverse. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product. Do not store with aluminum or magnesium. Do not mix with acids or organic materials.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
2 mg/m3 Ceiling
- ACGIH Threshold Limit Value (TLV):
2 mg/m3 Ceiling

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
White, deliquescent pellets or flakes.

Odor:
Odorless.

Solubility:
111 g/100 g of water.

Specific Gravity:
2.13

pH:
13 - 14 (0.5% soln.)

% Volatiles by volume @ 21C (70F):

0
Boiling Point:
1390C (2534F)
Melting Point:
318C (604F)
Vapor Density (Air=1):
> 1.0
Vapor Pressure (mm Hg):
Negligible.
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Very hygroscopic. Can slowly pick up moisture from air and react with carbon dioxide from air to form sodium carbonate.
Hazardous Decomposition Products:
Sodium oxide. Decomposition by reaction with certain metals releases flammable and explosive hydrogen gas.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Sodium hydroxide in contact with acids and organic halogen compounds, especially trichloroethylene, may causes violent reactions. Contact with nitromethane and other similar nitro compounds causes formation of shock-sensitive salts. Contact with metals such as aluminum, magnesium, tin, and zinc cause formation of flammable hydrogen gas. Sodium hydroxide, even in fairly dilute solution, reacts readily with various sugars to produce carbon monoxide. Precautions should be taken including monitoring the tank atmosphere for carbon monoxide to ensure safety of personnel before vessel entry.
Conditions to Avoid:
Moisture, dusting and incompatibles.

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11. Toxicological Information

Irritation data: skin, rabbit: 500 mg/24H severe; eye rabbit: 50 ug/24H severe; investigated as a mutagen.

--------\Cancer Lists\----------

	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Sodium Hydroxide (1310-73-2)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN/NA: UN1823
Packing Group: II
Information reported for product/size: 300LB

International (Water, I.M.O.)

Proper Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN/NA: UN1823
Packing Group: II
Information reported for product/size: 300LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Sodium Hydroxide (1310-73-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Hydroxide (1310-73-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Hydroxide (1310-73-2)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	-RCRA- CERCLA	261.33	-TSCA- 8(d)
Sodium Hydroxide (1310-73-2)	1000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: Yes (Pure / Solid)

Australian Hazchem Code: 2R
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **1**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately

flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Attachment C: State Specific Law, California

Subchapter 7. General Industry Safety Orders
Group 16. Control of Hazardous Substances
Article 109. Hazardous Substances and Processes

§5162. Emergency Eyewash and Shower Equipment.

(a) Plumbed or self-contained eyewash or eye/facewash equipment which meets the requirements of sections 5, 7, or 9 of ANSI Z358.1-1981, Emergency Eyewash and Shower Equipment, incorporated herein by this reference, shall be provided at all work areas where, during routine operations or foreseeable emergencies, the eyes of an employee may come into contact with a substance which can cause corrosion, severe irritation or permanent tissue damage or which is toxic by absorption. Water hoses, sink faucets, or showers are not acceptable eyewash facilities. Personal eyewash units or drench hoses which meet the requirements of section 6 or 8 or ANSI Z358.1-1981, hereby incorporated by reference, may support plumbed or self-contained units but shall not be used in lieu of them.

(b) An emergency shower which meets the requirements of section 4 or 9 of ANSI Z358.1-1981, incorporated herein by reference, shall be provided at all work areas where, during routine operations or foreseeable emergencies, area of the body may come into contact with a substance which is corrosive or severely irritating to the skin or which is toxic by skin absorption.

(c) Location. Emergency eyewash facilities and deluge showers shall be in accessible locations that require no more than 10 seconds for the injured person to reach. If both an eyewash and shower are needed, they shall be located so that both can be used at the same time by one person. The area of the eyewash and shower equipment shall be maintained free of items which obstruct their use.

(d) Performance. Plumbed and self-contained eyewash and shower equipment shall supply potable water at the flow rates and time durations specified in ANSI Z358.1-1981. The control valve shall be designed so that the water flow remains on without requiring the use of the operator's hands, and so that the valve remains activated until intentionally shut off for all but hand-held drench hoses. Personal eyewash units shall deliver potable water or other eye-flushing solution approved by the consulting physician.

(e) Maintenance. Plumbed eyewash and shower equipment shall be activated at least monthly to flush the line and to verify proper operation. Other units shall be maintained in accordance with the manufacturer's instructions.

NOTE: See section 5185 of the General Industry Safety Orders when the hazard involves the changing and charging of storage batteries. See article 6 of the Unfired Pressure Vessel Safety Orders when the hazard involves anhydrousammonia.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.