

PHYSICAL HAZARD CONTROL

WALKING AND WORKING SURFACES

1. Unguarded floor opening.

POSSIBLE SOLUTION: Provide a cover, grating, or standard guardrailing. Standard guardrailing measuring 42 inches high for the top rail, 21 inches for the midrail, and minimum 4 inch high toe board should be installed. The railing can be made of wooden 2 X 4's, provided they can withstand 200 pounds of horizontal pressure; otherwise, round metal tube railing is recommended.

2. Cords/wiring run across the aisleway present a tripping hazard.

POSSIBLE SOLUTION: Run cords/wiring overhead or route it so that it does not cross the aisle.

3. Unguarded floor hole.

POSSIBLE SOLUTION: A fixed floor hole cover should be installed. It should be capable of withstanding the weight of the traffic to which it is exposed.

4. Water, oils and/or other liquids on the floor creating a slipping hazard.

POSSIBLE SOLUTION: The floor of every workroom shall be maintained in a clean and, so far as possible, a dry condition. Where wet processes are used, drainage shall be maintained, and false floors, platforms, mats, or other dry standing places should be provided where practical.

5. The floor surface was damaged or defective. Especially carpeting with tears or fraying strands.

POSSIBLE SOLUTION: Have a qualified person make the necessary repairs to floors and surfaces to eliminate protruding nails, splinters, holes or loose boards. Aisles and passageways should be kept clear and in good repair with no obstructions across or in aisles that could create a hazard.

6. Open-sided floor, elevated platform, runway, or walkway unguarded.

POSSIBLE SOLUTION: Standard guardrailing measuring 42 inches high for the top rail, 21 inches for the midrail, and a minimum 4 inch high toe board should be installed. The railing can be made with standard wooden 2 X 4's, provided they can withstand 200 pounds of horizontal pressure; otherwise, they should be made of round metal pipe or other acceptable material.

7. Floor load limits posted.

POSSIBLE SOLUTION: The load limits should be posted for these areas so stored material will not exceed the limits.

8. Poor housekeeping. This hazard deals mainly with stacking on top of cabinets in classrooms.

POSSIBLE SOLUTION: All places of employment shall be kept clean and orderly and in a sanitary condition to prevent accumulation of materials that constitute hazards from tripping, fire, explosion, etc.

9. A flight of stairs with no hand railing was observed.

POSSIBLE SOLUTION: Install standard hand railing between 30 and 34 inches measured vertically above the top surface of the tread. Handrails should have a clearance of three inches between the rail and the wall. The railing should be able to withstand 200 pounds of pressure. Handrails should be installed on the right side, descending.

10. Stair steps were broken.

POSSIBLE SOLUTION: The broken step(s) should be repaired or replaced.

11. The stairs were not evenly constructed.

POSSIBLE SOLUTION: The stairs should be rebuilt to have a uniform rise height and tread width throughout the flight of stairs.

LADDERS

1. Portable ladder damaged or defective.

POSSIBLE SOLUTION: Ladders should be in sound, usable condition without cracks, splinters, breaks, bends, damaged or missing braces. If a ladder is defective, it should be destroyed.

2. A fixed ladder was not properly designed, constructed, or maintained.

POSSIBLE SOLUTION: Remove the poorly constructed ladder. If a new fixed ladder is to be installed, all parts shall be free from defects and designed to support its intended load. The ladder should be at least seven inches off of the nearest permanent structure.

3. A wooden ladder had a broken/damaged siderail.

POSSIBLE SOLUTION: The damaged side rail should be repaired to the manufacturer's specification, if possible. It must be brought back to the original strength and safety factor or be destroyed and replaced.

MECHANICAL POWER TRANSMISSION APPARATUS

1. Vee belt not guarded.

POSSIBLE SOLUTION: Construct and install a guard of perforated or expanded metal to completely enclose the belt and pulley system.

2. An unguarded horizontal shaft created an entanglement hazard.

POSSIBLE SOLUTION: Construct and install a stationary casing guard which will completely enclose the shaft. An alternative would be to construct and install a trough that will enclose the sides and top, or sides and bottom of the shaft. The trough or stationary casing guard may be constructed from expanded, perforated, or sheet metal.

3. Projecting shaft end not guarded.

POSSIBLE SOLUTION: Completely enclose the shaft end with a non-rotating cap, cup guard or safety sleeve.

4. Coupling not guarded.

POSSIBLE SOLUTION: Construct and install a guard of expanded, perforated, or sheet metal to enclose the coupling.

AUXILIARY EQUIPMENT

1. Fan blades not adequately guarded.

POSSIBLE SOLUTION: This fan must have the blades guarded. The guard should be made in accordance with the requirements set forth on standard materials and dimensions, Ohio Administrative Code 4121:1-5-99. Wire mesh or expanded metal are some materials which can be used. Also, the guards should be permanently affixed or should require the use of a tool for removal.

2. Blades on an exhaust/ventilating fan not adequately guarded.

POSSIBLE SOLUTION: This fan must have the blades guarded. The guard should be made in accordance with the requirements set forth on standard materials and dimensions, Ohio Administrative Code 4121:1-5-99. Wire mesh or expanded metal are some materials which can be used. Also, the guards should be permanently affixed or should require the use of a tool for removal.

3. Portable machinery not securely anchored.

POSSIBLE SOLUTION: Portable machinery, mounted on bases, should be locked or blocked to prevent movement or shift while such machinery is in operation.

4. Stationary machinery was not securely anchored.

POSSIBLE SOLUTION: Stationary machinery has to be securely anchored to prevent walking, moving or tipping during operation.

5. Unguarded foot pedal.

POSSIBLE SOLUTION: This foot pedal needs to have a cover guard to eliminate the hazard of an accidental activation due to unintentional contact with the pedal. Also, a pad with a non-slip contact area should be firmly attached to the pedal.

6. The operator had no easy means of disengaging the machine from its power supply.

POSSIBLE SOLUTION: A way to disengage the power supply to this machine should be provided within reaching distance of the operator so that, in case of the need for an emergency shut-off, the operator can actuate the shut-off immediately. A red palm button is an effective means.

7. An employee was using compressed air for personal cleaning.

POSSIBLE SOLUTION: Employees shall be instructed not to use compressed air for personal cleaning purposes. When compressed air is used for cleaning, debris or chemicals could become embedded in eyes or skin.

MACHINE GUARDING AND MISCELLANEOUS EQUIPMENT

1. A portable abrasive grinder did not have the guard in place.

POSSIBLE SOLUTION: On right angle head or vertical portable grinders, the guard shall have a maximum exposure angle of one hundred eighty degrees (180°) and be located so as to be between the operator and the wheel during use. The top half of the wheel shall be enclosed at all times.

2. Air line pressure was not reduced to less than 30 psi for cleaning equipment.

POSSIBLE SOLUTION: Employees should be instructed not to use compressed air in excess of 30 psi to clean equipment. Air lines with compressed air in excess of 30 psi should be equipped with pressure-reducing nozzles at the hose end.

3. The rated load was not marked on a jack.

POSSIBLE SOLUTION: Check with the manufacturer to determine the capacity of the jack. Stencil this weight information legibly in a prominent place on the jack where it will not be covered while in use and will not be subject to wear or damage.

4. A hand tool was damaged, defective, or improperly used.

POSSIBLE SOLUTION: Damaged or defective tools should be repaired or replaced. Tools should be used only in accordance with their intended purpose.

5. There was an unguarded wheel and/or blade on the bandsaw.

POSSIBLE SOLUTION: Obtain or construct a new guard which will enclose or guard the bandsaw wheel and all portions of the blade with the exception of the working portion. This guard can be made of metal or Plexiglas.

6. There was no guard on the blade of a table saw.

POSSIBLE SOLUTION: Obtain or construct a hood-type guard which will cover the exposed portion of the saw blade. The guard should be affixed in a manner that will prevent easy removal by employees. The guard can be made of metal or Plexiglas.

7. There was no anti-kickback device on the manual feed circular rip saw.

POSSIBLE SOLUTION: Obtain or construct a hood-type guard designed to prevent a kickback, or provide a separate anti-kickback attachment.

8. There was no spreader on the manual feed circular rip saw.

POSSIBLE SOLUTION: Obtain and securely fasten a spreader at the rear of the saw in alignment with the saw blade.

9. There was no guard, or the guard was defective, on a radial saw.

POSSIBLE SOLUTION: Obtain or construct a hood-type guard that will completely enclose the upper portion of the blade down to a point that will include the end of the saw arbor. The sides of the lower exposed portion of the blade should be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of the stock being cut. The guard may be made of metal or Plexiglas.

10. There was no automatic return on a radial saw.

POSSIBLE SOLUTION: Install a device which will return the saw automatically to the back of the table when released at any point of its travel.

11. There was no positive stop installed on the radial saw.

POSSIBLE SOLUTION: Install a stop to prevent the forward travel of the blade beyond the front edge of the table or extend the table.

12. The blade was not guarded on the miter/chop saw.

POSSIBLE SOLUTION: The blade on the miter/chop saw should be protected from contact. Consult with the manufacturer for the proper type of guard.

13. There was no automatic return on the miter/chop saw.

POSSIBLE SOLUTION: The saw should return to the up position when released. Consult with the manufacturer for the proper type of return device.

14. A chuck on a lathe was not guarded.

POSSIBLE SOLUTION: Provide and install a guard that covers the projecting portion of the chuck. The guard, constructed from Plexiglas or some other impact-resistant, transparent material, should be hinged so it can be movable during chuck adjustment. Contact the equipment manufacturer for assistance to determine the appropriate chuck guard needed.

15. The knife projection on the jointer's cutting head exceeded the maximum amount.

POSSIBLE SOLUTION: Knife blades are not permitted to project more than 1/8" beyond the cylindrical body of the head. Exceeding this distance can cause the blades to fracture and fly from the cutting head.

16. The cutting head of the jointer was improperly guarded.

POSSIBLE SOLUTION: The cutting head guard must keep the operator's hands from contacting the revolving knives and shall automatically adjust itself to cover the unused portion of the head and must remain in contact with the material at all times.

17. The cutting head of the jointer was improperly guarded on the back of the fence.

POSSIBLE SOLUTION: Maintenance should install a guard to cover the cutting head on the back of the fence.

18. The drum sander was improperly guarded.

POSSIBLE SOLUTION: A guard must be arranged to enclose the revolving drum, except for the portion of the drum above the table.

19. A woodworking machine was not equipped with a proper motor starter switch to prevent the machine from automatically restarting when the power is restored following a power failure.

POSSIBLE SOLUTION: Install a magnetic motor starter switch. The motor starter button must be used to restart the woodworking machine when power is restored following a power failure.

20. The disc sander was improperly guarded.

POSSIBLE SOLUTION: Disc sanders must have a guard so arranged to enclose the periphery and back of the revolving disc, and any portion of the disc below the level of the table.

21. The belt sander was improperly guarded.

POSSIBLE SOLUTION: Belt sanders require a guard that covers the inrunning nip point where the belt runs onto the pulleys. It is also necessary to guard the unused run of the belt.

22. The cutting head of the wood shaper was improperly guarded.

POSSIBLE SOLUTION: The cutting head needs to be enclosed with a cage or adjustable guard so designed as to keep the operator's hands away from the cutting edge. The diameter of circular shaper guards shall not be less than the greatest diameter of the cutter.

23. The cutting head of the molding equipment was improperly guarded.

POSSIBLE SOLUTION: All cutting heads need to be covered by a metal guard. Sheet metal guards must be at least 1/16 inch in thickness and cast iron guards must be at least 3/16 inch in thickness.

24. The router blade was not guarded.

POSSIBLE SOLUTION: Routers and other cutting heads should be guarded from contact. Where the cutting head moves without warning the area of movement should be guarded against access.

25. Training in the safe operation and maintenance of grinders was needed.

POSSIBLE SOLUTION: Provide proper training in the use and maintenance of grinders.

26. The grinding wheel was grooved, uneven, or loaded with foreign material.

POSSIBLE SOLUTION: Grinding wheels must have their working faces maintained in a flat and matter-free condition. If a wheel face is no longer flat or if it is loaded with foreign material, it should be cleaned and dressed with a dressing tool.

27. The spindle end, nut and flange projections on the grinder were not guarded.

POSSIBLE SOLUTION: A guard made of metal should cover the exposed spindle end, nut and flange projections to prevent accidental contact. The guard should be in proper alignment with the wheel and have fastenings which exceed the strength of the guard. The fasteners used to secure the guard should require tools to prevent easy and unnecessary removal.

28. A bench/pedestal grinder did not have a guard or properly designed guard.

POSSIBLE SOLUTION: Provide guards that cover all but 1/4 of the wheel periphery. Exposure should not begin more than 65 degrees above the horizontal plane of the wheel spindle. The guard should cover the spindle end, nut and flange projections.

29. The cup wheel was not guarded.

POSSIBLE SOLUTION: Provide safety guarding to protect employees in case of wheel breakage.

30. The work rest on the grinder was not properly adjusted.

POSSIBLE SOLUTION: Adjust the work rest so that the maximum opening between the rest and the wheel is not more than one-eighth inch to prevent the work from being jammed between the wheel and the rest. Check the grinders on a regular basis and adjust the rests as needed.

31. There was no work rest on the grinder.

POSSIBLE SOLUTION: An adjustable metal work rest, made to the specifications of the manufacturer of the grinder, should be attached. It needs to be adjusted so that the space between the work rest and the wheel is no more than one-eighth of an inch. Check the grinders on a regular basis and adjust the rests as needed.

32. The grinder's upper peripheral guard (tongue guard) was not properly adjusted.

POSSIBLE SOLUTION: The guard needs to be adjusted downward to within one-fourth inch of the wheel. Check the tongue guard on a regular basis to keep it in proper adjustment as the wheel wears down.

33. The grinder did not have an upper peripheral guard (tongue guard).

POSSIBLE SOLUTION: Contact the manufacturer for assistance to determine the guard needed. An alternative would be to construct a guard according to the specifications set forth in Table 12-J, Ohio Administrative Code.

34. A wire wheel was unguarded.

POSSIBLE SOLUTION: Provide a guard for the wire wheel. In addition to the wheel periphery, the spindle end and nut should be guarded.

35. A buffing wheel was unguarded.

POSSIBLE SOLUTION: Buffing wheels should be enclosed and attached to a ventilation system to remove the fine particles being generated. The hood or enclosure should cover the spindle end and nut.

36. The guard was not properly affixed to the machine.

POSSIBLE SOLUTION: Attach guards to machines with bolts, screws, allen screws or other similar means requiring a tool to remove them, or install electrical interlocks which will cause the machines not to run if the guards are removed. This was especially true about personal fans. The guards were loose or were broken creating a hazard.

37. A machine did not have proper point of operation guarding.

POSSIBLE SOLUTION: Provide proper point of operation guarding such as barrier guards (secured or interlocked), sensing devices (light curtains), two-hand controls or trips, etc.

38. The squaring shear not guarded.

POSSIBLE SOLUTION: Provide guards to protect against contact with the material hold-down devices and the blade on the feed side of the shear, and blade protection on the discharge side. Vacuum lifters (suction cups) or magnets should be used to handle materials to be fed into the shear.

39. Nip points created by inrunning rolls, rollover platen or other flat surface material being wound over roll surface not guarded.

POSSIBLE SOLUTION: Install guards that will prevent employees from reaching the nip areas or install safety trips (cable or wire center cord attached to electrical switch). Contact with the safety trip should cause the rolls to stop immediately. If a safety trip line is used, it should be red in color.

40. Power driven knives or cutting blades not guarded.

POSSIBLE SOLUTION: Install guards to protect employees from accidental contact. Guards must be designed to allow material to reach the cutting portion of the machines and still protect the operators. A good example of this would be a garbage disposal guard. This hazard was found quite often. Replace the old guard with a new one.

41. The point of operation on the press brake not guarded.

POSSIBLE SOLUTION: Install a point of operation guard or device or a combination guard and device to protect the operator and other workers from injury. Refer to the ANSI standards for specifics on guarding.

MOBILE MECHANICALIZED EQUIPMENT

1. A warning sign prohibiting smoking was not posted at the fueling station.

POSSIBLE SOLUTION: Post signs at the refueling area stating that the engine should be shut down and that smoking is not permitted.

2. There was no audible or visual warning device on the industrial vehicle, or it was defective.

POSSIBLE SOLUTION: Install or repair an audible or visible warning device on this motor vehicle.

3. A powered industrial truck's horn was not used as required.

POSSIBLE SOLUTION: Fork truck operators should use the horn to warn pedestrians and other vehicle operators at all locations where vision is obstructed (blind corners, intersections, enter or leaving a building, etc.).

4. The nameplate was not legible (or missing) on a powered industrial truck.

POSSIBLE SOLUTION: Obtain from the manufacturer and affix to this truck a nameplate with load capacities and other safety information. Maintain this nameplate in a legible condition.

5. A personnel-lifting cage was not used properly, constructed properly or adequately secured to the forklift.

POSSIBLE SOLUTION: A personnel-lifting cage with standard guardrail, toeboards, and a 72-inch mast guard that is securely fastened to the lifting carriage or forks should be used for raising employees with a forklift.

6. Forklift truck attachments did not have the capacity clearly and conspicuously marked on them.

POSSIBLE SOLUTION: Each forklift attachment is to be marked to identify it and show its approximate weight and capacity.

7. Wheel chocks were not used when loading and unloading truck-trailers.

POSSIBLE SOLUTION: Instruct employees to use wheel chocks under the rear wheels to prevent trailers from moving while they are being loaded or unloaded. Equivalent protection, such as dock locks, may be provided instead of wheel chocks.

HOISTING EQUIPMENT

1. The hoist limit switch was not tested.

POSSIBLE SOLUTION: At the beginning of each shift, the limit switch should be tested. The load block should be "inched" into the limit switch at slow speed with no load.

2. The control pendant for the overhead crane did not have the functions identified or they were not legible.

POSSIBLE SOLUTION: Identify all controls on the pendant to ensure that any employee using the crane will be aware of all the control functions.

3. The maximum capacity of the crane was not posted.

POSSIBLE SOLUTION: The rated load of the crane shall be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist shall have its rated load marked on it or its load block, and this marking shall be clearly legible from the ground or floor.

4. The retainer clip on a hoist hook was broken/missing.

POSSIBLE SOLUTION: Maintain retainer clips on all hoist hooks that were originally equipped with them.

5. There was a defective chain sling.

POSSIBLE SOLUTION: Chain slings that are damaged or defective should be removed from service until either destroyed or repaired in accordance with the manufacturers specifications.

6. An alloy steel chain sling did not have an identification tag affixed to the chain.

POSSIBLE SOLUTION: Alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity, and reach.

7. An alloy steel chain had a makeshift link or fastener.

POSSIBLE SOLUTION: Makeshift links or fasteners formed from bolts or rods or other such attachments shall not be used.

8. Unapproved lifting devices were being used.

POSSIBLE SOLUTION: Only approved (certified) lifting devices should be used to attach a load to a hoist or crane hook. Certification must come from the device manufacturer or an engineer and it must be in the form of a tag attached to the device or a written statement.

9. There was a defective synthetic web sling.

POSSIBLE SOLUTION: Synthetic web slings shall be immediately removed from service if any of the following conditions are present: acid or caustic burns; melting or charring of any parts of the sling surface; snags, punctures, tears or cuts; broken or worn stitches; or distortion of fittings.

10. Web slings were not marked or coded to indicate rated capacities and/or type of synthetic material.

POSSIBLE SOLUTION: Synthetic web slings should be either tagged or otherwise permanently marked to indicate the sling's rated capacity and type of synthetic material used.

11. There was a defective wire rope sling.

POSSIBLE SOLUTION: Those slings which showed signs of defect, damage, or distortion, need to be removed from service. Sling inspections should include looking for broken strands, birdcaging, kinking, stretching, or deterioration due to grease, grime, mud, abuse or misuse.

12. Eyes in a wire rope sling were formed by improperly using wire rope clips.

POSSIBLE SOLUTION: Rope clips attached with u-bolts shall have the u-bolts on the dead or short end of the rope. The spacing and number of the clips should be in accordance with manufacturer's recommendations.

13. Improper Sling Storage

Slings should be stored in an area to protect from vehicle and other damage. Hanging the sling on a wall is an acceptable safety practice.

CUTTING AND WELDING EQUIPMENT

1. Cutting and welding equipment was damaged.

POSSIBLE SOLUTION: Cutting or welding equipment that becomes damaged should be removed from service until repaired by a qualified person or replaced with an equivalent part.

2. There was no screen set-up in the welding area.

POSSIBLE SOLUTION: Provide screens or shields to protect employees from exposure to sparks and the possibility of flash injury to the eyes. Instruct welders to make sure the screens or shields are in place.

3. Welding and/or cutting were performed near combustible materials.

POSSIBLE SOLUTION: Welding/cutting operations should be performed a safe distance from combustibles or combustibles should be moved or protected with fire-resistant shields.

4. Welding was being performed on a used container.

POSSIBLE SOLUTION: All containers (drums, barrels, tanks, etc.) must be cleaned thoroughly to make absolutely certain that there are no flammable materials present or any substances such as greases, tars, acids or other materials which, when subjected to heat, might produce flammable or toxic vapors.

5. Acetylene was in use with a pressure in excess of 15 pounds per square inch.

POSSIBLE SOLUTION: Under no condition should acetylene be generated, piped (except in approved cylinder manifolds), or utilized at a pressure in excess of 15 pounds per square inch gauge pressure.

6. Oxygen and fuel-gas cylinders were stored together.

POSSIBLE SOLUTION: Oxygen cylinders in storage should be separated from fuel-gas cylinders or combustible material (especially oil or grease) a minimum distance of 20 feet or by a non-combustible barrier at least 5 feet high having a fire resistance rating of at least 1/2 hour.

7. Oxygen/acetylene cutting equipment was not in use, but lines were still under pressure and valves open.

POSSIBLE SOLUTION: Close valves on oxygen and acetylene cylinders and bleed off hose pressure after use to prevent damage to regulators and gauges.

8. A cylinder was not properly secured in an upright position.

POSSIBLE SOLUTION: Provide facilities for securely fastening cylinders of compressed gas in an upright position, such as ropes, chains, etc.

9. A cylinder was not equipped with a valve protection cap.

POSSIBLE SOLUTION: Replace the valve protection cap when a cylinder is not connected for use.

10. Backflow protection and/or flashback arresters were not provided.

RECOMMENDATION: Provide check valves and/or flashback arresters on the oxygen and acetylene hoses.

11. The gauges on the oxygen-fuel cutting equipment were not working properly.

POSSIBLE SOLUTION: Oxygen and fuel gas pressure regulators, including their related gauges, must be in proper working order while in use. Repairs must be done by a trained and qualified person.

12. The insulation on the electrode holder was damaged.

POSSIBLE SOLUTION: Defective insulation on electrode holders must be replaced to protect the operator against electrical shock. Have qualified maintenance personnel correct this problem.

13. An electrode holder, not in use, was not properly stored.

POSSIBLE SOLUTION: When work is suspended for any substantial length of time, the electrode should be removed from the holder. The electrode holder should be stored in a place that cannot make electrical contact with people or other objects.

14. The welding cable had a splice within 10 feet of the electrode holder.

POSSIBLE SOLUTION: Cables with splices within 10 feet of the electrode holder shall not be used. Replace the cable with one in good condition.

15. The insulation on welding cables was inadequate or damaged.

POSSIBLE SOLUTION: Cables with damaged insulation or exposed bare conductors must be replaced. Joining lengths of work and electrode cables must be done by the use of connecting means specifically intended for the purpose. The connecting means must have insulation adequate for its service condition.

16. The terminals for the welding leads were not guarded against accidental contact.

POSSIBLE SOLUTION: Provide protection by the use of:

Dead-front receptacles for plug connections;
Recessed openings with non-removable hinged covers;
Heavy insulation, sleeving, or taping;
Other equivalent electrical and mechanical protection.

17. The point of operation was not guarded on the spot/seam welding machine.

POSSIBLE SOLUTION: All press welding machine operations, where there is a possibility of the operator's fingers being under the point of operation, must be guarded by use of a device such as a presence-sensing device or two-hand controls.

18. Arc welding was performed in an open area without protective booths, screens or shields.

POSSIBLE SOLUTION: When possible, the welder should be enclosed in an individual booth painted with a low reflective paint, or enclosed with non-combustible screens similarly painted. Booths and screens must permit circulation of air at floor level.

PERSONAL PROTECTIVE EQUIPMENT

1. Personal protective equipment was not sanitary or not in good condition.

POSSIBLE SOLUTION: Remove unsanitary or defective personal protective equipment from use. Establish written inspection procedures for all personal protective equipment with instructions to report unsatisfactory equipment to supervision.

2. Proper eye protection was not being worn.

POSSIBLE SOLUTION: Provide approved eye protection to include side shields for this operation and for employees in the immediate work area.

3. A faceshield was not being worn.

POSSIBLE SOLUTION: Provide approved faceshields to afford protection to the face area. Contact a safety equipment supplier for assistance to determine the appropriate faceshield needed.

4. Appropriate protective equipment was not being worn while working around acids, caustics or other injurious liquids.

POSSIBLE SOLUTION: Provide appropriate personal protective equipment such as eye and face protection, gloves, aprons, sleeves or other impervious garments.

5. A respirator was improperly stored.

POSSIBLE SOLUTION: Respirators shall be stored in a convenient, clean, and sanitary location. Respirators should be stored in a sealable container.

6. Conditions existed which could have prevented an effective respirator seal.

POSSIBLE SOLUTION: Respirators shall not be worn when conditions prevent a good face seal. Such conditions may be growth of a beard, sideburns, a skull cap that projects under the facepiece, or temple pieces on glasses. If beards are worn by employees, you must provide and they must wear a hood type respirator.

7. An emergency eyewash station and /or shower was not provided or was defective.

POSSIBLE SOLUTION: Provide a facility for quick drenching of the eyes and/or body where an employee is exposed to injurious corrosive or toxic materials.

8. Access to an emergency eyewash and/or shower was blocked.

POSSIBLE SOLUTION: Maintain a cleared area around the eyewash or shower facilities to allow quick and easy access.

9. Emergency eyewash stations and/or showers were not activated to flush the lines and to verify proper operation.

POSSIBLE SOLUTION: Emergency eyewash stations and/or showers should be activated weekly to flush the lines and verify proper operation. Records should be maintained to verify compliance with testing procedures.

BATTERY CHARGING

1. A specific area was not set aside for charging batteries.

POSSIBLE SOLUTION: An area shall be designated for the purpose of charging batteries.

2. Battery charging areas did not have protection to prevent damage by trucks.

POSSIBLE SOLUTION: Provide barrier protection to prevent damage to the battery charger.

3. "No Smoking or Open Flame" signs were not posted.

POSSIBLE SOLUTION: Post signs prohibiting smoking or open flames in the charging area and strictly enforce the rule.

4. There was no fire extinguisher located near the charging area.

POSSIBLE SOLUTION: Provide a fire extinguisher for this area.

ELECTRICAL HAZARDS

1. An attachment plug without dead-front construction (fiber cover or no cover) was observed.

POSSIBLE SOLUTION: Provide solid-type attachment plugs which have no exposed current-carrying parts except the prongs, blades, or pins (dead-front construction).

2. Electrical equipment (disconnects, breakers and fuse boxes, etc.) needed identification.

POSSIBLE SOLUTION: Each disconnect must be clearly labeled or marked to indicate the circuit's function, and the label or mark should be durable and located at the point where the circuit originates. Identification should be specific, rather than general. The disconnect need not be labeled or marked, if its purpose is evident.

3. There was insufficient working space around electrical equipment.

POSSIBLE SOLUTION: Maintain sufficiently clear working areas around electrical equipment. This area should not be used for storage. See 1910.303, Table S-1, Working Clearances for minimum clearances.

<u>NOMINAL VOLTAGE TO GROUND</u>	<u>MINIMUM CLEAR DISTANCE</u>
0-150	3 FEET
151-600	3-4 FEET
CONDITION DEPENDENT	

4. A circuit tester indicated reverse polarity in the outlet.

POSSIBLE SOLUTION: A qualified electrician should check the wiring and correct the problem(s).

5. A circuit tester indicated an ungrounded outlet.

POSSIBLE SOLUTION: Have a qualified electrician check the outlet for grounding problems and make the necessary correction(s).

6. Cord and plug connected equipment was ungrounded.

POSSIBLE SOLUTION: Provide proper grounding for all cord and plug connected equipment. The work should be done by a qualified electrician to ensure sufficient grounding. This was especially true with personal fans brought to school by employees.

7. The grounding pin was broken off the extension cord plug.

POSSIBLE SOLUTION: A qualified electrician should replace the plug with a new three-pronged plug. The replacement plug should be dead-front constructed and have a cord grip.

8. A two-wire extension cord was being used to energize a non-double-insulated power tool or other equipment.

POSSIBLE SOLUTION: Immediately remove this unauthorized cord from service. Power tools that are not double insulated require the use of a three-wire, grounded extension cord.

9. Small wire, ungrounded extension cords ("zip" cord) were being used.

POSSIBLE SOLUTION: Provide and use heavy duty, grounded extension cords for temporary use and portable outlet strips with overload protection for more permanent situations.

10. Electrical equipment (outlets, panel boards, snap switches, etc.) did not have covers or faceplates, or did not have them closed or properly secured.

POSSIBLE SOLUTION: Provide approved, properly secured covers or face plates for all electrical equipment requiring them.

11. Unused electrical wiring and equipment had not been removed.

POSSIBLE SOLUTIONS: Unused and unmarked electrical wiring and equipment should be removed.

12. Electrical boxes and equipment had unused openings.

POSSIBLE SOLUTION: Cover all unused openings in electrical boxes and equipment to prevent employee contact with live parts and to keep dust and dirt from entering through these openings. Knockout seals can be used to cover most of these openings.

13. The electrical outlet was not protected with a ground fault circuit interrupter (GFCI).

POSSIBLE SOLUTION: Provide GFCI outlets where employees may be working in a wet environment. This type of electrical protection is classified as "employee protection". In certain geographic locations, it is a required building code to provide this type of outlet in bathrooms, kitchens, garages, and outdoor outlets.

14. Multi-plug adapters ("octopus" plugs) are being used.

POSSIBLE SOLUTION: Provide a sufficient number of fixed outlets to plug equipment into and eliminate the multi-plugs which could cause a circuit to be overloaded.

15. A metal knock-out box was attached to a flexible cord to make an extension cord. The knockouts could come loose and fall inside the box, resulting in exposure to electrical shock.

POSSIBLE SOLUTION: Immediately remove from service. This type of electrical box is intended for permanent mounting, not as a portable flexible cord attachment.

16. Flexible cords and cables were not protected by bushings or fittings where passing through holes in covers, boxes, or other enclosures.

POSSIBLE SOLUTION: Provide bushings or fittings to protect flexible cords or cables where they pass through holes in covers, boxes, or other enclosures.

17. Flexible cords and cables were attached to building surfaces; concealed behind walls or floors; run through walls, floors, or partitions; or wound around building projections (sprinkler piping, ventilation ducts, etc.).

POSSIBLE SOLUTION: Use flexible cords only where they can be clearly seen at all times and are not attached to building surfaces (except for one connection to a suitable tension take-up device) or wound around other objects.

18. Flexible cords and cables were used as a substitute for fixed wiring.

POSSIBLE SOLUTION: Equipment that is not portable or seldom moved should be hardwired (in conduit). Flexible cords or cable can be dropped directly down to machinery from busways. If machinery is moved, there should be sufficient plug-ins on the busways.

19. Cord and plug-connected equipment had been plugged into extension cords rather than directly into receptacle outlets.

POSSIBLE SOLUTION: Plug equipment that have flexible cords with attachment plugs directly into receptacle outlets and not into extension cords. Extension cords should only be used for maintenance or repair operations to energize portable tools.

20. Cord-equipped light fixtures suspended from the ceiling were improperly connected.

POSSIBLE SOLUTION: A cord-equipped light fixture should be suspended directly below the outlet box so that the cord is visible for its entire length and is not subject to any damage.

21. Trouble lights and other types of hand lamps did not have guards over the bulbs.

POSSIBLE SOLUTION: Provide guards over the bulbs on hand lamps and be sure they remain in place.

22. Lamps providing general illumination were not protected against accidental contact or breakage.

POSSIBLE SOLUTION: Protect these lamps by elevating them a minimum of 7 feet above the working surface, by installing a suitable fixture or by using a lamp holder with a guard.

23. A cord lacked strain relief.

POSSIBLE SOLUTION: Provide some type of strain relief device to prevent pull from being transmitted to connections and terminals.

24. A flexible cord was spliced together.

POSSIBLE SOLUTION: Remove from service. Use flexible cords in continuous lengths without splice or tap.

25. An electrical cord had damaged insulation.

POSSIBLE SOLUTION: Remove the cord from service to eliminate potential fire, shock or electrocution hazards. A qualified electrician should check the cord and make necessary corrections. If this cord can not be repaired, it should be replaced.

26. Sockets in lamp holders had live parts exposed where bulbs were missing.

POSSIBLE SOLUTION: Replace the light bulbs to protect employees from contact with energized parts.

27. An adapter plug which interrupted the equipment grounding connection was being used.

POSSIBLE SOLUTION: Remove this adapter from service. Flexible cords and attachment plugs should be energized directly from a grounded receptacle outlet.

28. Improper electrical equipment was used in a damp or wet location.

POSSIBLE SOLUTION: Electrical equipment should be designed for a wet or damp location. Contact a qualified electrician for corrections.

29. An inspection program for plug connected equipment and extension cords was not established.

POSSIBLE SOLUTION: Initiate visual inspection procedures. It is recommended that your employees visually check before use cords, plugs, and receptacles for external defects such as deformed and missing pins or damage to the outer jacket or insulation. The employer should prohibit use of defective equipment.

EXITS AND EGRESS

1. An exit was blocked.

POSSIBLE SOLUTION: No exit may be blocked or otherwise restricted. Supervisors should instruct employees not to place equipment or material so as to block access to an exit.

2. An exit door was locked.

POSSIBLE SOLUTION: No exit may be locked at any time. If security is a problem, then panic hardware is available to allow the door to be secured.

3. The path of egress was blocked.

POSSIBLE SOLUTION: The exterior path of egress should be kept in good condition with no obstacles or blockages and lead to a public street or alley.

4. There was a door that could be mistaken for an exit.

POSSIBLE SOLUTION: All doors that could be confused with an exit or a path to an exit and are not an exit or a path to an exit should be identified. The label should be durable and legible and should have the purpose of the door (bathroom, closet) or say "Not An Exit".

5. Emergency lighting was not maintained.

POSSIBLE SOLUTION: Malfunctioning emergency lights should be repaired by a qualified electrician. Emergency lights should be periodically inspected to ensure they are in working condition.

6. Emergency lighting was not tested for proper operation.

POSSIBLE SOLUTION: Emergency lighting should be functionally tested every 30 days for 30 seconds and yearly for 1-1/2 hours. Records shall be kept of tests.

7. Emergency lighting was not provided.

POSSIBLE SOLUTION: Emergency lighting of at least one foot candle at floor level should be provided for all stairs, aisles, corridors, ramps, escalators, passageways, and doors designated as exits or paths to exit. The emergency lighting should come on as soon as interruption of normal power is detected.

8. The bulb in an "EXIT" sign was burned out.

POSSIBLE SOLUTION: Replace the burned out bulb.

9. A fire door was blocked open.

POSSIBLE SOLUTION: Doors which serve as fire or smoke barriers and which are designed to be self-closing should not be blocked or held open except where devices are used that will release the door upon a signal from a smoke or fire alarm or loss of power.

10. Freezers and/or coolers had no means of opening the door from the inside.

POSSIBLE SOLUTION: Install emergency hardware for this purpose.

FIRE EXTINGUISHERS

1. A fire extinguisher was discharged.

POSSIBLE SOLUTION: Replace the discharged fire extinguisher with a fully charged extinguisher. Employees should report the discharge of any fire extinguisher to their supervisor for replacement.

2. Access to a fire extinguisher was blocked.

POSSIBLE SOLUTION: Fire extinguishers should be accessible at all times. Supervisors should instruct employees not to place materials and equipment in such a way as to block access. Fire extinguishers should be periodically checked to assure accessibility.

3. A fire extinguisher was not mounted.

POSSIBLE SOLUTION: Fire extinguishers should be mounted on a vertical surface with the top between 4 and 5 feet from the floor. The location should be identified by a sign or other means to make the extinguisher easily identifiable.

4. The location of a fire extinguisher was not identified.

POSSIBLE SOLUTION: The location of all fire extinguishers should be readily identifiable. Signs are available from your fire extinguisher service company.

5. There was no fire extinguisher training provided for designated employees as part of the company's emergency action plan.

POSSIBLE SOLUTION: Training should be provided to those employees who may have to use fire extinguishers. Contact your local fire department or your fire extinguisher service company for this type of training.

6. Fire extinguishers were not hydrostatically tested.

POSSIBLE SOLUTION: Dry chemical and Halon fire extinguishers should be hydrostatically tested every 12 years. All others should be tested every five years. Hydrostatic testing should be performed by a qualified person.

7. A yearly maintenance inspection was not conducted on fire extinguishers.

POSSIBLE SOLUTION: Ensure that your fire extinguisher service company maintains all the fire extinguishers in your facility on a yearly basis.

8. Monthly inspections of portable fire extinguishers were not performed.

POSSIBLE SOLUTION: An employee should be designated and trained to perform a monthly visual inspection of all fire extinguishers and record those inspections. The inspection should include, but is not limited to:

- 1) Level of charge in the fire extinguishers;
- 2) Proper placement of the fire extinguisher;
- 3) Accessibility of the fire extinguisher;
- 4) Physical condition of the fire extinguisher.

FLAMMABLE AND COMBUSTIBLE LIQUIDS

1. Spill containment for flammable liquids stored in an aboveground tank was not sufficient.

POSSIBLE SOLUTION: Means should be provided to contain any spillage or rupture of the aboveground tank. A liquid-proof dike or other entrapment means should be used. The capacity of the entrapment means should equal the maximum capacity of the tank.

2. A fuel dispensing tank/pump was not protected against damage from vehicular traffic.

POSSIBLE SOLUTION: Provide collision protection such as posts or railings to help prevent vehicles from running into these tanks/pumps and possibly causing a fire or explosion.

3. The fuel pumps did not have emergency power cut-off switches.

POSSIBLE SOLUTION: Install emergency power cut-off switches at a location remote from the dispensing devices to shut off the power in the event of an emergency.

4. Proper fire extinguishers were not provided for fueling operations.

POSSIBLE SOLUTION: A fire extinguisher of at least 6-B-C minimum classification should be provided within 75 feet of the fueling point.

5. Excess quantities of flammable liquids were improperly stored outside of approved storage cabinets/storage rooms.

POSSIBLE SOLUTION: Limit flammable liquids stored outside of approved cabinets/rooms to the maximum quantities listed below:

25 gallons of Class IA liquids in closed containers
120 gallons of Class IB, IC, II or III liquids in a closed container
660 gallons of Class IB, IC, II, or III liquids in a single portable tank.

6. The flammable storage cabinet was not constructed properly.

POSSIBLE SOLUTION: Metal flammable liquid storage cabinets should be constructed in the following manner:

Bottom, top, door and sides shall be at least No. 18 gauge sheet iron and double walled with 1-1/2 inch air space.

Joints shall be riveted or welded or made tight by some equally effective means.

The doors shall be provided with a three-point lock.

The door sill shall be raised at least 2 inches above the bottom of the cabinet.

Wooden flammable liquid storage cabinets should be constructed in the following manner:

Bottom, sides and top shall be constructed of an approved grade of plywood at least one in thickness, which will not break down or delaminate under fire conditions.

All joints shall be rabbetted and shall be fastened in two directions with flathead wood screws.

When more than one door is used there shall be a rabbetted overlap of not less than one inch.

Hinges shall be mounted in such a manner as not to lose their holding capacity due to loosening or burning out of the screws when subjected to the fire test.

7. The flammable storage cabinet was not vented and the vent opening was not sealed.

POSSIBLE SOLUTION: Seal the vent opening with a properly fitted metal bung.

8. A flammable liquid was stored in an unapproved container.

POSSIBLE SOLUTION: Contact a supplier of safety supplies to locate the proper type of safety container to use with flammable liquids. The container must have the following features:

- 1) Spring loaded pressure release pour cap or spout, and fill cap, if provided.
- 2) Flame arrester for pour opening and fill opening.
- 3) Attached pouring spout or funnel to prevent spilling liquid.
- 4) Proper labeling.

9. A flammable or combustible liquid was not kept in a closed container.

POSSIBLE SOLUTION: Flammable or combustible liquids shall be kept in tanks or closed containers when not in use.

10. Standard incandescent trouble lights are being used in a garage area.

POSSIBLE SOLUTION: Provide portable lighting equipment with exterior surfaces made of non-conducting material, that are of the unswitched type, and do not provide means for plug in of attachments. Lamps and cords should be supported or arranged so that they do not reach within 18 inches of the floor. Lamps to be used in hazardous locations (within 18 inches of the floor or in pits) must be designed for Class I, Division 1 locations.

11. Combustible waste materials impregnated with paints, thinners, or oils were not disposed of properly.

POSSIBLE SOLUTION: Combustible waste material and residues in a building or unit operating area shall be kept to a minimum, stored in covered metal receptacles and disposed of daily.

12. Ignition sources were present around flammable or combustible liquids.

POSSIBLE SOLUTION: Move flammable or combustible liquids to a safe location or eliminate ignition sources.

13. Sprinkler protection was not provided in a spray booth.

POSSIBLE SOLUTION: Automatic fire suppression systems (sprinklers) should be installed on the upstream and downstream sides of the filters.

14. Ignition sources were present around an open spraying area.

POSSIBLE SOLUTION: OSHA standards require that spark-producing equipment or any ignition source used within 20 feet of any spraying area (and not separated by a partition) must be designed for a Class I, Division 2 location.

15. Ignition sources were present within a spray booth.

POSSIBLE SOLUTION: Remove all ignition sources from a spray area.

16. Dry filters were not being used or were not maintained.

POSSIBLE SOLUTION: Install or maintain dry filters in the spray booth. Contact the spray booth manufacturer to obtain the proper filters.

17. An audible or visual warning air flow monitor was not present or was not functioning.

POSSIBLE SOLUTION: An audible or visual air flow monitoring system should be provided to assist in maintaining adequate air flow.

18. Material and equipment were stored around the spray booth.

POSSIBLE SOLUTION: A clear space of not less than 3 feet on all sides shall be kept free of storage or combustible material.

19. Ignition sources were present outside of open faced spray booths or rooms.

POSSIBLE SOLUTION: Ignition sources within 20 feet of open faced spray booths or rooms must be removed.

20. Containers were not labeled as to their contents.

POSSIBLE SOLUTION: All containers (except for use during a single shift by an individual) should be labeled as to their contents and any appropriate hazard warnings, which would include target organs.

PROCESS CHANGE POSSIBLE SOLUTIONS

When process changes are made and implemented, the same type of hazard should begin to disappear. This will allow more time to be spent on programs and other safety related items and less time on actual inspections.

Employee Empowerment:

There is a need for a process to be developed and implemented which would allow for the discovery and correction of physical hazards and conditions on a regular basis. The ideal process would allow not only management to routinely inspect for hazards, but would also include employees. This allows employees to be responsible for the identification of hazards that exist in their work areas. Furthermore, there should be a direct line of communication that allows employees to alert management to the hazards for prompt correction. Employees should assist management in developing ideas for correction of hazards.

Teachers Using Cabinets for Overhead Storage

If this process is going to continue, the storage should be neat, orderly, and pushed back away from the edge of the cabinet. However, we would propose purchasing more cabinets for storage and discourage all overhead storage in the classrooms.

Using Personal Equipment (Especially Fans) in Schools

Since the school system is not air conditioned, teachers and other employees are bringing personal fans to school. However, these fans are not grounded and are not guarded properly. Even though these are personal fans, if a teacher is injured the claim will be filed against your workers' compensation policy. If a student is injured because of these fans, you could be looking at a third party suit. Our solution to this process problem is to name a safety person at each location and not allow any personal equipment in the schools that has not been inspected and approved by the safety representative. This information should be documented and kept at the school location. Another alternative solution to this problem is for the school system to purchase industrial type pedestal fans that are grounded and guarded according to code; or air condition the entire school system.

Extension Cords

The extension cord problem could be resolved by implementing an assured equipment grounding program such as the ones used in the construction industry. Establish a time period (for example quarterly) when all extension cords could be inspected for grounding and exposed wiring. After the visual inspection, if the cord is in good operating condition, mark the cord with a colored sticker or strip of tape. Change the color of the marking each quarter as the visual inspections are completed. This process will provide a quarterly inspection, bad cords can be removed from service or repaired by a qualified electrician, and if the cord is marked by a color sticker all staff will know it has been inspected recently.

Machine Guarding

The machine guarding problem can be handled by making certain all vendors understand your policy of purchasing and accepting only machines that meet or exceed state and federal safety requirements (stamp this on all invoices). When any equipment arrives, inspect it to make sure all guards are in place, and before the equipment is used, train the staff on its safe and proper use and emphasize that all guards must remain in

place. If guards are removed, then questions as to why should be asked and follow-up training could be performed.