OC SAN ORANGE COUNTY SANITATION DISTRICT	SOP-120 (Ver. 3) Machine Safeguarding
Standard Operating Procedure (SOP)	Effective: 1/25/2022 Supersedes: 11/02/2020
Approved By: James D. Herberg General Manager 	

I. Purpose

The purpose of this program is to protect Orange County Sanitation District (OC San) staff and contractors from point of operation, power transmission, and other moving part hazards associated with machines, equipment, and tools.

It is the policy of OC San to protect all employees from occupational injuries through implementation of feasible engineering controls and enforcing safe work practices.

This program outlines responsibilities for OC San employees and contractors operating or inspecting process equipment and/or machine tools, as well as safeguarding design requirements. All employees are required to follow the minimum procedures outlined in this program. Any deviations from this program must be immediately brought to the attention of the Risk Management Division.

II. Background

This procedure applies to all work performed at the OC San treatment plants, pump stations and the collection system. All machines consist of the following fundamental areas that require safeguarding:

1. Point of Operation – Area where material is positioned, inserted, or manipulated, or where work is performed on the material, such as cutting, shaping, boring, or forming of stock.
2. Power Transmission Apparatus – All components of the mechanical system which transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks, and gears.
3. Other Moving Parts – All parts of the machine which move while the machine is working including, but not limited to, reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.
4. Operating Controls – A mechanical or electrical power control provided to make it possible for the operator to cut off power without leaving position at the point of operation.

Each machine will require a different level of safeguarding, which is based on physical characteristics and human involvement. Safeguarding will consist of guards, devices, personal protective equipment, lockout/tagout, maintenance and training.

District staff and contractors shall not operate any machine, equipment, or tools without approved safeguards in place. Machine safeguards shall not be modified without prior approval from Risk Management. The safeguards shall not be removed, except where hazardous energy has been controlled in accordance with the OC San Control of Hazardous Energy Program (SOP-605).

III. Definitions

Acceptable Risk – A risk level achieved after risk reduction measures have been applied.

Accidental Contact – Inadvertent physical contact with power transmission equipment, prime movers, machines, or machine parts which could result from slipping, falling, sliding, tripping or any other unplanned action or movement.

Adjustable Guard - A guard with provisions for adjustment to accommodate various jobs, tooling setups or material flow.

Affected Person – An individual who operates, services and/or maintains a machine, or others who are in proximity to a machine.

Authorized Person – Qualified personnel identified by the employer or supplier to perform a specific task.

Belts – All power transmission belts, such as flat belts, round belts, V-belts, etc., unless otherwise specified.

Belt Pole (sometimes called a Belt Shipper or Shipper Pole) – a device used in shifting belts on and off fixed pulleys on line or countershaft where there are no loose pulleys.

Belt Shifter – a device for mechanically shifting belts.

Control Reliability – The capability of the system, safeguarding, other control components and related interfacing to achieve a predetermined safe state in the event of a failure within their safety-related functions.

Conveyor – A device designed exclusively for transporting bulk materials, packages, or objects in a predetermined path and having fixed or selective points of loading or discharge.

Danger Zone – Any place in or about a machine or piece of equipment where an employee may be struck by or caught between moving parts, caught between moving and stationary objects or parts of the machine, caught between the material and a moving part of the machine, burned by hot surfaces, or exposed to electric shock.

Emergency Stop - A control that, when actuated, initiates immediate or controlled stopping action of hazardous motion of the manufacturing system, process, or cell. Reference NFPA 79 for explanation of the categories of emergency stops.

Enclosed – The moving parts are so guarded that physical contact by parts of the body is precluded. This does not prohibit the use of hinged, sliding or otherwise removable doors or sections to permit inspection or lubrication.

Fencing - Guarding by means of a fence, which restricts access to the machine. Guarding by fencing and location guards shall be designed to prevent contact with the hazardous equipment when reaching around, under, through or over the barrier.

Flywheel (sometimes referred to as a balance wheel or flywheel pulley) – a heavy wheel which by its inertia provides uniform energy of machinery by resisting sudden changes of speed.

Fixed Barrier Guard - A guard affixed to a fixed surface in such a manner to enclose all or part of hazard zone.

Guarded – Shielded, fenced, enclosed, or otherwise protected by means of a suitable enclosure guard, cover, casing guard, trough guard, shield guard, standard railing or by nature of the location where permitted, to remove the hazard from accidental contact.

Guarding by Location – The moving parts are located by their remoteness from floor, platform, walkway, or other working level, by their location with reference to the frame, foundation, or structure as to remove the likelihood of accidental contact.

Hazardous Parts of Machinery - Any machine, part of a machine or any projectile from a machine, capable of crushing, puncturing, severing, burning, breaking, or otherwise injuring any body part. Hazards include (1) point of operation hazards where work is performed on material such as cutting, shaping, boring, or forming; (2) all components of mechanical, hydraulic, pneumatic, or electrical systems, which transmit energy to the machine allowing it to perform work; and (3) and hazards associated with conductors, contacts, relays, flywheels, pulleys, belts, chains, rods, couplings, cams, spindles, gears, noise, vibration and projectiles.

Hazard Zone - An area or space in which immediate or impending hazards exist. It can also be defined as an area enclosed by fencing or barrier guarding.

In-Running (Ingoing) Nip Point – Any location where a part of the body could be drawn in and injured, between a rotating machine member and another rotating or fixed member, and the material.

Interlock – A series of sensors, software, relays and other machine control-logic and components that collectively monitor the status of a machine’s hazardous locations / operations and prevent unsafe-starting, or may stop or safely shut-down, a machine when any interlock-component or control-logic is violated or not in a proper / safe condition.

Interlocked Barrier Guard – A movable barrier or section of a barrier with a safety interlock switch to either prevent entry into a hazard area or interrupt the electric circuit and stop the equipment.

Jog (Mode) – An intermittent motion imparted to the momentary operation of the drive motor.

Local Control – A mode that provides the operator with direct control of machines and related equipment or cells within the machinery system.

Lockout Tagout (LOTO) – is a broad term describing the use of procedures, techniques, designs, and methods to protect personnel from injury due to inadvertent release of hazardous energy. LOTO is commonly called the control of hazardous energy.

Machine – the driver unit as distinguisher from the driving unit which is defined as a prime mover.

Machine Guarding – Device or devices which effectively prevent personnel, contractors, subcontractors, contracted services, or visitors from physical harm due to contact with any hazard present at any machine.

Machine Parts – all moving parts of the machine, except those forming part of the point of operation.

Momentary Contact Device – a device which requires constant pressure by the operator to operate the machine.

Nip Point – Any location where a part of the body could be drawn in and injured, between a rotating machine member and another rotating or fixed member, and the material.

Operator Station – The complete complement of controls used by or available to an operator on a given operation.

Pinch Point – Any point other than the point of operation at which it is possible for a part of the body to be caught between the moving parts of a machine or between moving and stationary parts of a machine.

Point of Operation – The area on a machine where materials are positioned for processing or change by the machine, and where work is being performed on the material. A machine may have more than one point of operation.

Power Operated Presses – Includes all mechanically powered machines that shear, punch, form or assemble metal or other material by means of tools or dies attached to or actuated by slides, commonly referred to as punch presses, press breaks, hydraulic power presses, and rivet setting machines.

Presence Sensing Device – A device designed, constructed, and arranged to create a sensing field or area that signals the clutch and brake control when any part of the operator's body or hand tool is within such field or area.

Prime Mover – An engine or motor whose main function is to drive or operate other mechanical equipment.

Programmable Logic Controller (PLC) – An electronic system that performs logical, decision-making, or arithmetic functions by executing programmed instructions.

Safeguarding – Protection of personnel from hazards using guards, safeguarding devices, awareness devices, and safeguarding methods. To determine if safeguarding is effective, an operator should be prevented from contacting a hazard by going around, under, through or over the safeguard.

Safeguarding Device – a device that provides protection from hazard(s) by preventing or detecting exposure in the danger zone.

Safeguarding Method – Safety guarding implemented to protect individuals from hazards by the physical arrangement of distance, holding, openings, or positioning of the machine or machinery systems to ensure that the hazard cannot be reached.

Safe Work Procedure – Formal written documentation developed by the user that describes steps to be taken to safely complete tasks where hazardous situations may be present to hazardous events are likely to occur.

Safety Block – A prop that is inserted between opposing tooling or machine members to prevent closing of machine members or tooling components.

Safety Distance – The distance a safeguard is installed from a hazard such that individuals are not exposed to the hazard.

Shear Point – A hazard area created by a reciprocal (sliding) movement of a mechanical component past a stationary point on a machine.

Sheaves – Grooved pulleys, unless used as a flywheel.

Stop Control – An operator control designed to immediately deactivate the clutch control and activate the brake to stop slide motion.

Tail Rod – the extension of the piston rod passing through a stuffing box in the outside head of an engine cylinder, compressor cylinder or pump cylinder.

Unexpected Start – Any start-up which, because of its unexpected nature, generates a risk to individuals.

Zero Access – When a machine is guarded so hands, arms, fingers, or other body parts cannot contact a hazard.

IV. Responsibilities

A. Risk Management

Risk Management is responsible for:

- Providing technical assistance for determination of required safeguarding for specific machines, equipment, or tools.
- Providing training and technical assistance for design, use, implementation, and removal of machine guards.
- Providing machine guard training to affected District staff.
- Reviewing and updating this program for overall effectiveness on an annual basis.
- Communicating machine guard requirements to OC San staff and contractors through written memos, SAFE bulletins, tailgate meetings, training, and posting of this program.
- Investigating near misses and injuries related to machine safeguarding.

B. Management

Management is responsible for providing equipment and resources necessary to implement this program, and for ensuring that the following provisions are being met:

- Ensure all machinery is properly safeguarded.
- Ensure new purchased equipment meets the machine safeguard requirements prior to use.
- Implement engineering controls as deemed necessary.
- Seek approval from Risk Management for alternative guarding methods.
- Train employees on process-specific machine safeguards.
- Monitor and inspect to ensure machine safeguards remain in place and function.
- Ensure those employees who need to remove or bypass a safeguard attend lockout/tagout training.
- Ensure all tagged “out of service” tools/equipment are replaced appropriately.
- Identifying equipment that needs machine safeguarding and submit a request to have the equipment guarded.
- Equipment that needs safeguarding will be taken out of service until a safeguard can be properly placed.

C. Employees

District staff and contractors working around or using equipment with moving parts are responsible for:

- Operating machines with all safeguards in place and follow all applicable safety requirements (e.g., lockout/tagout).
- Replacing machine safeguards properly after maintenance.
- Reviewing the equipment manufacturer provisions for appropriate safeguards.
- Verifying safeguarding devices are in place and functional before using the equipment.
- Reporting missing or worn guards to supervisors.
- Reporting near misses or incidents to supervisors in a timely manner.
- Participating in all required training.

V. Hazards

Machines generate hazardous motions and actions which can cause injury or death. The basic types of hazardous mechanical motions and actions are listed below.

A. Rotating Motion

Injury with rotating parts can be severe. Speed is not a factor in determining if the motion can cause injury. Even slow-moving parts can grip hair, clothing, body parts or tooling. Rotating motion is common in collars, couplings, cams, clutches, flywheels, shaft ends, spindles, gears, and horizontal or vertical shafting. Risk increases when projections, such as set screws, bolts, nicks, abrasions, and projecting keys, are exposed on the rotating parts.

B. Nip Point Hazards

Nip point hazards are caused by rotating parts on machines. Nip points can exist where parts rotate in opposite direction where axes are parallel to each other (e.g., belt press roller). Nip points can also exist between rotating and perpendicular moving parts (e.g., point between a belt and its pulley). Nip points may also occur between rotating and fixed parts that create a shearing, crushing or abrading action (e.g., screw conveyor).

C. Reciprocating Motion

Reciprocating motions occur during a back-and-forth or up-and-down motion where a worker may be struck or caught between a moving and stationary object.

D. Transverse Motion

Transverse motion (movement in a continuous straight line) is hazardous because workers can be struck or caught in a pinch or shear point by the moving part. One example of a transverse motion is a belt on a pulley system.

E. Cutting

Cutting actions involve rotating, reciprocating, or transverse motion. The danger of cutting action exists at the point of operation where fingers, arms or body injuries can occur and where flying chips or scrap metals can cause additional injuries. Mechanisms involving cutting hazards, include but are not limited to, bandsaws, circular saws, boring and drilling machines, lathes, and mills.

F. Punching

Punching actions are a result of power applied to a slide from the purpose of blanking, drawing, or stamping metal or other materials. This action occurs at the point of operation where stock is inserted, held, or withdrawn by hand.

G. Shearing

Shearing action involves trimming or shearing metal or other materials by applying a power slide or knife. This hazard occurs at the point of operation where stock is inserted, held, or withdrawn. Shearing is typical of mechanical, hydraulic, or pneumatic powered shears.

H. Bending

Bending action results where power is applied to a slide to draw or stamp metal or other materials. This is typical for power presses, press brakes and tube benders. The hazard occurs at the point of operation where stock is inserted, held, and withdrawn.

Note: This list is not exhaustive. Other machine hazards include such categories as compressed gases, hydraulic fluids, counterweights, etc.

VI. Safeguarding Types

Machine safeguarding must prevent hands, arms, and other body parts of a worker from contacting dangerous moving parts. The safeguards should not be easily removed and should

be made of durable material that will withstand conditions of normal use. The safeguards must be firmly secured to the machine.

Safeguards must be placed on machines to protect equipment operator(s) and other employees in the area from hazards such as those created by the point of operation, in-going nip points, rotating parts, moving belts, cutting teeth, flying chips/sparks, and any parts that impact or shear.

Machines can be safeguarded by adding a guard, safety device, guarded by location and distance, or combination thereof.

A. Guards

Guards are barriers that prevent physical access to the danger areas. There are four general types of guards:

- Fixed – A fixed guard is a permanent part of the machine and is not dependent upon moving parts to function. The fixed guard may be constructed of sheet metal, screen, wire cloth, bars, plastic, or any other material that is substantial enough to withstand whatever impact it may receive and to endure prolonged use.
- Interlocked - When this type of guard is opened or removed, the tripping mechanism and/or power automatically shuts off or disengages, the moving parts of the machine are stopped, and the machine cannot cycle or be started until the guard is back in place. An interlocked guard may use electrical, mechanical, hydraulic, or pneumatic power or combination thereof. Interlocks should not prevent “inching” by remote control if required. Replacing the guard should not automatically restart the machine.
- Adjustable – This type of guard is adjustable and protects the operator by placing a barrier between dangerous areas and the operator. These guards are flexible and allow for various sizes of material to be fed into the machine.
- Self-Adjusting – The openings of these guards are determined by the movement of the material being fed into the machine. As an operator moves material into the danger area, the guard is pushed away, providing an opening which is only large enough to admit the material. After the material is removed, the guard returns to the rest or closed position. The guards may be constructed of plastic, metal, and other substantial material. The guard protects the operator by placing a barrier between the danger area and the operator.

B. Safety Devices

Safety devices may be installed to replace or supplement guards. Safety devices may perform one of the following functions:

- Stop the equipment if a hand or any part of the body is inadvertently placed into equipment.
- Restrain or withdraw the operator's hands during operation.
- Require the operator to use both hands-on equipment controls.
- Provide a barrier which is synchronized with the operating cycle of the equipment to prevent entry during the hazardous part of the cycle.

Safety devices may include the following:

- Presence-Sensing Devices
    1. Photoelectric (light curtain) – this device uses a system of light sources and controls which can interrupt the machines cycle. This device is a type of presence-sensing device. If the light field is broken, the machine stops and will not cycle. This device must be used only on machines which can be stopped before the worker can reach the danger area. The design and placement depend on time required to stop the mechanism and speed of the employee across the danger zone.
    2. Radiofrequency – this device uses radio beam that is part of the machine control circuit. This device is a type of presence-sensing device. When the capacitance field is broken, the machine will stop or will not activate. Like photoelectric devices, this device shall only be used on machines which can be stopped before the worker can reach the danger zone. This requires the machine to have a friction clutch or other means of stopping.
    3. Electromechanical – this device has a probe or contact bar which descends to a predetermined distance when the operator starts the machine cycle. If there is an obstruction preventing it from descending its full distance, the control circuit does not actuate the machine cycle. This device is a type of presence-sensing device.
- Pullback – this device utilizes a series of cables attached to the operator's hands, wrists, or arms. The device is primarily used on machines with a stroking action. When the slide/ram is between up cycles, the operator can access the point of operation. When the slide/ram begins to cycle by starting its descent, a mechanical linkage automatically assures withdrawal of the hands from the point of operation.
- Restraint (holdback) – this device utilizes cables or straps that are attached to the operator's hands and a fixed point. The cables or straps must be adjusted to let the operator's hands travel with a predetermined safe area. There is no extending or retracting action involved. Hand-feeding tools may be necessary if the operation involves placing material into the danger zone.
- Safety Trip Controls – these devices provide a quick means for deactivating the equipment in an emergency. A pressure-sensitive body bar, when depressed, will deactivate the machine. If the operator or anyone trips, loses balance, or is drawn toward the machine, applying pressure to the bar will stop the operation. The positioning of the bar, therefore, is critical. It must stop the machine before a part of the employee's body reaches the danger zone.
- Two-Hand Control – this device requires constant, concurrent pressure by the operator to activate the machine. This kind of control requires a part-revolution clutch, brake and brake monitor if used on power press. For this device, the operator's hands are required to be at a safe location (on control buttons) and at a safe distance from the danger area where the machine completes its cycle.
- Two-Hand Trip – this device requires concurrent application of both operator's control buttons to activate the machine cycle, after which the hands are free. This device is typically used on machines equipped with full-revolution clutches. The trips must be placed far enough from the point of operation to make it impossible for the operator to move their hands from the trip buttons or handles to the point of operation.
- Gates – this is a moveable barrier that protects the operator at the point of operation before the equipment can be started. Gates are designed to be operated with each machine cycle. The gate must be interlocked so that the machine will not start its cycle

unless the guard is in place. It must be in the closed position before the machine can function.

C. Guarded by Location or Distance

Dangerous moving parts of a machine can be positioned so that those areas are not accessible or do not present a hazard to a worker during normal operation of the machine or equipment. This may be accomplished by locating a machine so that the hazardous parts of the machine are located away from operator workstations or areas where employees cannot walk or work.

Hazardous parts may be located seven feet or more above a floor or working level and be considered guarded, except where an employee may be required to work from an elevated location along the floor or working level, in which case the equipment shall be guarded or controlled using lockout/tagout methods.

VII. Equipment Inspections

Inspections shall be performed to verify safeguarding is in place and adequate. Each machine should be thoroughly inspected before each use. Machines that do not pass inspection shall be taken out of service. Equipment removed from service due to inadequate guarding is subject to OC San's Control of Hazardous Energy Program (SOP-605). Equipment can be returned to service after machine safeguarding deficiencies have been adequately addressed.

VIII. Equipment Maintenance

All equipment must be properly maintained per the manufacturer's or the equipment owner's requirements. All District employees and contractors shall comply with SOP-605 for shutting down equipment prior to removal or bypass of safeguards.

To prevent hazards while servicing machines, each machine or piece of equipment shall be safeguarded during the conduct of servicing or maintenance by:

1. Notifying all affected employees (usually machine or equipment operators or users) that the machine or equipment must be shut down to perform some maintenance or servicing.
2. Stopping the machine.
3. Isolating the machine or piece of equipment from its energy source.
4. Locking out or tagging out the energy source.
5. Relieving any stored or residual energy.
6. Verifying that the machine or equipment is isolated from the energy source.

When the servicing or maintenance is completed, there are specific steps which must be taken to return the machine or piece of equipment to service. These steps include:

1. Inspection of the machine or equipment to ensure that all guards and other safety devices are in place and functional.
2. Checking the area to ensure that energization and startup of the machine or equipment will not endanger employees.
3. Removal of the lockout devices.

4. Reenergization of the machine or equipment.
5. Notification of affected employees that the machine or equipment may be returned to service.

Machine design should permit routine lubrication and adjustment without removal of safeguards.

IX. Troubleshooting Equipment

To the extent feasible, equipment troubleshooting shall be performed in accordance with the Electrical Maintenance section of this program. If equipment operation is required with safeguards removed, equipment specific procedures shall be developed for identifying and controlling hazards. Temporary barriers shall be installed to prevent personnel from physically contacting the danger areas.

If it is necessary to lubricate or make tooling adjustments while the machine is running, special safeguarding equipment may be needed solely to protect the employee from exposure to hazardous moving parts. Maintenance personnel must know which machines can be serviced while running and which cannot. For example, the seal or packing gland of a pump can be adjusted while in operation. The danger of accident or injury is greatly reduced by shutting off and locking out all sources of energy.

X. Unauthorized Removal of Machine Safeguards

Employees are authorized to remove safeguards as permitted in the above sections for equipment maintenance or troubleshooting of equipment. Maintenance must replace the guards before the job is considered finished and the machine released from lockout.

Except where permitted in this section or where approved by Supervision and Risk Management, all other safeguard removal or defeat is deemed unauthorized. Management does not tolerate the unauthorized removal of machine safeguards. Any employee found to have removed a machine safeguard without Supervisor and Risk Management approval will be subject to disciplinary actions.

XI. Anchoring Fixed Machinery

Machines and equipment designed for use at a fixed location shall be securely anchored to prevent walking or moving. (i.e., drill press, pump, bench grinder).

XII. Automatic Restarting of Equipment

Machines or equipment, where injury to the operator might result if motor were to restart after power has been restored following a power failure, shall have anti-restart devices. The anti-restart devices shall be installed to prevent machines from automatically restarting upon restoration of power.

XIII. Emergency Stop Devices

Each machine that has the potential for pulling a person into it point of operation, nip point, or power transmission device shall be equipped with emergency stopping device.

The emergency stopping device shall be colored red and the background around the device shall be colored yellow. The emergency stopping device shall require the operator to manually reset the emergency stopping device once it has been pushed.

Emergency stop devices shall be designed to only be used in reaction to an incident or hazardous situation. These devices include buttons, rope pulls, cable pulls, or pressure sensitive body bars. These devices are not to detect or prevent employee exposure to the machine hazards, but rather initiate a stop action when they are activated by the employee.

XIV. Guard Design Requirements

Guards shall conform to the design and function of the machine or equipment. Guards must not create additional hazards and must be physically attached to the equipment where possible. If the guard cannot be attached, it must be positioned at distance from the machine or equipment that provides equivalent protection.

Guards shall meet the following general requirements:

- Prevent Contact – The safeguard shall prevent hands, arms, and any other part of a worker's body from contacting dangerous moving parts. An effective guard eliminates the possibility of the operator or another worker placing parts of their bodies near hazardous moving parts.
- Secure – Workers should not be able to easily remove or tamper with the safeguard but require a tool to remove them. Guards and safety devices shall be made of durable material that will withstand the conditions of normal use.
- Afford Protection from Falling Objects – The safeguard shall ensure that no objects can fall into moving parts. A small tool which is dropped into a cycling machine could easily become a projectile that could strike and injure someone.
- Create No New Hazards – A safeguard defeats its own purpose if it creates a hazard of its own such as a shear point, a jagged edge, or an unfinished surface which can cause a laceration. The edges of guards, for instance, should be rolled or bolted in such a way that they eliminate sharp edges.
- Create No Interference – Any safeguard which impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded. Proper safeguarding can enhance efficiency since it can relieve the worker's apprehensions about injury.
- Allow for Safe Lubrication and Adjustment – Where lubrication or other such tooling adjustments are required, the guard should be designed so that the entire guard allows for such task or equipment parts requiring maintenance be relocated outside the guarded area. For example, locating oil reservoirs to outside the guard with a line leading to the lubrication point, will reduce need for employee to work in a danger zone.
- Generally, install machine guards on all openings of ¼ inch or greater. Guards shall meet the minimum distance from the point of operation or moving parts as listed below:

Distance of Opening from Hazard	Maximum Size of Opening
½" – 2 ½"	1/4"
2 ½" to 3 ½"	3/8"
3 ½" to 6 ½"	5/8"
6 ½" to 7 ½"	1 1/4"
7 ½" to 17 ½"	1 7/8"
17 ½" to 36"	5"
>36"	Standard Railing

- Guards may be provided with hinged or removable sections where it is necessary to change belts, adjust, or for admission of lubricants.
- Materials – Non-corrosive metal is the best material for guards. Clear plastic guards may be used, which can allow for easy inspection. Plastic guards or safety glass may be used where visibility through the guard is required. Wood guards are generally not recommended because of their flammability and lack of durability and strength. In areas where corrosive chemicals are used, wood guards may be the best choice.

Point of operation guards must conform to appropriate standards (e.g., standard for punch press or table saw). If specific standards are not available, then the construction of the machine or guard should prevent the operator from having any part of their body in the danger zone during equipment cycling.

Abrasive wheels must be equipped with a manufacturer approved safety guard, which is designed to restrain the pieces of abrasive wheel if the wheel is broken during operation. If the wheel allows for handgrip installation as designed by the manufacturer, one must be equipped. Wheels shall meet specifications for thickness, diameter, and operating speeds.

XV. Operational Requirements

Employees operating machines and equipment shall abide by the following:

- Equipment and machinery shall not be operated without the required safeguards (e.g., guards, presence sensing devices, safety trip controls, etc.) in place and functioning properly.
- Employees shall not wear loose jewelry, clothing or permit unrestrained long hair when working on or in proximity (3 feet or 1 meter) of operating machinery or equipment.
- Do not remove, damage, tamper with or by-pass machine safeguards without Supervisor and Risk Management approval.
- Employees shall not place hands, arms, fingers, or any other portion of body in the point of operation or other recognized danger zone.
- Do not use hand tools to dislodge materials or clear jams. If a guard must be removed or by-passed to clear a jam, clean a machine, lubricate, or otherwise access a point of operation, power transmission or other danger zone, the machine or equipment must be properly de-energized using lockout/tagout.
- Actively look for potential hazards or defects associated with machinery, equipment, or safeguards prior to beginning work and report them to your supervisor immediately.
- Complete pre-use, periodic or routine inspections as required.

- Do not operate equipment or machinery without the required training or authorization.

XVI. Hand Tools

Tools can be used to feed or remove materials into or from a machine to keep an employee's hands away from the danger area. Hand tools may only be used in conjunction with guards or other safeguarding devices. These tools should be shatterproof and ergonomically designed for the specific task being performed. Hand tools must allow easy handling of the material without the operator placing hands in the danger zone. Such tools may not replace guards where required.

XVII. Training

Employees who work with or are potentially exposed to machines or equipment that require safeguarding will receive training to ensure familiarity with the installation, operation, and removal of machine safeguards and to ensure he/she understands and is able to follow all requirements in this program. This training shall have instructions describing at least the following topics:

- Description and identification of the hazards associated with machines.
- The safeguards themselves, how they provide protection, and the hazards for which they are intended.
- How to use the safeguards and why.
- How and under what circumstances safeguards can be removed, in conjunction with lockout/tag-out practices and taking equipment out of service, and by whom (in most cases, repair or maintenance personnel only).
- What to do (e.g., contact the supervisor) if a safeguard is damaged, missing, or unable to provide adequate protection.

Each employee who works in a general area where safeguards are used shall receive training to understand the requirements of this program and to understand that safeguards shall not be removed or defeated.

Employees will be retrained if:

- There is a change in assignment that involves using a different machine.
- There is a change in the machine, equipment or processes that presents new hazards.
- There is a change in the machine safeguarding procedures.
- The supervisor has reason to believe or determines through inspection or observation that an employee lacks sufficient knowledge of the safeguarding procedures.
- An injury or near-miss occurs related to a machine safeguarding hazard or deficiency which provides a learning opportunity for affected employees.

Refresher training will be provided every two years.

XVIII. Program Review

The program will be audited on an annual basis to ensure that the principles and procedures of the machine guarding program are being followed. Where the audit determines that the

principles and procedures of this program are not being followed, appropriate corrective actions/revisions shall be made. The program review shall be completed at least every year.

The review will consider new machines, changes in existing processes, the facility layout, and the cost and frequency of machine-related injuries. The annual review will include a discussion with random operations and maintenance staff to determine overall effectiveness of this program.

XIX. Recordkeeping

All records created or generated during this procedure shall be legible and stored in a way that they are readily retrievable in facilities or electronic document/content management systems that provide a suitable environment to prevent damage, deterioration, or loss. Records may be in the form of any type of media, such as hard copy or electronic media. The OC San Records Retention Schedule is the official procedure governing the retention, retirement, and destruction of District records. Document owners should use these schedules to determine the item and series that best fit their records. Document owners are responsible for ensuring that documents are properly marked, indexed, and filed for their projects or area of responsibility.

XX. References

Injury and Illness Prevention Program

SOP-605, Control of Hazardous Energy (LOTO)

SOP-608, Contractor Safety

American National Standards Institute (ANSI) B11.0-2015 *American National Standard for Safety of Machinery*

American National Standards Institute (ANSI) B11.6-2001 *American National Standard for Safety Requirements for Manual Turning Machines with or without Automatic Control*

American National Standards Institute (ANSI) B11.19-2010 *American National Standard for Machines, Performance Criteria for Safeguarding*

American National Standards Institute (ANSI) B11.TR3-2000 *American National Standard Institute Technical Report: Risk Assessment and Risk Reduction – Risks Associated with Machine Tools*

American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME) B20.1-2012 *Safety Standard for Conveyors and Related Equipment*

Title 8, California Code of Regulation (CCR), General Physical Conditions and Structures Orders, §3273

Title 8, California Code of Regulation (CCR), Safe Practices and Personal Protection, §3328

Title 8, California Code of Regulation (CCR), Power Transmission Equipment, Prime Movers, Machines and Machine Parts, §3942-3945, 4000-4002

Title 8, California Code of Regulation (CCR), Flywheels, §3995

Subject: **Machine Safeguarding**

Title 8, California Code of Regulation (CCR), Conveyors, §3999

Title 8, California Code of Regulation (CCR), Shafting, Collars, Clutches, and Couplings, §4050-4051

Title 8, California Code of Regulation (CCR), Pulleys, §4060-4063, 4070-4071

Title 8, California Code of Regulation (CCR), Gears, Friction Drives, Sprockets, and Chains, §4075-4076

Title 8, California Code of Regulation (CCR), Points of Operation and Other Hazardous Parts of Machinery, §4002, 4184-4187

Title 29, Code of Federal Regulations, Standard 1910, Subpart O, Machinery and Machine Guarding

XXI. Revision History

Version	Date	By	Reason
1.0	02/07/2012	Bauer, Wesley	New
2.0	07/01/2020	Frattali, John	Periodic Update – Refer to Program Change Log
3.0	12/08/2021	Spencer, Case	Periodic Update – Refer to Program Change Log