Section 51.0
MACHINERY AND MACHINE GUARDING

A. Purpose

1. The purpose of this procedure is to provide **JAGUAR ENERGY SERVICES, LLC** personnel with an overview of machinery and machine guarding principles.

2. The implementation of this procedure will enable **JAGUAR ENERGY SERVICES, LLC** to comply with OSHA 29 CFR 1910.221 through 222.

3. This procedure addresses safeguarding and personal protective equipment requirements that are essential for protecting machine operators and others from injury.

B. Scope

This procedure applies to all **JAGUAR ENERGY SERVICES, LLC** jobs and work activities that involve machines with moving parts that must be guarded to prevent worker injury.

C. Responsibilities

1. The Safety Coordinator orhis/her designee is responsible for ensuring that employees have completed the training required by this procedure.
   (a) Additional responsibilities include:
      (i) Ensuring that employees have been properly trained.
      (ii) The implementation of this Policy.
      (iii) Take corrective actions on all violations or suspected violations of this procedure.
      (iv) Documentation of completion by each employee.

2. The Safety Director is responsible for aiding in the implementation of this Procedure.
   (a) Additional responsibilities include:

(i) Keeping the Safety Coordinator informed of any incidents related to this Procedure.
(ii) Conducting inspections to identify any violation of this Policy.

3. The Supervisor is responsible for providing assistance in the implementation of this policy.
   (a) Additional responsibilities include:
      (i) Informing the Safety Director of any incidents involving machine guarding.
      (ii) Making suggestions to management for ways to improve this Policy.
      (iii) Replace or repair any defective or missing machine guards.

4. **JAGUAR ENERGY SERVICES, LLC** personnel are responsible for understanding the contents of this procedure.
   (a) Additional responsibilities include:
      (i) Recognizing hazards associated with machine guarding.
      (ii) **JAGUAR ENERGY SERVICES, LLC** personnel are responsible for completing the required training on this Policy.
      (iii) Ensuring that they only use machines with proper guarding in place before working around or using the machine.
      (iv) Wear appropriate personal protective equipment when operating machinery.

D. Procedure

1. **JAGUAR ENERGY SERVICES, LLC** personnel must have a basic understanding of machinery and machine guarding principles.

2. This procedure describes the basic principles of mechanical motions and hazards.

3. **JAGUAR ENERGY SERVICES, LLC** requirements for machine safeguards and personal protective equipment are included.

4. Mechanical Motions and Actions

(a) A variety of mechanical motions and actions can present hazards to a machine operator.
  (i) These can include the movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and machine parts that impact or shear.
  (ii) The various types of hazardous mechanical motions and actions are basic to nearly all machines, and recognizing hazards is the first step toward preventing accidents.

(b) The basic types of hazardous mechanical motions and actions are: Motions, including rotating, reciprocating and transverse.

(c) Actions, including cutting, punching, shearing, and bending.

5. Rotating Motion

(a) Rotating mechanisms include cams, clutches, flywheels, shaft ends, spindles, and grinding wheels.

(b) Rotating machinery can grip clothing and force an arm or hand into a dangerous position.

6. Reciprocating Motion

Reciprocating motions can be hazardous due to the back-and- forth or up-and-down motion.

(a) A worker can be struck or caught by a moving part such as a piston.

7. Transverse Motion

Transverse motion, or movement in a straight, continuous line, creates a hazard because a worker may be caught in a pinch or shear point by the moving part.

8. Cutting Action

Cutting action involves rotating, reciprocating, or transverse motion.

(a) The danger of cutting action exists at the point of operation where finger, head, and arm injuries can occur and where flying chips or scrap material can strike the eyes or face.

(b) Typical examples of mechanisms involving cutting hazards include bandsaws, circular saws, boring or drilling machines, turning machines (lathes), or milling machines.

9. Punching Action

Punching action results when power is applied to a slide (ram) for the purpose of blanking, drawing, or stamping metal or other materials.

(a) The danger of this type of action occurs at the point of operation where stock is inserted, held, or withdrawn by hand.

(b) Typical machinery used by iron workers for punching operations are power presses.

10. Shearing Action

Shearing action involves applying power to a slide or knife in order to trim or shear metal or other materials.

(a) A hazard occurs at the point of operation where stock is actually inserted, held, and withdrawn.

(b) Typical examples of machinery used for shearing operations are mechanically, hydraulically, or pneumatically powered shears.

11. Bending Action

Bending action results when power is applied to a slide in order to draw or stamp metal or other materials.

(a) A hazard occurs at the point of operation where stock is inserted, held, and withdrawn.

(b) Equipment that uses bending action includes power presses, press brakes, and tubing benders.

12. Where Mechanical Hazards Occur

The following parts of machinery can present hazards and need to be safeguarded:

(a) Point of Operation.

(i) The point where work is performed on the material, such as cutting, shaping, boring, or forming of stock.

(b) Power Transmission Apparatus.

(i) All components of the mechanical system that transmit energy to the part of the machine performing the work.

(ii) These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks, and gears.

(c) Nip Points.

(i) Moving machinery, particularly machinery with rotating parts, can cause nip points.

(ii) Nip points are areas where there is potential for a worker to get caught in the mechanical action.

(iii) Examples of nip points include the point of contact between a belt and pulley and intermeshing gears.

(d) Other Moving Parts.

(i) All parts of the machine that move while the machine is working.

(ii) These can include reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

13. Requirements for Safeguards

(a) Whenever the operation of a machine, or accidental contact with a machine, can injure the operator or others in the vicinity, the hazard must be controlled with an appropriate guard (or the machine removed from service).

(b) Safeguards must meet the following minimum requirements:

(i) **Prevent contact.**

(i) The safeguard must prevent hands, arms, or any other part of a worker's body from making contact with dangerous moving parts.

(ii) A good safeguarding system eliminates the possibility of the operator or another worker placing their hands near hazardous moving parts.

(ii) Securely Attached.

(i) Workers should not be able to easily remove or tamper with the safeguard.

(ii) Guards and safety devices should be made of durable material that will withstand the conditions of normal use.

(iii) They must be firmly secured to the machine.

(iii) Protect from falling objects.

(i) The safeguard should ensure that no objects can fall into moving parts.

(ii) A small tool which is dropped into a cycling machine could easily become a projectile that could strike and injure someone.

(iv) Create no new hazards.

(i) 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.

(ii) The edges of guards, for example, should be rolled or bolted in such a why that they eliminate sharp edges.

(v) Create no interference.

(i) A safeguard that impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded.

(ii) Proper safeguarding can actually enhance efficiency since it can relieve the worker's apprehensions about injury.

(vi) Allow safe lubrication.

(i) If possible, one should be able to lubricate the machine without removing the safeguards.

(ii) Locating oil reservoirs outside the guard, with a line leading to the lubrication point, will reduce the need for the operator or maintenance worker to enter the hazardous area.

14. Non-mechanical Hazards

In addition to hazardous motions and actions, machines can present a variety of non-mechanical hazards.

(a) Non-mechanical hazards that can cause operator injury include electricity, high pressure systems, noise, vibration, and hazardous substances.

15. Electricity

Electrically powered or controlled machines must be properly grounded. Wiring should not be frayed or exposed.

16. High Pressure Systems

Machinery that requires pressure will need careful inspection and maintenance to prevent possible failure from pulsation, vibration, or leaks.

(a) Such a failure could cause explosions or flying objects.

17. Noise

Machines often produce noise (unwanted sound) that can result in a number of hazards to workers.

(a) Noise can startle and disrupt concentration and can interfere with communication.

(b) Research has linked noise to harmful health effects, including hearing loss, aural pain, nausea, fatigue, reduced muscle control, and emotional disturbances.

18. Vibration

Excessive vibration can cause noise and thus result in fatigue and illness for the operator.

(a) This hazard should be minimized by keeping machines properly aligned, supported, maintained, and, if necessary, anchored.

19. Hazardous Substances

Certain machines require the use of cutting fluids, coolants, and other potentially hazardous substances.

(a) These substances can cause ailments ranging from dermatitis to serious illnesses and disease.

(b) Specially constructed safeguards, ventilation, and protective equipment and clothing are possible solutions to machinery-related chemical hazards. (x-ref Hazard Communication)

20. Personal Protective Equipment

In addition to machine safeguards, which help to eliminate hazards at the source, operators may be required to wear personal protective equipment (PPE).

(a) PPE for machine operators can include hard hats, face shields, safety glasses, goggles, gloves, foot protection, and hearing protection.

(b) PPE should be used when:

(i) Other controls are not feasible

(ii) Other controls do not reduce the hazard to an acceptable level

(iii) As an interim measure while other controls are being implemented.

(c) PPE must be selected based on the hazards presented by a particular work task.

(d) Field Service Personnel should be familiar with and follow the requirements of **JAGUAR ENERGY SERVICES, LLC**'s Personal Protective Equipment procedure.

E. Training Requirements

1. **JAGUAR ENERGY SERVICES, LLC** personnel will be trained on the following topics:
   (a) Description and identification of mechanical hazards.
   (b) Description and identification of the non-mechanical hazards.
   (c) Safeguarding requirements.
   (d) Circumstances when safeguards can be removed, and by whom.
   (e) Personal protective equipment.
   (f) The contents of this procedure.

F. Training Frequency

1. **JAGUAR ENERGY SERVICES, LLC** personnel will be trained to the following schedule:
   (a) Initially upon hire.
   (b) As necessary thereafter.

G. Definitions

1. **Nip Points** are areas on machinery where there is potential for an operator to get caught in the mechanical action.

2. **Point of Operation** is the point where work is performed on material, such as cutting, shaping, boring, or forming of stock.