WORKING COPY

VERIF. DATE: _____

INTIALS: _____

CP3-HS-2014 FRev. 2	**TITLE**: Fall Prevention and Protection	Page 1 of 25

DOCUMENT CATEGORY:	☐ Administrative	☒ Technical Support
LEVEL OF USE:	☐ Information Level ☒ Reference Level	☐ Continuous Use

FUNCTIONAL AREA: Health, Safety, Security & Quality **SUBJECT MATTER EXPERT**: Safety and Health	**SUBJECT MATTER EXPERT**: Tim Reynolds, Safety and Health
NUCLEAR SAFETY REVIEW DOCUMENTATION: FRNP-19-0196-D	**APPROVED BY/DATE** (Signature on file): Rich Rhoads, Safety and Health Manager 3/26/19
REQUIRED REVIEW DATE (or expiration date for temporary change): 3/26/2022	**EFFECTIVE DATE**: 4/22/19

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
FRev. 0	Initial Release	All	10/20/2017
FRev. 1	Nonintent Changes to Remove From Bluesheet	All	12/07/2017
FRev. 2	Revision to ensure compliance with low slope roof and designated area requirements and documented inspections.	All	3/26/19

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE 3
1.1 Purpose 3
1.2 Scope 3
2.0 REFERENCES 3
2.1 Use References 3
2.2 Source References 4
3.0 COMMITMENTS 4
4.0 PRECAUTIONS AND LIMITATIONS 4
4.1 Precautions 4
4.2 Limitations 6
5.0 PREREQUISITES 7
6.0 INSTRUCTIONS 7
6.1 Implementation of Fall Protection 7
6.2 Identifying Fall Protection Equipment for a Specific Job 7
6.3 Procurement of Fall Protection Equipment 8
6.4 Inspection of Fall Protection Equipment 9
6.5 Storage, Control, and Maintenance of Fall Protection Equipment 10
6.6 Use of Fall Protection Equipment 11
6.7 Fall Prevention and Protection Guidelines 12
6.8 Temporary Floor Holes 12
6.9 Low Slope Roofs 13
6.10 Designated Areas 16
6.11 Oversight Inspections 17
7.0 ACCEPTANCE CRITERIA 17
8.0 POST PERFORMANCE WORK ACTIVITIES 17
9.0 RECORDS 17
9.1 Records Generated 17
9.2 Records Disposition 18
APPENDIX A - ACRONYMS/DEFINITIONS 19
APPENDIX B - ISSUES TO CONSIDER WHEN EVALUATING ELEVATED WORK 22
APPENDIX C - FALL DISTANCE CALCULATION 23
APPENDIX D - FALL PREVENTION AND PROTECTION FLOW CHART 24
APPENDIX E – FALL PROTECTION COMPETENT PERSON INSPECTION FORM (EXAMPLE) 25

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes the actions required to provide a systematic approach to eliminate fall hazards, prevent falls, eliminate injuries, and provide compliance with federal regulations while implementing the Integrated Safety Management System (ISMS) for elevated work.

1.2 Scope

This procedure applies to activities performed by the Deactivation and Remediation Contractor (D&R), employees and subcontractors that require *fall prevention* (see definitions) or *fall protection* (see definitions) measures.

A *personal fall arrest system (PFAS)* (see definitions) is required when an employee is on a *walking/working surface* (see definitions) with an unprotected side or edge which is **4 feet** (for *general industry* [see definitions] work) or **6 feet** (during *construction* [see definitions] work) or more above a lower level and where fixed fall prevention *(standard guardrail)* (see definitions) is **NOT** provided. (The 4-foot elevation requirement may be reduced to a lesser elevation depending upon certain hazards [for example,, rotating machinery, hazardous chemicals, energized lines, and impalement potential] to which a falling person may be exposed.)

EXCEPTIONS:

- Emergency response activities (for example, Firefighting, rescue operations, etc.)
- Personnel working from scaffolding with standard guardrails (refer to cp3-hs-2015, *scaffolds*)
- Personnel working from aerial devices, which only operate vertically (for example,, scissors lifts)
- Rolling stock (such as, railcars, etc.)
- Personnel on ladders with three points of contact
- Vehicles with handrails installed (for example, cylinder hauler trucks, etc.)
- Flatbed trailers
- Crane egress devices
- Fixed ladder safety devices

2.0 REFERENCES

2.1 Use References

- CP3-HS-2004, *Job Hazard Analysis*
- CP3-HS-2008, *Accident Prevention/Equipment Control Tags*
- CP3-HS-2011, *Portable Ladders*
- CP3-HS-2012, *Construction and Work Zone Barricades and Signs*
- CP3-HS-2015, *Scaffolds*

2.2 Source References

- American National Standards Institute (ANSI) A10.32, 2004, Personal Fall Protection for Use in *Construction and Demolition Operations*
- ANSI Z359.1-R2007, *Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components*
- CP2-HS-2000, *Worker Safety and Health Program*
- CP3-HS-2009, *Stop/Suspend Work*
- CP3-TR-0102, *Conduct of Training*
- Owner's manuals for specific fall protection *hardware* (see definitions) and equipment
- Title 29 Code of Federal Regulations (CFR) § 1910, Subpart D, *Walking Working Surfaces* (1910.22, .23, .25, .26, .27, .28, .29, .30, .66, & .67)
- Title 29 CFR § 1910, Subpart I, *Personal Protective Equipment*
- Title 29 CFR § 1926, Subpart M, *Fall Protection*

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 In situations where a fall could result in impalement or other injury (such as,, working over a hot process, operating equipment), fall protection equipment shall be utilized regardless of the potential falling distance.

4.1.2 A Personal Fall Arrest System (PFAS) must be attached to an anchorage point approved by a Qualified Engineer that will support at least 5,000 pounds, the minimum for use by one person or be designed, installed, and used as approved by a Qualified Engineer, as part of a complete PFAS that maintains a safety factor of at least two.

4.1.3 A Personal Fall Restraint System (PFRS) must be attached to an anchorage point approved by a Qualified Engineer that will support at least 1,000 pounds, the minimum for use by one person or be designed, installed, and used as approved by a Qualified Engineer as part of a complete PFRS that maintains a safety factor of at least two.

4.1.4 Activities with fall hazards **NOT** mitigated by primary fall protection equipment (guardrails, walls, or other barriers) shall be protected by the use of secondary fall protection equipment (safety harness, *lanyard* [see definitions], *lifelines* [see definitions]).

4.1.5 Personnel working or traveling on permanent decks, floors, and walk ways that are free of fall exposures are **NOT** required to wear a PFAS provided they can access the elevations by completed permanent stairs, ladders, fully enclosed personnel hoists (elevators), or the area is fully equipped with guard rails.

4.1.6 PFAS, when stopping a fall, shall be rigged such that the user can neither *free fall* (see definitions) more than **6 feet**, nor contact any lower level. This system shall also bring the user to a complete stop and limit maximum deceleration distance the user travels to **3.5 feet** (see Appendix C, *Fall Distance Calculation,* for additional guidance).

4.1.7 Any employee suspended in their PFAS must be rescued quickly to avoid permanent damage due to pooling of blood in the legs. Means of rescue should be considered when using a PFAS

for employee protection.

4.1.8 The employee's weight plus tools carried shall **NOT** exceed the manufacturer's rated limits for the fall arrest system being used.

4.1.9 Lanyards shall be attached to the D-ring located in the middle back of the safety harness unless the Miller G2 connector is being used for a double legged lanyard.

4.1.10 D-rings on a full body harness located at the waist may only be used for work positioning (such as, electrical linemen work).

4.1.11 Lifelines may be mounted either vertically or horizontally and are generally intended to provide mobility to personnel working at elevated areas.

4.1.12 As structures are erected or demolished, priority shall be given to the consideration of proper lifeline placement.

4.1.13 A *Qualified Engineer* (see definitions) shall design horizontal lifeline systems. A minimum safety factor of 2 must be maintained at all times.

4.1.14 Horizontal lifelines shall be installed and maintained by persons qualified in the rigging practices necessary to ensure adequate lifeline systems.

4.1.15 Lifelines in use shall be inspected weekly by a Qualified Engineer with the inspection documented in some fashion so that users are aware the inspection has been completed.

4.1.16 **NO** more than one person per vertical life line.

4.1.17 If used during a fall arrest (stopping a fall), shock absorbing and self-retractable lanyards/lifelines shall be removed from service and destroyed. Other FPE involved such as harnesses, anchorage straps, and carabiners shall be inspected by a competent person to determine if the equipment is safe to use again.

4.1.18 Sliding rope grabs approved for the size rope used are the only method for securing a safety lanyard to a vertical lifeline. Lanyards shall **NOT** be attached to lifelines by means of knots or loops.

4.1.19 Rope grabs shall be positioned on the lifeline at least at or above the shoulders of the user.

4.1.20 Softeners shall be used where lifelines may possibly contact sharp edges (such as,, beam flanges).

4.1.21 Fall protection equipment is required if a determination is made that potential falls **CANNOT** be eliminated by other means.

4.1.22 Personnel working from portable ladders shall comply with CP3-HS-2011, *Portable Ladders*.

4.1.23 Personnel working or traveling in elevated skeletal steel/open structures will achieve 100 percent fall protection (tied off at all times) through use of safety harness/lanyards, retractable lifelines, connectors, toggles, and aerial lifts.

4.1.24 In lieu of lifelines, personnel may secure shock absorbing lanyards to substantial, stationary structural steel members, pipe, and pipe supports capable of supporting 5,000 pounds as determined by Engineering or the manufacturer. Personnel shall **NOT** secure lanyards to cable trays, conduit, small-bore pipe (<3" standard wall), and/or screw pipe.

4.1.25 Personnel working or moving across incomplete structures construction work where there is a risk of falling more than **6 feet** must wear an approved PFAS on the structure.

4.1.26 Personnel working or traveling in incomplete permanent structures where fall exposures exist, such as floor *openings* (see definitions) and open sided floors, must wear an approved full body harness/shock absorbing lanyard system and be properly tied off when within **6 feet** of any fall exposure unless fall prevention measures (for example,, temporary handrails) can be installed.

4.1.27 Only authorized personnel involved in work activities associated with the installation of equipment/materials to eliminate fall exposures may work on floors or walkways that are incomplete. These personnel must be provided with secondary fall protective systems.

4.1.28 Caged ladders do **NOT** require secondary fall protection (retractable lanyard).

4.1.29 Personnel erecting or dismantling structural steel shall achieve 100 percent fall protection (tied off at all times) through use of safety harness/lanyards, retractable lifelines, connectors, and aerial devices.

4.1.30 When lanyard lengths longer than standard are required due to large steel members, contact Safety & Health/Industrial Hygiene (S&H/IH) to approve methods for obtaining the additional length.

4.1.31 Personnel working more than **6 feet** above ground level on rebar walls, piers, and on concrete form walls must have fall protection 100 percent of the time.

4.1.32 Fall protection can be achieved through the use of retractable lifelines, static lifeline, and rope grabs or use of double lanyards.

4.1.33 Personnel working rebar or formed walls and elevated piers generally require a work positioning lanyard (cannot be used for fall protection) and a fall protection lanyard.

4.1.34 On vertical rebar walls, the safety lanyard shall be secured either to a lifeline or a horizontal section of rebar (inner bar) at a point above the worker's head.

4.1.35 On form walls, personnel shall use construction form tie-off attachments or lifelines to secure their safety lanyards. These persons shall receive specific on the job training for the equipment and the fall protection practices to be used.

4.1.36 Work performed on *low slope roofs* (see definitions) shall be performed according to Section **6.9**.

4.1.37 Information and details should be obtained from Engineering on the integrity of the *roof* (see definitions) structure and load capacity of roof during pre-job planning.

4.1.38 In situations where a fall could result in impalement or other injury (such as,, working over a hot process, operating equipment), guardrails shall be utilized regardless of the potential falling distance unless infeasible (see definitions) in which case a PFAS may be used.

4.2 Limitations

4.2.1 DO **NOT** walk chords and lacings of crane booms without continuous fall protection such as a horizontal lifeline.

4.2.2 DO **NOT** perform *roof work* (see definitions) at night unless appropriate and adequate illumination is provided.

4.2.3 DO **NOT** perform roof work during inclement weather.

4.2.4 DO **NOT** use lifelines for any purpose other than fall protection.

4.2.5 DO **NOT** carry items in your hands while climbing or descending ladders.

4.2.6 DO **NOT** climb columns and diagonal structural steel members.

4.2.7 DO **NOT** secure lanyards to cable trays, conduit, small-bore pipe (< 3" standard wall) or screw pipe.

4.2.8 DO **NOT** use rigging equipment (for example,, wire rope slings/chokers) as part of any fall protection system.

4.2.9 DO **NOT** go within 15 feet of an unprotected edge on a low slope roof without using fall protection in accordance with Section **6.9** and Appendix D – Fall Prevention and Protection Flowchart.

4.2.10 DO **NOT** go within 15 feet of an unprotected edge in a designated area without using fall protection in accordance with Section **6.10** and Appendix D – Fall Prevention and Protection Flowchart.

5.0 PREREQUISITES

5.1 **Prior** to performing any action steps identified in CP3-HS-2014, *Fall Prevention and Protection,* review this document based upon its level of use.

5.2 Ensure fall arrest equipment and any other special tools/equipment are obtained.

5.3 **If** you have responsibilities within this procedure **then** ensure the required training is completed **prior** to using fall arrest equipment or serving as a safety monitor:

6.0 INSTRUCTIONS

NOTE:

Work Steps in this procedure need **NOT** be performed sequentially, but may be performed as required during work performed within the scope of this procedure.

6.1 Implementation of Fall Protection

Supervisor

6.1.1 **If** assistance is needed to determine which jobs require fall protection and what specific type of fall protection equipment is needed, **then** refer to the applicable job hazard analysis (JHA), procedure, work package **or** contact S&H/IH.

6.1.2 Address fall prevention and/or fall protection during the planning phase of a project.

6.1.3 Perform a walk down of *work area* (see definitions) to ensure safe access and egress to elevated work areas, and that elevated working surfaces can safely support the employee, tools, and materials (support 4 times the maximum intended load).

6.1.4 Where feasible, rely on engineering controls (such as, guardrails) to prevent exposure to fall hazards as opposed to administrative controls or personal protective equipment (PPE).

6.1.5 Manage exposure to fall hazards by reducing the number of workers exposed, relocating equipment, work sequencing, or by choosing different equipment options (such as, choosing an aerial device rather than a ladder or scaffold).

6.2 Identifying Fall Protection Equipment for a Specific Job

Supervisor

6.2.1 **If** work is to be performed at an elevated height, **then** ensure hazards are evaluated and controls are identified and implemented as part of a comprehensive planning process using guidance in

Appendix B, *Issues to Consider When Evaluating Elevated Work*.

6.2.2 **If** required by this procedure or CP3-HS-2004, *Job Hazard Analysis*, **then** develop a JHA.

6.2.3 **If** a PFAS must be used, **then** make a selection of the most appropriate PFAS to use for specific job or task which may require assistance from S&H/IH.

6.2.4 Ensure fall protection anchorage points are clearly identified by a Qualified Engineer and that personnel required to use them are aware of the specific anchorage point to be used and limitations. (such as, support *fall restraint* (see definitions) versus fall arrest).

6.2.5 Ensure fall protection equipment is installed in a manner that does **NOT** create additional hazards such as tripping, cutting, or puncture hazards.

Qualified Engineer

6.2.6 Inspect potential anchor points to determine if it will support the intended load for fall arrest or fall restraint.

6.3 Procurement of Fall Protection Equipment

Requestor

6.3.1 Complete a purchase requisition to provide the specifications for new fall protection equipment.

6.3.2 **If** needed, **then** request assistance from S&H/IH in selecting fall protection equipment.

Qualified Engineer

6.3.3 **If** commercial fall protection equipment is **NOT** available for a specific task, **then** serve as the design authority for all custom-engineered fall protection systems at the PGDP.

Procurement Representative (see definitions)

6.3.4 Process the purchase requisition **and** forward it to applicable personnel including S&H/IH for the proper reviews.

S&H/IH

6.3.5 Conduct safety review of specifications in the requisition for fall protection equipment.

Procurement Representative

6.3.6 Procure fall protection equipment that meets the required specifications.

6.3.7 Notify the requester when it arrives so that it may be inspected by Quality Control (QC) prior to its first use.

Competent Person

6.3.8 Perform inspections of each new fall protection item in accordance with section **6.4** of this procedure.

6.4 Inspection of Fall Protection Equipment

Competent Person

NOTE:

Subcontractor-owned/operated equipment is subject to inspection by PGDP personnel at any time to ensure safe working conditions.

6.4.1 Inspect new fall protection equipment before it is put into service and on an annual basis to ensure it is fit for continued service.

NOTE:

Carabiners are **NOT** required to show a date of manufacturer. Therefore, the equipment owner relies on the annual *competent person* (see definitions) inspection and prior to use visual inspection as opposed to the age of the carabiner to determine if it is safe for use.

6.4.2 **After** April1st, 2019, remove from service all fall protection equipment that is more than ten years old regardless of the condition of the equipment.

6.4.3 Verify the fall protection equipment operates properly **and** use the manufacturer's inspection instructions provided by the Safety and Health group to perform annual inspections.

6.4.4 Inspect hardware items (D-rings, buckles, and connectors) for evidence of deterioration, defects, or damage which may include:

- Cracks
- Sharp edges
- Deformation
- Corrosion
- Chemical attack
- Excessive wear
- Alterations
- Excessive heating

6.4.5 Inspect ropes, straps, lines, and cable for evidence of deterioration, defects, or damage which may include:

- Fraying
- Unsplicing
- Unlaying
- Kinking
- Knotting

- Broken or pulled stitches
- Excessive elongation
- Chemical attack
- Abrasion
- Excessive wear
- Excessive lubrication

6.4.6 Inspect for missing parts and/or improper function of mechanical devices and connectors.

6.4.7 Identify unapproved equipment **and** notify the equipment owner to tag with a Defective Equipment Tag according to CP3-HS-2008, *Accident Prevention Equipment Control Tags,* Request the equipment owner to remove it from service until repaired or replaced or destroy/dispose if **NOT** repairable, if equipment fails inspection.

6.4.8 **If** the equipment passes inspection, **then** punch a hole in manufacturer's inspection tag **or** apply an inspection sticker on the equipment to identify either the date of inspection or the date when the inspection is due next.

NOTE: Documentation of the inspection may also be performed using the example shown in Appendix E

6.4.9 Forward list of equipment inspected with date of inspection and name of inspector to S&H. .

Supervisor

6.4.10 Determine the disposition of any rejected fall protection equipment, as follows:

- Return new equipment to vendor as defective.
- Render used defective equipment inoperable to ensure they are not used.
- Order any needed replacement items.

Procurement Representative

6.4.11 Return rejected new equipment, if requested, to the vendor **or** order replacement items as requested by the Supervisor.

6.5 Storage, Control, and Maintenance of Fall Protection Equipment

Supervisor

6.5.1 **If** needed, request assistance from S&H/IH to identify an appropriate location for proper storage of all fall protection equipment that satisfies manufacturer recommendations.

Workers or Supervisor

6.5.2 Assume responsibility for the storage and control of all fall protection equipment (full body harnesses, anchor straps, all lanyards, lifelines, and carabiners).

6.5.3 Maintain all fall protection equipment in a safe condition throughout the duration it is available for use.

Worker

6.5.4 **Prior** to use, confirm all fall protection equipment has a current inspection tag, label, **or** sticker.

6.5.5 Identify defective (degraded or damaged) fall protection equipment with a Defective Equipment Tag according to CP3-HS-2008.

Supervisor or Worker

6.5.6 Segregate defective fall protection equipment to prevent its use prior to its disposition (repair or disposal).

6.5.7 **If** the competent person inspection date has expired, **then** perform the following:

- Remove the equipment from service.
- Attach Defective Equipment Tag in accordance with CP3-HS-2008.
- Schedule the equipment to be reinspected by a competent person.

6.6 Use of Fall Protection Equipment

Worker

6.6.1 Before starting work, obtain required fall protection equipment from the designated storage location.

6.6.2 Perform visual inspection of the fall protection equipment to verify a current (**NOT** expired) inspection sticker/tag/label is attached.

6.6.3 Visually inspect all fall protection equipment prior to use for any evidence of defects **or** damage using the visual inspection criteria for hardware and other components as specified in Steps **6.4.3** through **6.4.6 and** disposition defective equipment according to Step **6.4.7**.

Supervisor

6.6.4 Prior to performing work, ensure personnel have proper work control documents (for example, work packages, procedures) and hazard analysis identifying hazards and controls.

Worker

6.6.5 With assistance from S&H, if necessary, evaluate the location of the anchor point to ensure a fall will **NOT** result in the employee "swinging" into an obstruction.

6.6.6 Attach fall protection equipment only to anchor points approved by a Qualified Engineer.

6.6.7 **If** fall protection equipment has been subjected to impact loading, **then** follow Steps **6.6.8** through **6.6.11.**

6.6.8 Immediately stop work (do **NOT** continue to use that fall protection equipment).

6.6.9 Notify Supervisor about any equipment subjected to impact loading.

6.6.10 Attach a Defective Equipment Tag according to CP3-HS-2008.

6.6.11 Segregate fall protection equipment that has been subjected to impact loading until inspection can be performed by a competent person.

6.6.12 Return fall protection equipment, **NOT** subject to a fall, to a designated storage location upon completion of the work.

Supervisor

6.6.13 Enforce the use of appropriate fall protection equipment according to this procedure and/or applicable JHAs.

6.7 Fall Prevention and Protection Guidelines

S&H/IH

6.7.1 During design or field reviews, verify standard guard rail systems consist of the following elements:

- A top rail approximately **42 inches** (± 3 inches) above the walking/working surface
- A mid-rail at approximately **21 inches** above said surface
- When required, a **4-inch** tall toe board mounted at the walking/working surface
- Upright support post spacing must **NOT** exceed **8 feet** and the entire system must be capable of supporting 200 pounds force applied in a downward or outward direction within 2 inches (5 cm) of the top edge with minimum deflection. These systems may be used to guard open sides of floors, platforms, and walkways in elevated areas.

6.8 Temporary Floor Holes

NOTE:

This section applies to work around *holes* (see definition) where there is exposure to a fall hazard of at least **4 feet**. Temporary floor holes are typically created during construction/demolition activities and/or by open manholes, open vaults, or open lift stations, etc. To be considered temporary, the hole must only be open for no more than one shift. At the completion of one shift, the open hole is no longer considered temporary.

Supervisor

6.8.1 Ensure temporary floor holes, which do **NOT** require employees to enter, are guarded by an attendant whose job it is to remain at the location to warn others of the fall hazard **and** keep them **6 feet** away from the unprotected temporary floor hole.

NOTE:

The barricades must meet the requirements of CP3-HS-2012, *Construction and Work Zone Barricades and Signs*.

Attendant

6.8.2 **If** the attendant must leave the temporary floor hole during the shift, **then** ensure that barricades are installed at least **6 feet** from the open hole on all sides.

Supervisor

6.8.3 **If** the work being performed cannot be completed in one shift, **then** ensure the hole is protected using one of the following methods:

- Ensure the hole cover or lid is re-installed to eliminate the fall hazard.
- Verify that guardrails are installed around the hole to protect personnel from the fall hazard caused by the open hole.

NOTE:

Personnel required to work down in a hole (manhole/vault/lift station etc.) are **NOT** required to wear fall protection equipment while they travel to and from the hole.

6.8.4 **If** work requires personnel to enter into the open hole (such as, manhole, vault, or lift station, etc.) **then** take the following actions:

- Ensure that guardrails are installed so that employees whose work requires them to be within six foot of the hole (such as, confined space attendant, IH monitoring, co-worker handling tools into the manhole/vault, etc.) are protected from falls into the hole.
- Ensure that any gaps left in the handrail system for access into the hole are minimal in width and at least six foot from the edge of the hole.

6.8.5 **If** it is physically impossible to install guardrails around the open hole, **then** ensure that all personnel who need to be within **6 feet** of the open hole which has **NO** guardrails are wearing a PFAS or PFRS and are tied off to an anchor point approved by a Qualified Engineer.

6.8.6 Verify that the open hole has barricades installed at least **6 feet** from the edge of the open hole according to CP3-HS-2012, *Construction and work Zone Barricades and Signs*.

6.9 Low Slope Roofs

NOTE:

This section specifically applies to work performed on a low slope roof and is further clarified by Appendix D, *Fall Prevention and Protection Flow Chart*.

Engineering/Evaluation Team

6.9.1 **When** performing visual inspections, investigations, or assessments of workplace conditions prior to work or after work is completed on low slope roofs (such as, for potential roof repairs, demolition, future construction, etc.) ensure a Safety Monitor is identified and is with the roof inspectors on the same working level at all times.

Safety Monitor

NOTE:

The Safety Monitor is current on fall protection training, has **NO** other responsibilities assigned, remains on the same working level as the workers and is empowered to pause/stop work, if needed.

6.9.2 Ensure the Engineering/Evaluation Team is made aware of unprotected edges on the roof once the inspection requires the employees to be within **15 feet** of the unprotected edge of the roof.

6.9.3 Prohibit all employees performing the inspection from being closer than **6 feet** from any unprotected edge on the roof.

Supervisor

NOTES:

Work performed closer than **6 feet** to an unprotected side or edge may lead to falls which could result in serious injuries or death.

Hazards and controls shall be identified and documented whenever work defined by Step **6.9.4.A** is performed on a low slope roof closer than **6 feet** to an unprotected side or edge. Controls necessary to perform this work may include portable or new guardrail system or portable/permanent anchorage points for travel restraint or fall arrest along with an approved work control document.

6.9.4 For any work that will require employees to be within **15 feet** of an unprotected edge on the low sloped roof where the use of a PFAS/Personal Fall Restraint System (PFRS) is **NOT** possible, verify the following conditions are met:

A. Work to be performed will be limited to:

- Low slope roofing work
- General industry work (such as,, general maintenance and repairs such as relamping, troubleshooting, heating, ventilation, air conditioning [HVAC], radcon surveys, etc.)
- .

B. Designated area is established and employees remain in the designated area while work is being performed.

C. Designated area has a slope from the horizontal of 10 degrees or less (or slope of 4 in 12 or less).

D. Perimeter of the designated area is clearly marked with a warning line system (for example, rope, wire, or chain) no closer than **6 feet** from the unprotected side or edge for work that is temporary and infrequent or **NOT** less than **15** feet for other work.

6.9.5 **If** work to be performed does **NOT** meet the criteria of Step **6.9.4.A**, **then** go to Step **6.9.10**.

6.9.6 Ensure that a Safety Monitor is present during installation of the warning line system.

Safety Monitor

NOTE:

The Safety Monitor is current on fall protection training, has **NO** other responsibilities assigned, remains on the same working level as the workers and is empowered to pause/stop work, if needed.

6.9.7 Ensure that all personnel stay a minimum of **6 feet** away from the unprotected side or edge during installation of the warning line.

NOTE:

Strength requirements for newly installed stanchions and warning lines listed below must be verified by Engineering prior to work beginning on the first day.

Engineering

6.9.8 Verify that the warning line system meets the following minimum requirements:

- Stanchions for the warning line must be capable of resisting, without tipping over, a force of at least 16 pounds applied horizontally against the stanchion. The force must be applied **30 inches** above the work surface and perpendicular to the designated area perimeter, and in the direction of the unprotected side or edge.
- Line must have a breaking strength or tensile strength of **500 pounds**.

Supervisor

6.9.9 Verify that the warning line system meets the following minimum requirements:

- Line must be attached to each stanchion so that pulling on one section of line between stanchions will **NOT** result in slack being taken up in adjacent sections before the stanchions tip over.
- The lowest point of the line shall be **NO** less than **34 inches** and no more than **39 inches** from the walking/working surface.
- Line must be clearly visible from any unobstructed location within the designated area up to **25 feet** away, or at the maximum distance a worker may be positioned away from the line, whichever is less.
- Stanchions must be erected as close to the work area as is permitted by the task being performed
- The perimeter of the designated area must be erected at least **6 feet** from the unprotected side or edge.
- When mobile mechanical equipment is being used, the line must be erected **NOT** less than **6 feet** from the unprotected side or edge which is parallel to the direction of mechanical equipment operation, and **NOT** less than **10 feet** from the unprotected side or edge which is perpendicular to the direction of mechanical equipment operation.
- Access to the designated area must be by a clear path, formed by two lines, attached to stanchions that meet the strength, height, and visibility requirements of this section of the plan.

Supervisor

NOTEs:

As defined by Step **6.9.10,** construction work performed closer than **15 feet** to an unprotected side or edge may lead to falls which could result in serious injuries or death.

Hazards and controls shall be identified and documented whenever work defined by Step **6.9.10** is performed on a low slope roof closer than **15 feet** to an unprotected side or edge. Controls necessary to perform this work may include portable guardrails or portable anchorage points along with an approved activity level work control document.

6.9.10 **If** the work being performed does **NOT** meet the criteria listed in Step **6.9.4A** but is limited to *construction* (for example., new construction, demolition, painting), may require employees to be within **15 feet** of an unprotected edge on the low sloped roof, and the use of a PFAS/PFRS is **NOT** possible, **then** verify the following conditions are met:

- Warning line system is established and employees remain inside the warning line system area while the work is being performed.
- Working surface area has a slope from the horizontal of **10** degrees or less (or slope of **4** in **12** or less).

- Perimeter of the warning line system area is clearly marked with a warning line (rope, wire, or chain) no closer than **15** feet from the unprotected side or edge
- Ensure that a Safety Monitor is present during installation of the warning line system

Safety Monitor

NOTE:

The Safety Monitor is current on fall protection training, has no other responsibilities assigned, remains on the same working level as the workers and is empowered to pause/stop work, if needed.

6.9.11 Ensure that all personnel stay a minimum of **15 feet** away from the unprotected side or edge during installation of the warning line.

NOTE:

Strength requirements for newly installed stanchions and warning lines listed below must be verified by Engineering prior to work beginning on the first day.

Engineering

6.9.12 Verify that the warning line system meets the minimum requirements of Step **6.9.8**.

Supervisor

6.9.13 Verify that warning lines are installed according to the criteria listed in Step **6.9.9** with two exceptions:

- Personnel shall stay a minimum of **15 feet** away from the unprotected side or edge during installation.
- The perimeter of the designated area must be erected at least **15 feet** from the unprotected side or edge.

6.10 Designated Areas

NOTE:

This section specifically applies to general industry work performed in a *designated area* (see definitions) and is further clarified in Appendix D.

Supervisor

6.10.1 Ensure that work performed/work location meets the following requirements:

- Limited to general industry work (such as,, general maintenance and repairs such as relamping, troubleshooting, HVAC, Radcon surveys, etc.)
- Designated area is established and employees remain in the designated area while work is being performed.
- Designated area has a slope from the horizontal of **10 degrees** or less (or slope of **4** in **12** or less).
- Perimeter of the designated area is clearly marked with a warning line system (for example, rope, wire, or chain) no closer than **6 feet** from the unprotected side or edge for work that is temporary and infrequent or not less than **15 feet** for other work.

6.10.2 Ensure that a Safety Monitor is present during installation of the warning line system and

provides oversight during work within the warning line system

Safety Monitor

NOTE: Safety Monitor is current on fall protection training, has no other responsibilities assigned, remains on the same working level as the workers, and is empowered to pause/stop work, if needed.

6.10.3 Ensure that all personnel stay a minimum of **6 feet** away from the unprotected side or edge during installation of the warning line.

NOTE: Strength requirements for newly installed stanchions and warning lines listed below must be verified by Engineering, preferable during the procurement process or prior to installation but no later than prior to work beginning on the first day.

Engineering

6.10.4 Verify that the warning line system meets the minimum requirements of Step **6.9.8**.

Supervisor

6.10.5 Verify that warning line system meets the minimum requirements of Step **6.9.9** with two exceptions:

- The perimeter of the designated area must be erected at least **6 feet** from the unprotected side or edge for work that is temporary and infrequent or not less than **15** feet for other work.
- When mobile mechanical equipment is being used, the line must be erected **NOT** less than **6 feet** from the unprotected side or edge which is parallel to the direction of mechanical equipment operation, and **NOT** less than **10 feet** from the unprotected side or edge which is perpendicular to the direction or mechanical equipment operation.

6.11 Oversight Inspections

S&H/IH

Periodically conduct an assessment of this program to monitor regulatory compliance.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

None

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

Inspected Equipment List

9.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*

Appendix A - Acronyms/Definitions

ACRONYMS

ANSI	American National Standards Institute
CAAS	Criticality Accident Alarm System
CFR	Code of Federal Regulations
PGDP	Paducah Gaseous Diffusion Plant
S&H/IH	Safety & Health/Industrial Hygiene
HVAC	Heating Ventilating and Air Conditioning
ISMS	Integrated Safety Management System
JHA	Job Hazard Analysis
OSHA	Occupational Safety and Health Administration
PFAS	Personal Fall Arrest System
PFRS	Personal Fall Restraint System
PPE	Personal Protective Equipment
QC	Quality Control

DEFINITIONS

Competent Person - one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. By way of training and/or experience, a competent person is knowledgeable of applicable standards, is capable of identifying workplace hazards relating to the specific operation, and has the authority to correct them. For the purpose of this procedure, a competent person for fall protection equipment inspections has received some form of training to conduct inspections of fall protection equipment.

Construction - combination of erection, installation, assembly, demolition, or fabrication activities involved to create a new facility or to alter, add to, rehabilitate, dismantle, or remove an existing facility. It also includes the alteration and repair (including dredging, excavating, and painting) of buildings, structures, or other real property, as well as any construction, demolition, and excavation activities conducted as part of environmental restoration or remediation efforts.

Designated Areas - distinct portion of a walking working surface delineated by a perimeter warning line in which work may be performed by employees without additional fall protection.

Fall Prevention - Any equipment, device, or system that prevents an employee from experiencing a fall from elevation such as a guardrail.

Fall Protection - Any equipment that mitigate the effects of a fall such as a personal fall arrest system

Fall Restraint - Systems, fixtures, and/or devices that limit the motion of users to prevent falling from elevated work areas

Free fall - The act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Free fall distance - The vertical displacement of the fall arrest attachment point on the employee's body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or retracting lifeline/lanyard (see definitions) extension before they operate and fall arrest forces occur.

Appendix A - Acronyms/Definitions (continued)

General Industry - For the purpose of this procedure, this is work covered by OSHA 1910 that includes but is not limited to tasks such as relamping, HVAC repairs, Criticality Accident Alarm System (CAAS) horn testing, instrument calibrations, general maintenance and repairs, and inspection/assessments in preparation for general industry work.

Guardrail system - A barrier erected to prevent employees from falling to *lower levels* (see definitions).

Hardware - Rated buckles, D-rings, *snap-hooks* (see definitions), and associated hardware used to attach the components of the system together.

Hole - A gap or void **2 inches** (5.1 cm) or more in its least dimension, in a floor, roof, or other walking/working surface.

Infeasible - Means that it is impossible to perform the work using a conventional fall protection system (such as,, guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

Lanyard - a component consisting of a flexible rope, wire rope, or strap, which typically has a connector at each end for connecting to the body support and to a fall arrester, energy absorber, anchorage connector, or anchorage.

Leading Edge - An area within **6 feet** of a change of elevation that is **6 feet** or more in height or to an extra hazard condition such as impalement, rotating machinery, hazardous chemicals, etc.

Lifeline - A line provided for direct and indirect attachment to a user's body belt, body harness, lanyard, or deceleration device. Such lifelines may be horizontal or vertical in application and part an engineered fall protection system.

Low Slope Roof - A roof having a slope of four in twelve or less from horizontal.

Lower levels - Those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

Opening - A gap or void **30 inches** or more high and **18 inches** or more wide, in a wall or partition, through which employees can fall to a lower level.

Personal Fall Arrest System - A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness, and may include a lanyard, deceleration device, lifeline, or suitable combination of these.

Personal Fall Restraint System - A system used to prevent an employee from reaching a fall hazard and falling over an unprotected edge. It consists of an anchorage, a body harness, and a lanyard connector that is a length that will not allow an employee to physically reach the unprotected edge.

Positioning device system - a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

Procurement Representative - A member of the Procurement organization designated with purchasing authority by the Procurement Manager/Subcontracts Supervisor is responsible for performing activities prescribed by this procedure.

Qualified Engineer - A person who by possession of a recognized degree, certificate or professional standing, or who, by knowledge, training and experience, has successfully demonstrated an ability to solve or resolve problems relating to the specific subject, work, product, or project. Typically, for the purpose of this procedure, this person will have a structural/civil Engineering degree and work in Engineering.

Retracting Lifeline/Lanyard - A deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

Rope grab - A deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

Roof - The exterior surface on the top of a building. This does not include floors or form work which, because a building has not been completed, temporarily become the top surface of a building.

Roof work - The hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

Safety Factor of two - Components of a fall arrest system (such as,, horizontal life line systems, anchorages) capable of supporting at least twice the weight expected to be imposed upon it.

Safety Monitor – person current in recognized fall prevention/fall protection training responsible for identifying fall hazards. This person shall have no other responsibilities assigned while serving as the safety monitor, shall remain on the same working level as the workers and is empowered to pause/stop work if needed.

Snap-hook - A connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Approved snap-hooks are the locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection.

Standard Guardrail - A system designed to prevent falling from an elevated position and is capable of withstanding 200 pounds of force applied in a downward or outward direction within 2 inches of the top edgeany direction (except up) consisting of: a top rail **42 inches** ± 3 inches from the floor, when required a **4-inch** high toe board, and a mid-rail approximately one-half the distance between the top rail and toe board. Guardrails are the preferred method of fall protection when personnel must be exposed to elevated or and/or *leading edges* (see definition).

Toeboard - A low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

Unprotected sides and edges - Any side or edge (except at entrances to points of access) of a walking/working surface,(for example,, floor, roof, ramp, or runway) where there is no wall or guardrail system at least **39 inches** high.

Walking/working surface - Any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

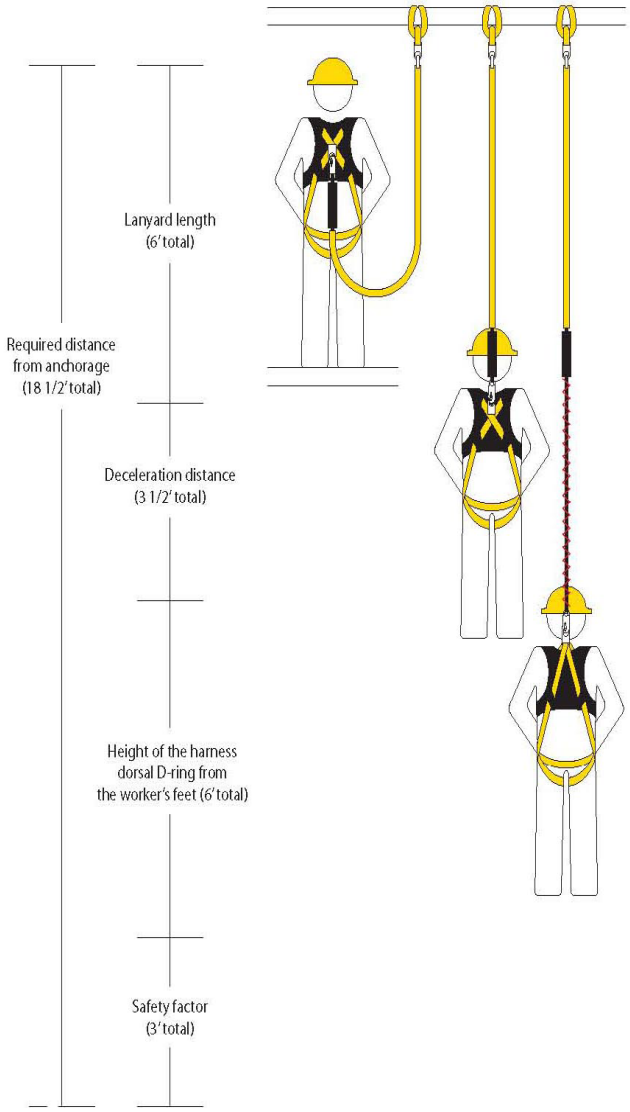
Work area - The portion of a walking/working surface where job duties are being performed.

Appendix B - Issues to Consider When Evaluating Elevated Work

- Have all reasonable means of eliminating the need to climb on a job been identified and evaluated?
- Which is the best climb path to the work area?
- Can a ladder, mobile platform, or scaffold be used instead of climbing?
- Would some type of fall protection equipment still be needed if the worker used a ladder, mobile platform, or scaffold?
- What is the frequency of this work and how many people will be exposed to the fall hazards?
- What other hazards exist in the area that may affect the safety of elevated work? Consider:
  1. Oily, wet, or slippery surfaces
  2. Pipe insulation that can roll, crush, or break off
  3. Hot piping
  4. Sensitive equipment that could be damaged if climbed on, such as small instrument lines and transmitters
  5. Objects that may interfere with the safety of a worker's ascent or descent
  6. Rotating, moving, or energized equipment
  7. Water or steam leaks
  8. Objects or equipment below on which a user may be impaled if he/she were to fall
     - If a user does fall, how would he/she be rescued? Would special rescue equipment be needed?
     - Are there any other issues specific to the task to be performed and the work environment that need to be considered?

Appendix C - Fall Distance Calculation

FALL DISTANCE CALCULATION



ANCHORAGE CONNECTOR

Anchor: The point of attachment for lanyards and lifelines, also called a tie off point. Must be capable of handling a 5,000 lb load in the direction a fall would occur. (Roof Truss, I-Beam)

Anchorage connector: Used to join the anchor point to the connecting device. (Beamer, Cross Arm Strap)

BODY WEAR

Full body harness distributes the weight of impact across the body in a fall. It keeps the user upright if hanging from the dorsal D-ring. Completes the connection of Anchor to connector to harness.

CONNECTING DEVICE

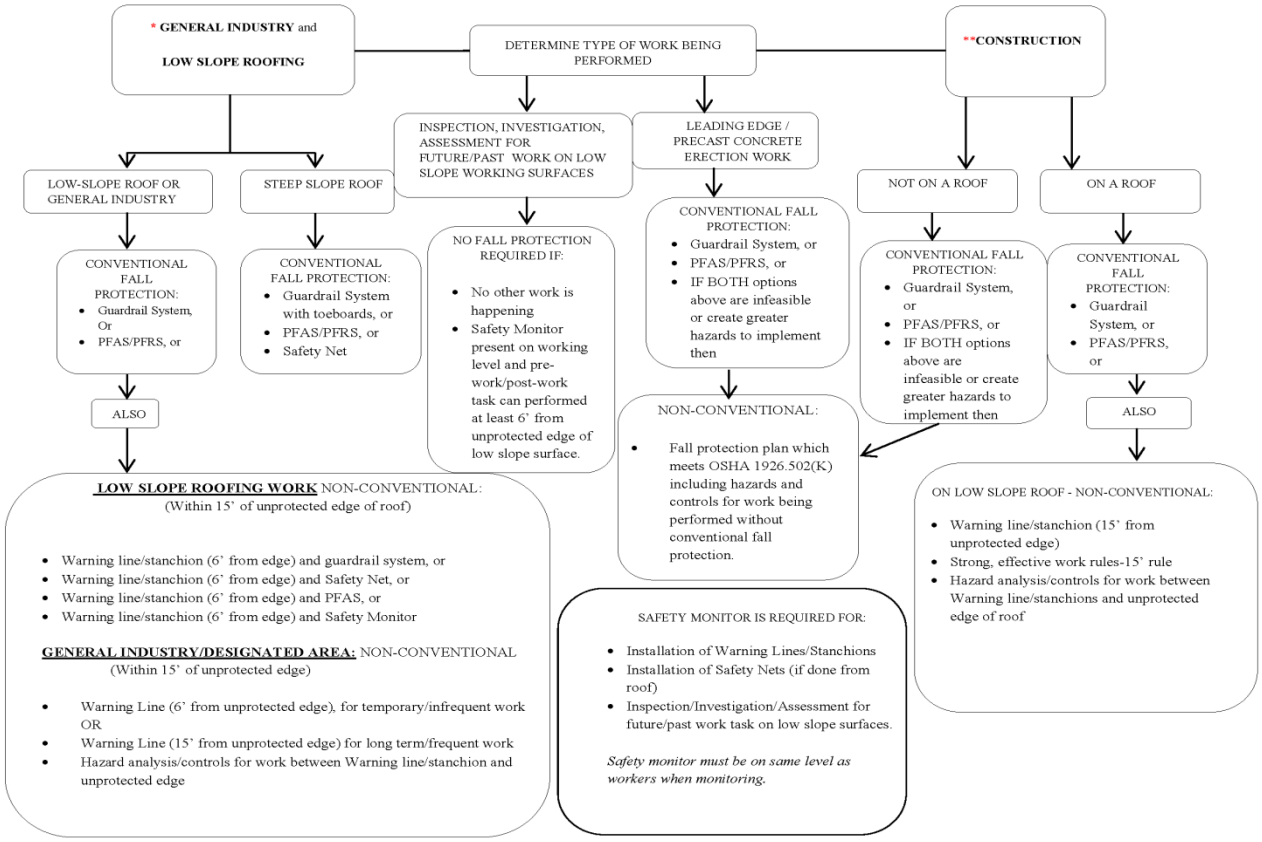
Connects the harness to the anchor or anchorage connector.

DECELERATION DEVICE

Device that slows and reduces energy in a fall. It lowers forces the body receives upon impact. (Shock Absorbing Lanyard, Rope Grab, Retractable Lifeline)

Appendix D - Fall Prevention and Protection Flow Chart

This is intended as a guide for determining the requirements for protecting employees from fall hazards.



***General Industry** - work covered by OSHA 1910 with a ≥4' fall hazard that includes but is not limited to tasks such as relamping, HVAC repairs, CAAS horn testing, instrument calibrations, Radcon surveys, general maintenance and repair work, and inspection/assessment in preparation for general industry work.

** **Construction (see definitions)** - work covered by OSHA 1926 with a ≥ 6' fall hazard that includes but is not limited to tasks such as new construction, demolition, and painting. Tasks such as low slope roofing work, leading edge, and precast concrete erection work are in a separate work classification by OSHA for fall protection and thus those have stand-alone fall protection requirements specific for those activities.

Temporary/Infrequent - Temporary implies simple, short term tasks lasting (approximately) several hours or less. Infrequent implies regular maintenance that is performed no more than once per month or sporadically due to equipment breakdown.

Appendix E – CP3-HS-2014-F01 - Fall Protection Competent Person Inspection Form

FLM	Bldg.	Org.	Equipment	Made by	Date Made	Model #	Serial #	Inspect Date	Inspector	Pass/Fail

EXAMPLE