

HIGH RISK, LONE WORKER

The Unacceptable Risk

By Fred Straub

IMAGINE IT IS A HOT SUMMER DAY and David the field technician receives an electronic text for a service call in the middle of his morning schedule. David adjusts his schedule to accomplish an assigned urgent task: the repair or replacement of a cooling fan for a natural-gas-fired HVAC unit atop the roof of a customer's correctional facility.

Arriving at the work site 30 minutes later via a company vehicle, David positions an extension ladder to gain access to the client's roof. He troubleshoots the HVAC unit and determines the malfunction to be a faulty bearing set. David climbs down to his vehicle to obtain the replacement part and returns to the roof with an extension cord and a reciprocating saw to complete the work. He locates a rooftop electrical outlet to power his saw and begins to disassemble the unit. When the repair is completed, David intends to return to ground level, lower and stow the ladder and proceed to a nearby fast food establishment to take his lunch break and cool off.

OSH professionals will quickly grasp the serious injury and fatality (SIF) hazard potentials that this worker encountered while

KEY

TAKEAWAYS

● Working alone is generally an accepted practice in the U.S.

● Working alone when performing high-risk work presents an unacceptable risk to workers.

● Educating management and affected employees regarding the risk of lone work and integrating the related risk-reducing controls of a working alone safety program will contribute to the eventual unacceptance and discontinuance of high-risk work by lone workers.

working alone, remotely or in isolation. Consider the motor vehicle operation, ladder ascent/descent, fall from an elevated working surface, flammable gas under pressure, electrical contact through a power tool and extension cord, energized electrical HVAC components, unexpected HVAC start-up, workplace violence potential and heat stress exposure due to elevated temperature extremes.

The risk appetite of U.S. employers is maturing to recognize and respond to the hazards of lone work. Old business paradigms of minimal staffing to achieve maximum profits are being countered with wise risk management decisions to produce quality service and products in a safe manner.

An estimated 53 million people are lone workers in the U.S., Canada and Europe (Myers, 2015). Once OSH professionals begin pondering the topic, work environments and tasks for which lone work has been accepted in the past, despite the related SIF potentials, are easily identified and countered. The author

believes a risk-based approach to OSH will not let this unsafe paradigm continue.

Working Alone Safety Program

Working alone can increase the likelihood of some workplace hazards or risks occurring (WorkSafe Victoria, 2017). Consequently, if loss incidents arise when working alone, the consequences can be more severe. A working alone safety program (WASP) may be developed and implemented to address this exposure, thereby supporting an employer's goals of reduced risk and zero losses. The elements of a WASP may include hazard identification, risk assessment, risk controls over lone work, supervision of lone workers, monitoring of lone workers, training, annual audit and prohibited jobs tasks for lone workers.

Hazard Identification

An organization must be committed to the safety and health of all its employees, not just those working from fixed and mobile work sites where coworkers are present. As organizations and regulatory agencies begin to distinguish the unique OSH concerns created by lone work, solitary employees, unattended contractors or single self-employed persons should not be put at more risk than others (OSHA, 1970).

Effective legislation to protect lone workers currently exists in the U.K., Australian states and nine Canadian provinces. With exception to the current U.S. regulations affecting lone work (Table 1), working alone is generally not against the law in the U.S. and it will often be safe to accomplish for low-risk work. However, the OSHA General Duty Clause requires employers to carefully consider, then address, any OSH risks for employees working alone within fixed and mobile work sites (OSHA, 1970). The author supports the clarity of the Canadian Center for Occupational Health and Safety's (CCOHS, 2018) definition of lone work, whereas an employee is considered to be working alone if the individual: 1) works alone at a work site in circumstances where assistance is not readily available when needed; and 2) cannot be seen or heard by another person.

To assist OSH professionals in their occupational hazard identification for lone work, Table 2 provides a partial listing of workers in fixed and mobile work sites. Table 3 exhibits a brief listing of potential SIF risks to lone workers. Tables 2 and 3 are not comprehensive; additional work sites and risks may be identified during an employer's comprehensive hazard identification and risk assessment.

TABLE 1
U.S. REGULATIONS ON LONE WORK

Rule	Requirements/work operations addressed
29 CFR 1910.120	Requires a buddy system during HazWOPER operations.
29 CFR 1910.134	Firefighters encountering an atmosphere immediately dangerous to life and health must follow the two-in/two-out rule.
29 CFR 1910.146	Requires multiple employees for permit-required confined space entries.
29 CFR 1910.269	Relates to job tasks that require at least two electrical generation personnel.
29 CFR 1915.84	Pertains to lone work in a confined space or remote location in shipyards.
29 CFR 1926.800	Involves check-in/check-out allowances for workers during underground construction.
56 CFR 18020	Concerns monitoring miners on MSHA sites.

TABLE 2
EXAMPLES OF WORK SITES WHERE LONE WORK MAY OCCUR

Fixed work sites	Mobile work sites
<ul style="list-style-type: none"> •Employees working alone in a small workshop, utility substation, food kiosk or convenience store; •Homeworkers engaged in moderate to higher risk work (e.g., baking, woodworking, automobile repair); •Personnel working alone for long periods (e.g., in remote clinics, factories, offices, laboratories, wastewater treatment plants, warehouses); •Staff working outside normal hours (e.g., IT, housekeeping, maintenance, service technicians, security). 	<ul style="list-style-type: none"> •Lone construction workers, surveyors and utility repair; •Sole workers in agricultural, oil/gas drilling fields, mining, wind/solar generation and forestry; •Service personnel working alone, including EMS, law enforcement, security, social and medical; •Unattended watercraft operations, truck/delivery, bus/taxi/rideshare drivers; •Alone field engineers, real estate, field science, sales, landscaping, or service/cleaning/repair to residential and commercial premises.

Risk Assessment

Regardless of an existing regulatory requirement, OSH professionals have a duty to assess the risk of identified hazards to lone workers and take steps to eliminate, avoid or control risks where feasible.

Because there are no hazards which are exclusive to working alone, the hazards and risks of the particular job need to be dealt with first. However, working alone does increase the risks (e.g., probability and/or severity) of any given job. (WorkSafe Victoria, 2017)

A prudent organization will take into account normal work and foreseeable emergencies (e.g., fire, equipment failure, illness, loss incidents) in its risk assessment. With input from current OSH agencies, the author submits the following expanded suggestions to achieve the goal of risk assessment (CCOHS, 2018; HSA, 2018; Washington State Department of Labor & Industries, 2010).

1) Involve affected employees when assessing potential risks from lone work and measures to control them. Consider using the lone worker OSH perception survey shown in Figure 1 (p. 32).

2) Proactively evaluate work sites, work practices and job hazard analyses (JHA) to identify lone work potentials and take steps to ensure that risks are eliminated when practicable.

3) Perform a risk analysis of any remaining potential lone work risks that cannot be eliminated. Obtain management support for reducing resulting risk levels to as low as reasonably practicable (ALARP) via additional risk controls (e.g., engineering, administrative measures), implementing lone work OSH procedures, conducting related training, mandating effective

TABLE 3
SIF RISKS TO LONE WORKERS

SIF risks	Examples
Sudden illness	<ul style="list-style-type: none"> •heart attack; •stroke; •occupational asthma; •anaphylactic reaction to bee sting, or spider or snake bite.
Occupational injury	<ul style="list-style-type: none"> •vehicle collision; •fall from an elevation; •electrocution; •machinery entrapment; •struck-by heavy equipment or motor vehicles; •robbery, assault, active shooter; •slip or falls; •burns; •heat or cold stress; •toxic chemicals; •severe strains or sprains; •biological hazards; •animal attack.
Contributing factors to loss	<ul style="list-style-type: none"> •fatigue; •unreliable roadways; •drowning potentials; •high-stress occupations; •fire; •inaccessible to EMS; •carbon monoxide; •limited communication abilities; •workplace violence; •high voltage; •moving equipment; •toxic chemicals; •flammable or combustible materials; •radioactive and biological hazards; •unpredictable behaviors of clients or other roadway drivers; •shiftwork; •distraction; •mental isolation; •underground; •severe weather; •confined spaces; •temperature extremes; •shortcuts with equipment, PPE or safe work practices.

check-in protocols, and providing suitable equipment to ensure that the worker can perform the required tasks safely. See the “Hierarchy of Risk Controls for Lone Work” sidebar on p. 32 for additional risk control suggestions.

4) Analyze all loss incidents or near hits associated with lone work where being alone increased the likelihood or the severity of the event.

5) Review work operations to establish whether the lone worker will have exposure to motor vehicle collisions or vehicle breakdowns in harsh environments.

6) Verify the existence of safe, unrestricted access in and egress out for the lone worker. Determine whether workplace configurations present a specific risk to the lone worker (e.g., due

FIGURE 1
SAMPLE LONE WORKER PERCEPTION SURVEY

	Yes	No	N/A
Are you aware of the potential lone work hazards of your job?			
Are you aware of our OSH procedures relating to lone work?			
Have you received up-to-date OSH training for lone workers? Date: _____			
Do you believe you have been adequately trained in the risks of lone work and the appropriate measures for controlling these risks?			
Do you have access to appropriate safety equipment (e.g., lone worker personal monitor/alarm devices, panic alarms)?			
Do you know how to use and maintain lone worker safety equipment?			
Do you know how to report a loss incident or near-hit event?			
Are you aware of any loss events or near-hits involving lone work in the last year? If YES, provide details below.			
Do you understand the importance of proper planning before performing a lone work task, the need to be aware of the risks and to do everything you can in advance to ensure your own safety?			
Do you always provide a daily safe work plan to your supervisor before performing lone work?			
Do you keep in regular communication with your supervisor or primary contact when performing lone work?			
Do you carry out task hazard assessments prior to performing lone work?			
Do you understand the circumstances under which lone work can be terminated?			
Are you aware that you should never put yourself or coworkers in danger and that, if you feel threatened, you should withdraw from the lone work situation immediately?			
Do you believe management would support your decision to withdraw from lone work if unsafe to proceed?			
Regarding lone work, do you have a clear understanding of your own work responsibilities as well as your supervisor's responsibilities?			

Date: _____

Name: _____

Department/work site: _____

Additional related comments for OSH director: _____

Note. Adapted from "Improving Safety for Lone Workers: A Guide for Lone Workers," by NHS Employers, 2013.

to low lighting or temporary access equipment such as portable ladders that one person would have difficulty handling).

7) Identify machinery associated with the lone work that one person cannot operate safely due to size, complexity or risk. Is machinery involved in the work that could result in an SIF to the lone worker in the event of equipment malfunction or operator error (e.g., chain-saws, lathes, circular saws, firearms, forklift, grinders, welders)?

8) Determine whether hazardous chemicals are being used that may pose an SIF risk to the lone worker.

9) Establish whether the lone work involves lifting objects too heavy for one person. A debilitating back injury from unsafe lifting could adversely affect the lone worker's ability to exit a workspace or safely operate a vehicle.

10) Verify whether a risk of workplace violence exists.

11) Determine any reasons the individual may be more vulnerable and particularly at risk if working alone (e.g., underage, disabled, female, pregnant, trainee).

12) Evaluate whether any language barriers exist between lone workers, supervisors and emergency responders.

13) Assess whether the lone worker is exposed to severe weather when working outside (e.g., hot or frigid temperatures, tornados, heavy snow, high winds, lightning).

14) Seek medical advice and consider whether the employee is medically fit to safely work alone (e.g., consider both routine work and foreseeable emergencies that may place additional physical or mental burdens on the lone worker).

Recognize that some tasks may be too difficult or dangerous to be completed safely by an unaccompanied worker. If the risks of a task cannot be suitably controlled by a lone worker, it becomes a prohibited task.

Risk Controls Over Lone Work

Once lone work tasks are identified and assessed, effective risk controls should be applied. With contributions from current sources (CCOHS, 2018; Hendrix, 2017; Washington State Department of Labor & Industries, 2010), the author presents the following risk controls for consideration and possible utilization by OSH professionals. The seasoned professional will likely notice several of the suggested risk controls may also apply to all workers, not just those working alone. They are provided here, as noted, because working alone can increase the severity and likelihood of some workplace hazards or risks occurring

HIERARCHY OF RISK CONTROLS FOR LONE WORK

In selecting suitable risk controls over lone work potentials, consider the following eight-step risk treatment hierarchy in the order presented (Bird, Germain & Clark, 2003; OSHA, 1993).

- 1) Avoidance:** Involves preventing the hazard from occurring, possibly by engaging prevention through design risk analysis for new operations or utilizing management of change risk analysis when contemplating modifications to an existing process, procedure, service or product.
- 2) Elimination:** Involves removing the hazard altogether, such as by eradicating dangerous machinery, modifying workstations or moderating temperature extremes.
- 3) Substitution:** Involves replacing the material/process with something less hazardous, such as replacing 175-lb extension ladders with 55-lb replacements or substituting a flammable cleaner with a higher flash point product.
- 4) Engineering controls:** Involves job modification by the use of new or modified tools, workstations, equipment and environmental controls.
- 5) Warnings:** Involves alerting workers to the hazards via signs, audible alarms, training and verbal instructions.
- 6) Administrative controls:** Involves changing work processes such as job rotation, workload distribution, lone work personal monitoring devices, work schedule changes and developing lone work OSH procedures.
- 7) Behavior-based controls:** Involves modification of safe work behaviors such as having employees perform warm-up exercises, maintaining a positive diet and sleep regime, defensive driving, and striving for proper work postures and material handling techniques.
- 8) PPE:** Involves providing the lone worker with equipment such as eye/face protection equal to the hazard, gloves, thermal clothing and arc-flash coveralls.

(WorkSafe Victoria, 2017). As in most risk reduction efforts, a combination of risk controls is typically most effective in preventing loss by providing layers of defense.

1) Prohibit lone work with SIF potential when the risk assessment demonstrates that it is impossible for the work to be conducted safely by a lone worker (e.g., rearrange work schedules so otherwise lone workers are not required to work alone, implement a buddy system to provide help or backup personnel).

2) Engineer out identified hazards of lone work with SIF potential (e.g., purchase/maintain safer motor vehicles, provide guarding on power tools).

3) Train lone workers to conduct task hazard analyses prior to engaging in lone work to verify current risk controls are adequate.

4) Provide adequate instruction, training and supervision regarding the hazards and related risk controls over lone work (e.g., safe motor vehicle operator training, daily safe work plans, periodic check-ins).

5) Inform other affected employers of the risks and required control measures undertaken over lone work (e.g., when a lone worker is engaged at another employer's workplace, host employers should require visiting contract employers to assess and control the risk of lone work to their workers).

6) Substitute acutely toxic chemicals used during lone work with less hazardous products and lesser quantities (e.g., replace a product containing a flammable aerosol propellant with another having nonflammable tetrafluoropropene, substitute 1-gallon flammable safety cans for current 5-gallon cans).

7) Formalize a prearranged check-in process to periodically account for lone workers at intervals appropriate to the risk of the task (e.g., typically every 1 to 2 hours). Implement an overdue employee procedure to respond when a lone worker who fails to check-in.

8) Support a preventive and predictive maintenance program to ensure the reliability of safety-critical equipment related to lone work (e.g., motor vehicles, GFCI-protected portable generators).

9) Implement a workplace violence prevention program to ensure that lone workers are adequately protected (e.g., situational awareness training for assault/robbery/active shooter threats, verbal de-escalation techniques).

10) Implement an occupational fatigue exposure control program to ensure that lone workers are adequately rested.

11) Ensure that lone workers are fully trained in existing emergency preparedness procedures, current in their certification for first aid, CPR and self-rescue, and verify that a comprehensive first-aid kit is fully stocked to the potential hazards and available on site.

12) Develop a daily safe visit plan for lone workers entering an alternate setting to provide services (e.g., private residence, remote clinic).

13) Develop lone work OSH procedures for lone work deemed low-risk and communicate same to affected workers to ensure their safety and health during these activities.

14) Implement a lone worker health surveillance process, wellness function and company-wide total worker health program (e.g., pretask stretching, employee assistance program).

15) Require lone workers to report any loss event or near-hit occurring during lone work to ensure full OSH consideration, investigation and transparent corrective risk controls to prevent recurrence.

16) Provide a complete version of the employer's occupational health and safety management system (OHSMS) to lone workers for unfettered access, in hard copy or electronic version.

17) Employ lone worker monitoring technology (e.g., supervised personal monitors, local panic alarms for violent attack).

18) Ensure that the work site is accessible to emergency re-

sponse personnel (e.g., accomplish emergency preplanning, Knox boxes to allow EMS after-hours access).

19) Verify that allowances have been developed to achieve emergency communications with non-English-speaking lone workers.

20) Perform a management of change risk analysis for lone work potentials when a significant change is planned in a working practice.

21) Perform a prevention through design risk analysis for exposures to working alone whenever a new product, service or hard site is under consideration.

22) Reduce cost-cutting efforts within the company that result in increased risk to lone workers or the generation of more employees at risk for lone work.

23) Communicate to all employees that they have the right to refuse to work alone if they feel their personal safety is in jeopardy.

Again, some tasks may be too difficult or dangerous to be completed safely by an unaccompanied worker. If the risks of a task cannot be suitably controlled by a lone worker, that task becomes a prohibited task.

Supervision of Lone Workers

The extent of supervision required for lone workers depends on the risks involved and the maturity and ability of the individual to identify and handle OSH issues. The level of supervision needed is a management decision that should be based on the findings of the risk assessment (e.g., the higher the risk, the greater the level of supervision required). It should not be left solely to lone workers to decide whether they need direction or assistance. When a worker is new to lone work assignments or undergoing training for same, it is advisable for the individual, upon first beginning his/her job duties, to be accompanied by a qualified mentor.

Monitoring Lone Workers

Just as effective means of communication within the OSH profession and top management are essential for reduced risk, procedures should be emplaced to maintain communication with lone workers. This is accomplished by monitoring or tracking.

The employer is required to provide an effective emergency response to a lone worker in the event of a crisis. If monitoring is ineffective, the ability to respond successfully is diminished. Current regulatory requirements pertaining to the frequency of lone worker monitoring or tracking are generally not helpful. This may be due to the complexity of assessing the risk of various lone work tasks and the varying competence of the affected lone worker. For example, in its shipyard regulation OSHA (2013) outlines that employers must account for workers by sight (e.g., camera or in-person) or verbal communication from both parties (e.g., two-way radio, in-person, intercom system).

Employers should require lone workers to periodically check in with their supervisor to verify they are safe and to obtain any work-related instructions or guidance. The potential shortfall of this method is that the supervisor may not learn of a lone worker's injury or unresponsiveness for several hours. This delay could be disastrous. For most lone work, a landline or cell phone will be the primary tool for communication and monitoring. If cell phones are contemplated for monitoring, they may only be considered if the reception is guaranteed. If cellular service is unreliable, other technologies must be arranged. Methods of communication unacceptable for lone worker monitoring include the sound of power tools, whistling, or tapping on tank walls, bulkheads or decks (OSHA, 2013).

As it is the employer's responsibility to protect and monitor its workforce, possible monitoring options and procedures may include the following.

1) Require lone workers to submit a daily safe work plan so the supervisor knows where they will be and when, including

FIGURE 2
SAMPLE LONE WORK OSH PROCEDURE

Lone Work OSH Procedure for _____ (Task)

Work site: _____

Lone work OSH procedure: _____

Identified lone work risks	Corresponding lone work risk controls
1)	1)
2)	2)
3)	3)
4)	4)

Working Alone Contact Information (To be completed by each work site with lone employees)

Primary contact	Office telephone	Mobile telephone	Location
Emergency contact	Office telephone	Mobile telephone	Location

Frequency of call-in contacts with supervisor _____
 Maximum allowable timeframe between call-ins _____

Lone work monitoring device in use? Yes Model _____ No

Task Hazard Analysis: The lone worker is directed to conduct a task hazard analysis (THA) prior to initiating this lone work. The THA is to identify any additional hazards and implement suitable risk controls. Contact your supervisor if you have any doubts or questions.

or health condition. This allows the monitoring center to initiate delivery of emergency response to the lone employee's exact location. The alarm devices may also be activated automatically via fall detection, no-motion/man-down detection or if the employee fails to check in. Some monitoring systems can capture audio from the field to gauge the degree of risk to the lone worker and for law enforcement to use in subsequent investigations. Also critical is the fact that most monitoring systems can verify that the lone worker has completed his/her task or returned to base.

Great Britain's National Health Service (NHS Employers, 2013) alone funded 30,000 lone worker personal monitoring devices for its medical workers in the field in 2009. These monitoring technologies can dramatically reduce emergency response time and provide precise lone worker location for EMS response. These outcomes are far superior to the traditional check-in process considered by some employers. This trend in electronic lone worker monitoring is predicted to increase as OSH professionals educate management teams in the risk of lone work.

Training

According to Washington State Department of Labor and Industries (2010), "Training is particularly important where

there is limited supervision to control, guide and help in uncertain situations." Training is fundamental in enabling workers to cope with unexpected circumstances, emergencies and exposure to workplace violence potentials. Lone workers may be unable to ask more experienced colleagues for help, so extra training may be appropriate (Washington State Department of Labor & Industries, 2010). Lone workers must be mature, sufficiently experienced, medically fit and acutely aware of the risks and precautions involved with their work responsibilities and the physical locations they operate in. They must display competency in both their trade and in their OSH compliance.

Through the risk assessment process, the employer should set the limits to what low-risk work is permitted while working alone. The lone work OSH procedure is a requisite and should be communicated to all affected lone workers. Much like a JHA, the lone work OSH procedure would also contain the obligatory check-in procedure with required contact personnel and related timing. Job tasks not assigned a lone work OSH procedure should be deemed prohibited tasks for lone work. A sample procedure is provided in Figure 2.

The employer must also ensure that lone workers are qualified and competent to deal with the requirements of the job and that they can recognize when to seek advice from a supervisor. Related training should be provided to affected lone workers prior to the assignment of duties and periodically thereafter. Should the lone worker's supervisor suspect that additional retraining is necessary due to a work-related observation, said training must be conducted.

Consider what happens if a lone worker becomes ill, has a loss incident or an emergency arises. The hazard risk assessment should identify these predicted loss potentials. Related emergency procedures should be developed and affected employees should be trained

remote site contact information, mode of travel, alternate plans in the event of an emergency, and possibly a code word to be utilized to identify or confirm that aid is needed.

- 2) Deploy supervisors to periodically visit and observe employees working alone in real-time.
- 3) Provide the lone worker with a functional, fully charged cell phone or radio that is to remain on his/her person during working hours.
- 4) Establish prearranged intervals of regular check-in contacts between the lone worker and the supervisor, using telephones, radios, monitors, text or e-mail.
- 5) Identify the primary supervisory contact person, plus one backup individual, with office and mobile phone numbers.
- 6) Clearly explain the employer's open-door policy, whereas the lone worker feels completely comfortable in contacting his/her supervisor at any time during lone work.
- 7) Deploy monitored camera systems or intercom devices to verify lone worker safety.
- 8) Implement an effective system to ensure that a lone worker has returned to his/her base or home once the lone work is completed.
- 9) Provide functioning smoke/fire/carbon monoxide detection within buildings where lone work occurs, connected to central-station monitoring.
- 10) Utilize manually operated or automatic lone worker personal monitoring devices that trigger a supervised signal as necessary (Washington State Department of Labor & Industries, 2010).

Employee lone work monitoring products, such as smartphone applications and wearable technology, are available to monitor lone workers and alert monitoring personnel when an OSH incident is developing or has occurred. These devices may utilize a global positioning system (GPS) or geolocation process, and allow the lone worker to manually activate a body-mounted alarm device to notify a monitoring location if s/he senses a threat or has suffered an injury

and drilled in same. Information regarding emergency procedures is typically found within the OHSMS provided to lone workers. Lone workers must possess current first-aid training equivalent to the hazards encountered and have easy access to suitable first-aid kits. Should the lone worker be severely allergic to insect bites, suitable allergy response supplies are necessary for the first-aid kit. Lastly, the lone worker may require an adequate level of training in communication systems repair, vehicle breakdowns, relevant administrative procedures and outdoor survival (CCOHS, 2018).

Annual Audit

As part of the employer's plan-do-check-act cycle, the effectiveness of the WASP must be periodically audited and evaluated by an authorized employee other than one utilizing the program being audited. Any deviations or inadequacies must be documented, risk scored and scheduled for correction. It is recommended that 50% or more of affected employees be interviewed during this audit process. This is often best accomplished during a refresher training session in which all affected employees review the WASP parameters. The lone work OSH perception survey may also be redeployed.

In determining the effectiveness of the WASP, the auditor should review changes to the work site or related OSH procedures, assess whether any loss events have occurred in which lone work played a role as a primary causal factor, and monitor applicable lone work regulations and industry best practices for potential enhancement of the program.

Prohibited Jobs Tasks for Lone Workers

Reducing or eliminating risk is the primary objective of every OSH professional. The subject under review is well suited to the recommended risk controls noted. In addition, the author and forward-thinking organizations (CCOHS, 2018; University of Texas at Dallas, 2012; Washington State Department of Labor & Industries, 2010) have identified the following high-risk (i.e., SIF-potential) activities where at least one other qualified worker is required to be present.

- Any work task for which the lone worker has not been adequately trained per the OHSMS and the applicable lone work OSH procedure.
- Working in a permit-required confined space.
- Working at elevations over 4 or 6 ft without proper fall prevention (e.g., standard railing system).
- Working at elevations over 4 or 6 ft while donning personal fall arrest equipment.
- Working with flammable gases, vapors, mists or flammable liquids in excess of one safety can.
- Performing lockout/tagout.
- Any job tasks for which the lone worker's preexisting medical conditions may elevate the risk.
- Working at or near exposed live electrical conductors greater than 50 V.
- Any job task within an atmosphere immediately dangerous to life or health requiring the use of atmosphere-supplied or self-contained breathing apparatus respirators (e.g., firefighting, HazWOPER).
- Working with materials under dangerous pressures.
- Working with hazardous chemicals (i.e., acutely toxic) capable of causing burns, blindness, incapacitation, death or explosion.
- Working in the health, retail or social care sector when dealing with unpredictable client behavior and situations with related workplace violence history or potentials.

- Working on or over water having the potential for drowning.
 - Working when a hot work permit or line break permit is required.
 - Working with powered equipment capable of causing severe injury from lacerations, punctures, impalement or burns (e.g., chainsaws, firearms, grinders, powder-actuated tools, circular saws, arc welders, oxyacetylene torches, plasma welders).
 - Performing wet chemical manipulations within a chemical laboratory.
 - Working in an excavation 4 ft or deeper.
 - Crane and heavy equipment operations having possible contact with overhead electrical lines.
 - Working with boots-on-pavement adjacent to live motoring traffic streams.
 - Scaffold erection, use or dismantling.
- Other job tasks not listed may also require two or more persons based on an employer's risk assessment.

Conclusion

Lone work during high-risk job duties presents an unacceptable risk level to workers. U.S. employers and OSH professionals should not await full regulatory action by OSHA to protect affected employees. Rather, they should assess the hazards of their operations for SIF potentials involving lone work and reduce the related risk by implementing the risk controls provided here and typically found in a working alone safety program. **PSJ**

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