Minimal staffing and lone working: ensuring employee safety and wellbeing in the power sector

energy institute

MINIMAL STAFFING AND LONE WORKING: ENSURING EMPLOYEE SAFETY AND WELLBEING IN THE POWER SECTOR

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FOREWORD

Minimal staffing and lone working are common in the energy sector; for example, gas engineers in the utilities sector, and likely to become more common with the move towards more distributed forms of power generation, including battery storage, onshore and offshore wind, and solar.

While minimal staffing can bring its own benefits in terms of limiting exposure of hazards to large numbers of people, it also presents a large number of challenges that should be managed in order to protect employees. Lone working presents risks to physical and mental wellbeing of employees, and presents challenges to how these risks are usually managed when employees work in larger teams. For example, in lone working scenarios, employees supervise their own work, are at risk of threatening behaviour by others, often have roles involving a lot of driving (and to remote locations), and have little back-up in case of emergency response.

This publication provides good practice guidance to help organisations manage the risks of lone working. The publication covers when lone working should be avoided, and provides guidance on various topics that are common to most lone working scenarios, including risk management, competence, supervisions, monitoring and communications, wellbeing, fatigue, maintaining focus, driving, personal security, safety culture, and emergency response. This publication also provides a simple checklist for organisations to help ensure these issues have been effectively considered.

This publication is aimed at those who manage employees who work alone, or in minimal teams.

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1 INTRODUCTION

The EI's Power Systems Committee (PSC) identified the need for practical guidance for the power sector covering lone and minimal staff working. Whilst such working arrangements are familiar to the sector, the need for guidance has been hastened by an anticipated growth in small-scale generation, renewables, and battery storage sites, and with it an increase in the amount of lone and remote working[1].

1.1 PURPOSE OF PUBLICATION

This publication should help organisations understand, and overcome, the challenges posed by minimally staffed power assets, remote and lone working. The guidance aims to:

- raise awareness of the key hazards and issues amongst companies;
- enable companies to identify effective approaches to address the hazards and issues that are relevant to them, and
- help companies realise the benefits that come from a well-orchestrated approach to minimally staffed assets.

1.2 OVERVIEW OF PUBLICATION

The publication is topic-based, starting with an overview of the risks involved and the broader safety management aspects, including a set of principles for managing lone working risk (section 2). Each section then focuses on a specific topic:

- Section 3: Competence management.
- Section 4: Supervision, monitoring and communication.
- Section 5: Wellbeing.
- Section 6: Fatigue and fitness-to-work.
- Section 7: Maintaining focus.
- Section 8: Driving safety.
- Section 9: Personal security.
- Section 10: Safety culture.
- Section 11: Emergency response.

The focus across these topics is on the lone and minimally staffed working issues, with the intention that readers can identify measures they are able to integrate into their organisations' existing approach to safety management. The guidance does not advocate a standalone safety management system for lone working. Section 12 includes a topic-based checklist which serves as a useful tool, and which helps consolidate guidance in one place.

1 At the time of writing (Autumn 2020), the coronavirus pandemic has heightened the need for, as well as people's experiences of, lone working, therefore underlining the need for guidance.

1.3 SCOPE OF PUBLICATION

According to the Health and Safety Executive (HSE) guidance INDG73 *Protecting lone workers – how to manage the risks of working alone,* a lone worker is:

'*someone who works by themselves without close or direct supervision*'.

The scope of this publication is a little broader, as it covers situations where several workers might interact together, perhaps at the beginning of a shift, or when performing critical tasks or when attending essential meetings, but otherwise they spend most of their working time alone. Also included are occasions where workers are alone even for very short periods, as are situations where support is provided remotely, using collaborative technologies. Arrangements covering home working are not explicitly covered by the publication.

2 LONE WORKING RISKS AND SAFETY MANAGEMENT

This section sets out some of the terminology, types of work, locations, risks, and controls associated with lone working.

2.1 TYPES OF WORK AND LOCATIONS

The scaling-back of some power generation sites, and the growth in the number of smaller battery storage sites means that companies are increasingly responsible for a greater number of sites with reduced, or no, permanently stationed personnel. These may be monitored remotely, staffed occasionally, and are sometimes in difficult to reach locations.

The size of sites can vary significantly from relatively small defined battery storage sites to very large gas storage facilities covering many acres. Such sites pose different challenges when it comes to monitoring personnel whereabouts, personal security, and workplace transport.

Lone working is used on a wide range of activities. Common examples include: inspection; simple maintenance tasks; operating equipment in the field (for example, turning valves), and 'call out' response. Road driving is also a feature of many lone working scenarios.

2.2 LONE WORKING RISKS

The flexibility that lone working offers means that companies can operate more sites with greater effectiveness and efficiency. Doing this well depends on understanding and managing the risks that lone workers may face:

– Safety – lone working has the potential to compound both normal occupational safety risks (such as slips, trips and falls) and more technical safety issues (such as loss of containment, electrocution, etc.). Vehicle accidents are a major cause of harm to lone workers, both on- and off-site.
– Health and wellbeing – isolation, loneliness and stress associated with being the main responsible person. This also includes exposure risk from extreme environmental conditions.
– Personal security – assault and verbal threats from site trespassers, road users and neighbours.

There are a range of factors that can increase lone working risk, as illustrated with the following examples:

– Remote supervision and monitoring – lone working can make it harder to do normal management tasks such as: competence assessments; setting expectations; work checks; progress reviews; wellbeing checks; failure investigation, and fault-fixing. Therefore, there is greater reliance on self-supervision amongst lone workers.
– Fatigue – has a wholesale negative affect on cognitive and physical performance. Lone working often means: not having others to intervene and help; it can be harder to take breaks; more driving, and limited access to welfare facilities.

– Difficulties in maintaining focus – working alone requires a high level of focus and concentration. Losing focus can lead to errors, such as missing defects, or failing to notice a worsening situation.
– Safety culture – there may be a temptation to take shortcuts because no one is watching, or because the job cannot be safely done alone.
– Delays to emergency response – if the lone worker is incapacitated, or if they are in a distant or hard-to-reach location.

It is important to note that lone working can help reduce risk by having fewer people that can be harmed, and less opportunity for direct interpersonal conflict and horseplay. There is also a reduced scope for peer pressure and other damaging social processes, such as group think (where people do not speak up), or diffusion of responsibility (where individuals do not take ownership for decisions).

2.3 PRINCIPLES FOR MANAGING LONE WORKING RISK

Many companies have their own rules of thumb relating to lone working. These have been summarised as a set of principles, as follows:

1. **Reduce or eliminate lone working** – review options for the task to be performed remotely, or when there is a team on-site.
2. **Apply a formal organisational change process** – when moving from accompanied forms of working to lone or minimal staffing, it is key that safety, health, wellbeing and security issues are managed. HSE's guidance *Organisational change and major accident hazards* provides an overview and HSE's long-standing safe staffing method *Assessing the safety of staffing arrangements for process operations in the chemical and allied industries* may apply for larger changes.
3. **Target lone working for simpler lower-risk activities** – risk assessment is key to decide how to proceed. Effective work planning and training can help lone workers maintain control of the plant and avoid hazardous situations from developing.
4. **Schedule outdoor work to take place when environmental conditions are likely to be favourable** – ideally during daylight, when it is dry, and windspeed is low. To reduce risks posed by poor winter conditions, some companies target planned maintenance for the summer months.
5. **Support your workers** – stay in regular spoken contact with lone workers. Emphasise they have the authority to stop the job if they feel something is not right, and will be treated fairly if they use it. Make sure that they have the necessary lone working skills.
6. **Use technologies that help live collaboration** – keep workers and the company in contact, including monitoring technology that alerts if a person may be incapacitated, or in need of emergency assistance.
7. **Test your emergency response** – to help demonstrate that it can work in practice, and check that personnel can administer first aid effectively.

2.4 RISK ASSESSMENT

Many companies have a standard or procedure on lone working which sets out their arrangements for risk assessing lone work; these should be consistent with HSE's guidance on lone working, INDG73 *Protecting lone workers – how to manage the risks of working alone*. The following example is a four-step process used by a major energy company:

1. Identification of lone or remote working activities.
2. Risk assessment of all lone or remote working activities.
3. Identification and implementation of effective control measures from the risk assessment.
4. Conduct periodic audits and inspections of work activities (see section 4).

These are covered in the following subsections.

2.4.1 Identification of lone or remote working activities

Having a list of tasks that lone workers can perform is a vital first step. Such a list can also be used to check the completeness of existing site risk assessments. A list of site-specific lone working activities may be identified from the following sources:

- previously published lists of lone work tasks;
- existing task risk assessments;
- operating manuals and procedures;
- maintenance procedures;
- planned maintenance routines;
- jobs in a permit-to-work system, and
- barriers identified using a process safety methodology.

Experience has shown that operations and maintenance managers familiar with the site will be comfortable reviewing procedure titles and task lists whilst asking 'what lone working can take place when doing this?' Input from workforce representatives will help ensure a complete list of activities is identified for risk assessment.

Many lone working tasks and risks are common across sites, so it makes sense to pool information. The common risks and control measures identified by a large power company are reproduced in Annex A.1. These, along with other common tasks, have been consolidated as 'activity groupings', which can be used as a set of prompts to identify cases where lone work may take place:

- cleaning;
- security;
- driving to, and on, site;
- walking and cycling on site;
- loading/unloading vehicles (manual handling);
- contractors;
- vegetation and arboriculture work;
- workshop environments;
- warehouse and storage;

– electrical work;
– building maintenance, and
– process activities, including checks, inspection, sampling, turning valves, testing, assembling equipment, overrides, and inhibits.

2.4.2 Risk assessment of lone or remote working activities

According to HSE, in the UK (for example) a separate standalone risk assessment for lone working is not required; the analysis can be incorporated into existing risk assessments. For example, some companies insert a column into their current risk assessment template to indicate whether the assessment relates to a lone working scenario. To cover lone and accompanied working, a task might need to be assessed twice.

To help support its risk assessments, one company developed a set of considerations for lone worker risk assessments as follows:

– Take account of the specific legal requirements for lone working (reproduced in Annex A.2 of this document).
– Take account of normal working conditions and foreseeable emergencies, such as fire, equipment failure, illness, and accidents.

Establish whether:

– the workplace, work equipment or work activity presents any special risk to the lone worker;
– there is safe, properly lit access and exit for one person;
– one person can handle temporary access equipment such as ladders and trestles;
– work methods can be changed or an effective way established to provide help when needed if the plant, substances or goods cannot be safely handled by one person;
– help is needed for lifting heavy objects;
– more than one person is needed to operate essential controls for the safe running of equipment;
– there is a risk of violence;
– the person is medically fit – seek medical advice if necessary and do not overlook foreseeable emergency requirements which may place extra physical and mental burdens on the individual, and
– there are additional risks to 'vulnerable groups', e.g. young persons, pregnant workers, etc.

Assessment of medical fitness should also include a medical assessment of the risk of a sudden loss of consciousness, incapacitation, rapid onset balance or coordination loss, or a sudden reduction in cognitive abilities. Such assessments should be performed under the supervision of a qualified occupational health physician.

2.4.3 Identification and implementation of effective control measures from the risk assessment

Throughout this publication there are examples of risks and control measures that can be incorporated into risk assessments. However, when judging the suitability of risk controls, the following questions can help determine their availability and effectiveness:

– If reviewing an existing risk assessment, do previously identified control measures assume that workers operate in the presence of others?
– Can control measures be implemented in a lone working scenario, or are updates necessary to ensure the control will be available? Or, are alternative measures required?
– In upset conditions, can all the actions required by a lone worker realistically be performed within an acceptable time frame?
– Is lone worker incapacitation considered when reviewing the availability of risk controls?

2.5 SITE DOCUMENTATION

As well as an organisation standard on lone working, there are other site documents that are relevant. A large energy company has the following key documents in place for its sites:

– Description of site information. Covering site layout, key roles, core processes/ activities, hazards and controls, facilities, etc. An example document contents list can be found in Annex A.3. This is especially useful to lone workers who attend many similar sites and need to orientate themselves quickly.
– Lone worker site access document. Including an entrance checklist that covers: names; purpose of visit; communication system; check-in frequency; expected time on site; measures to take if no contact; access codes, and phone numbers.
– Site emergency response procedure. Including both the response and the drills that are performed.

3 COMPETENCE MANAGEMENT

Compared to those working with others, there can be advantages to having additional skills to cope with the demands of lone working. This section considers what the competence management system should cater for when it comes to lone working. The areas discussed here include non-technical skills, training and assessment, and ongoing competence management.

3.1 NON-TECHNICAL SKILLS AND LONE WORKING

Working alone for extended periods may require a different skill set to those who spend time accompanied and under supervision. Higher levels of self-supervision and self-reliance are often needed, and these are examples of so-called non-technical skills (NTS). NTS are the hidden skills used to avoid and catch errors, and they differ from technical skills. According to a definition used across several sectors, NTS:

> '*…are the cognitive, social and personal resource skills that complement technical skills, and contribute to safe and effective task performance*'
>
> (Flin, Connor and Crichton, 2008)

NTS are important as most incidents can be linked to NTS shortcomings. NTS also have greater significance when working alone, as it is harder to independently supervise, guide, and check work. Instead, this tends to rest with the lone worker, and their own skills.

To illustrate the importance of NTS, consider the following example. The inspection of a bridge requires knowledge of its construction, foundations, maintenance history, materials, and where signs of possible weakness such as cracking may be found; these are technical in nature. However, NTS relate to how someone does that task: for example, is a cursory glance all that is given? Or does someone take measurements and compare with earlier data and photographs to identify changing conditions? Doing this job thoroughly requires NTS such as good attention to detail and adopts a systematic and thorough approach.

There are various lists of NTS in use in the oil and gas, aviation, medical, and rail sectors, and Table 1 contains a comprehensive set identified for predominantly lone safety critical workers in the rail sector.

Selection, training, and development activities are the main ways to embed NTS in the workforce. To achieve this means integrating NTS into the competence management system and there are several ways to do this; the example process shown in Annex B.1 is used in the rail sector. Most companies confirm it can take two to three years to embed NTS, as it requires ongoing reinforcement and regular reminders before the skills become second nature.

Annex B.2 has an illustrative example of the NTS identified for someone that undertakes gas main and service repair work. The example looks at some of the technical tasks identifiable from company procedures, and identifies the associated behavioural indicators and NTS.

Table 1: NTS list (reproduced from Association of Train Operating Companies (ATOC), GN019)

NTS category	NTS skill
Situational awareness	– Attention to detail – Overall awareness – Maintain concentration – Retain information (during shift) – Anticipation of risk
Conscientiousness	– Systematic and thorough approach – Checking – Positive attitude towards rules and procedures
Communication	– Listening (people not stimuli) – Clarity – Assertiveness – Sharing information
Decision making and action	– Effective decisions – Timely decisions – Diagnosing and solving problems
Cooperation and working with others	– Considering others' needs – Supporting others – Treating others with respect – Dealing with conflict/aggressive behaviour
Workload management	– Multitasking and selective attention – Prioritising – Calm under pressure
Self-management	– Motivation – Confidence and initiative – Maintain and develop skills and knowledge – Prepared and organised

3.2 TRAINING AND ASSESSMENT

Most companies will operate a competence management system that covers the training and assessment of lone workers. To check how well your approach works for lone and minimally staffed assets, compare it to the following characteristics that experience has shown to be important. Does the competence management system:

1. Have a period of shadowing where trainees can watch tasks being done correctly and practice them?
2. Provide opportunity for trainees to visit the different types of location where they will work?
3. Give priority to learning critical tasks, such as emergency response?
4. Cover NTS training?
5. Encourage trainees to gradually perform more tasks themselves, with decreasing levels of supervision according to the level of support the trainee needs?
6. Allow employers and trainees to have sufficient time to build confidence, or is the emphasis on getting individuals through the training so they can be 'productive'?

7. Have an assessment scheme that clearly indicates which tasks the employee can perform alone?
8. Have a system for ongoing competence monitoring when personnel are working alone?

Some of these characteristics can be seen in the following case study of the training arrangements in place at a large company providing hydroelectric power.

Training and assessing lone workers at a company providing hydroelectric power

Lone working is not permitted until the trainee completes a training and competency assessment process, and is signed off as competent. A bespoke process has been developed for each role and trainees are issued with a booklet that gives detail about the job and how tasks are to be done.

Training for a field operator who attends site, such as reservoir dams to operate pumps, valves, perform inspections, clean water filters, etc. can be as short as six months for internal transfers, lasting up to 12 months if there are more sites and tasks to learn. During this period trainees would start by observing and providing 'an extra pair of hands', after three to six months they would perform more tasks by themselves, but under the supervision of a nominated 'buddy' (an experienced operator). Training would start with safety critical activities, such as operating a flood gate or dealing with a fire incident, before moving to the day-to-day tasks.

When the trainee and supervisor believe they are ready, a formal competence assessment would take place in line with the normal company process. Only then would the employee attend the site alone and perform tasks within their job role. The trainee would then join the company's formal three-yearly competence assessment process.

Some aspects of lone working are covered with a formal certification scheme, provided by a nationally recognised awarding organisation such as City and Guilds. These qualifications cover detailed skills required by a job and sector, rather than offering general certification in lone working. Companies should still perform their own competence assessments to cover the specific activities that a role holder needs to be able to perform.

3.3 ONGOING COMPETENCE MANAGEMENT

Skill and knowledge fade can be significant issues for lone working. Where locations are visited rarely, and tasks are performed infrequently, there is a risk that someone may find themselves in a difficult or unfamiliar situation. Formal periodic competence assessments should explicitly cover infrequent tasks and locations. On a day-to-day basis, competence issues might be picked up by a supervisor, perhaps after they ask the role holder to talk them through an unusual assignment, or when an employee flags concerns they have. These interactions do not have to happen face-to-face, but could occur using mobile phones or on video conferencing. However, the benefit of these discussions relies upon having a trusting and supportive atmosphere where such issues can be raised, rather than personnel just 'carrying on'.

Where a competence shortcoming has been identified as an issue, perhaps after an incident or assessment, the focus moves to rebuilding confidence and competence. Development activities such as additional shadowing, instruction and support may be all that is required. Check whether the competence issue is just a one-off occurance, or indicative of a wider workforce or lone working problem requiring attention. Adopting a fair and positive

approach to development work will help someone engage and respond positively to the process. Following development work, it is good practice to perform a targeted reassessment to demonstrate the process has worked and can be closed.

3.4 FURTHER INFORMATION – COMPETENCE

International Association of Oil and Gas Producers (IOGP) has produced relevant publications on NTS and the related topic of crew resource management:

- IOGP 501 *Crew resource management for well operations teams*;
- IOGP 502 *Guidelines for implementing well operations crew resource management training*;
- IOGP 503 *Introducing behavioural markers of non-technical skills in oil and gas operations*, and
- IOGP 509 *The use of behavioural markers of non-technical skills in oil and gas operations: supporting material*.

The EI has also produced guidance on crew resource management training: *Guidance on crew resource management (CRM) and non-technical skills training programmes*.

4 SUPERVISION, MONITORING AND COMMUNICATION

The very nature of lone working means that face-to-face, managerial, or supervisory support is harder to provide on a day-to-day basis. Minimally staffed assets can also experience similar issues. Ensuring people are working safely and effectively all of the time, whilst not being able to see those people at work, is a significant challenge.

A lack of management visibility may also start to disrupt an otherwise positive safety culture. A key component of culture is leaders behaving in a way that supports the messages they espouse; in other words, are they 'walking the talk'? Providing workers with the opportunity to observe their superiors' behaviour therefore helps them to develop a real understanding about how they operate. So, how do you ensure sufficient management visibility for lone workers in order to contribute to a strong culture?

Aside from the behavioural and cultural impact, the challenge for workers is also to remain motivated, informed, and confident in what they are doing technically. They should practice evaluating their own work without the insight or fresh perspective of a senior or peer.

4.1 STAYING IN CONTACT

Even when geographical distance is a barrier, it is still important to keep in touch with workers via phone calls, video conference, or text-based communications (e.g. email, instant messenger, etc.). On a long night shift, receiving an informal call from a manager asking how they are shows that they care, which can positively contribute to morale, motivation, focus, productivity, and ultimately safety, in much the same way as supervising or monitoring in person.

From time to time, it is advisable to visit lone workers in the field to inspect their work. As face-to-face contact time is less frequent when workers operate alone, it is important to be mindful about the significance of personal contact time when it does happen. To avoid this being received negatively, visits should be done in the right way. Emphasise that you are checking that they have received the right training and support, and that you are keen to better understand their working environment and the challenges faced by lone working; also ask about any particular issues they have experienced. Ultimately the experience should be fair: allow workers time to say what they think and what they might be concerned about – keep the dialogue open, pragmatic and non-judgemental.

Safety leadership in the field. The EI provides useful guidance on the topic of supervisors taking time to actively listen to workers in the field and encourage them to talk more openly about a problem or concern whilst managers provide constructive, non-punitive support. See here for more: https://toolbox.energyinst.org/c/videos/safety-leadership-in-the-field

'Toolbox talks' (job briefings, etc.) may traditionally be delivered face-to-face, but video conference also works, allowing multiple workers to join in from different locations. Toolbox talks may also provide a natural opportunity for managers to check in on wellbeing and whether there are any difficulties, etc.

4.2 JOB DESIGN

Sometimes critical equipment, plant infrastructure, or site areas are only seen by one person for weeks at a time. This can mean that small changes or emerging defects are not noticed as the change each day is so small, or changes are not perceived by that individual to present a risk. One way of mitigating against this would be to consider job rotation to ensure a different person inspects assets so that there is a fresh pair of eyes looking at the situation to help identify any potential weaknesses.

Another way of designing the job to help combat emerging defects is mandated cross-checking of work. For example, for certain tasks it might be stipulated that work needs to be cross-checked with a peer or senior. Using mobile technology (e.g. video conferencing, photographs, etc.) is one way of overcoming the challenge of doing this when people are working alone, or on minimally staffed assets.

Chevron start work checks app. Chevron have introduced the app as 'a mobile verification tool designed to help field workers confirm appropriate safeguards are in place and 'Save Your Life Actions' are completed immediately prior to the start of high-risk work activities. The app supports overall efforts to eliminate serious injuries and prevent work-site fatalities'. The tool is available from online app stores.

4.3 REMOTE AND MOBILE COMMUNICATIONS TECHNOLOGY

Communications technology provides organisations and workers with a vast array of options to help manage, supervise and communicate with lone workers. However, the right products should be selected to suit the workforce and particular operation. Here are some options for consideration:

– Mobile and smart phones – a familiar and relatively reliable method for communicating on the move or when working alone. Most people have one for their personal life meaning they know how to operate at least a basic model. The cons are that coverage cannot always be relied upon, especially for remote locations, and battery life can be very short. Furthermore, smartphones may be a constant source of distraction with ready access to messaging apps, social media and the web.

– Dedicated mobile monitoring device – 'man down' or lone worker devices provide two-way communications: in an emergency, workers can call for help using an 'SOS' button (utilising 'roaming SIM (subscriber identification module) card' technology to link into any available mobile phone network), whilst the device also tracks workers exact whereabouts using global positioning system (GPS) data, automatically detecting if the worker has fallen and/or become horizontal. The device is linked directly to an incident response centre who will follow a defined protocol to alert the company concerned. Companies will initiate their emergency response procedure if contact cannot be made with the worker.

Such devices can also send lone workers a message at frequent intervals which the worker must respond to, to confirm they are OK. If no response is provided, the worker can then be contacted, and if still no response, the situation can be escalated.

The devices themselves are typically small and can be discreetly carried on a belt, pendant, keyring or badge holder.

Mobile monitoring device example

Our people wear an attachment on their belt loop or as a necklace – it senses if you're inactive and will send you a prompt for you to verify everything is OK. For example, often operating a grain dryer will be quite an inactive job, so this sets the device off – but the operative just needs to send a response back to verify everything is OK. If you don't verify – by way of a simple prompt back – it will contact the emergency services and a local first responder. The system is very well embedded in our way of working. It will also send an alert when someone has become horizontal or similar. It's fairly inexpensive – so cost isn't prohibitive to implementation.

Global food processing plant

Figure 1: Example lone working device worn on top pocket

– Video conferencing – a now commonplace method for keeping in touch with a lone and possibly isolated workforce. Video conferencing provides almost the next best alternative to meeting or speaking in person. A range of different platforms exist, including Microsoft Teams, Zoom, Skype and Google Meet, etc., which all operate similarly and allow participants to see each other on screen whilst talking. It also allows screen sharing to facilitate the sharing of different media (e.g. documents, images, video, etc.) which may be helpful for training and toolbox talks.

– Body cameras – the use of mobile recording devices have several benefits for the lone worker. Firstly, in terms of supervising technical work, body cameras can collect valuable live stream data on a particular issue on site, as well as overcoming technical issues such as fault rectification from a first-hand perspective. This provides supervisors with the opportunity to provide support and input to a task, even when they cannot physically be there on site. Secondly, in terms of managing their safety and security, if worn when driving or during contact with a potentially threatening member of the public, they provide a valuable deterrent and possibly even a source of evidence should something serious happen.

– Virtual reality – virtual reality (VR), augmented reality (AR) and mixed reality (MR) are ways of creating either completely digitalized (VR) or partially digitalized environments (AR/MR). Although still mostly in their infancy due to cost and developmental constraints, so far, they have helped to generate environments for those not conveniently accessible. In the future, this may help to lessen the risk to lone workers, as it will prevent them needing to enter potentially high-risk environments at all. It may also provide opportunities for training at remote sites that might otherwise be inaccessible for remote workers.
– Drones – drone technology may reduce the need for lone workers or two-man teams to conduct work at height or in difficult to access locations, therefore reducing the overall risk to individual workers.

4.4 CONTRACTOR MANAGEMENT

Contractors that work alone without the physical presence of company managers or supervisors should be treated just like employees. Firstly, a risk assessment should help determine whether lone working is acceptable. Even if lone working is deemed acceptable, it might still be preferable for them to be on site when other employees are working on the same site or area, or another member of the team may be available to accompany them.

If working alone is the only option, ensure contractors are managed to the same standard as other lone workers at the company. Stipulate they must use lone working systems and practices that match or exceed the systems as used by employed workers, as well as being familiar with company lone working policies and procedures.

When commissioning work from contractors, make sure that the tendering process reviews their policies and procedures for lone working to ensure they are aligned with the awarding companies' own procedures.

4.5 SITE ACCESS SYSTEM

A tried and tested site access system for lone working is for workers to register once they arrive, and depart, from a site. This may either be by registering in person with a main control room at bigger sites, or by registering their attendance by telephone with a satellite control room for smaller sites. Often, departure times are also estimated and registered. This means the control centre knows who is on site at any one time, as well as who is due to leave and when. Contractors should also be required to work in the same way, registering attendance and departure, along with other details like their company name and contact telephone number.

If workers do not leave at the time expected, or fail to notify of their departure, those monitoring should then follow-up to check if there are any problems. Having an up-to-date record of attendance/departures will help facilitate the site's emergency response as emergency services and company management can check who was on site at that time.

Although the type of lone working system described above provides a robust means of monitoring worker whereabouts it is also important to consider fitness to work aspects and competency before allowing individuals to work by themselves (see 6.3 for fitness for work and section 3 for competence).

Finally, the company's lone working system should be well communicated, understood and fully documented in lone working policies and procedures (see section 2.5).

4.6 FURTHER INFORMATION – SUPERVISION, MONITORING AND COMMUNICATIONS

For more information on managing lone or distributed workers, you may find the following links helpful:

– IOSH report *Out of sight, out of mind?* presents research into the occupational safety and health of distributed workers. https://iosh.com/media/1524/out-of-sight-out-of-mind-full-report.pdf

– HSE, Indg73, *Protecting lone workers: how to manage the risks of working alone* https://www.hse.gov.uk/pubns/indg73.PDF

– EI *Engaging contractors – Partnership approaches to improving safety in the power industry*, focusing on the good practices and specific strategies that have been applied within the sector through shared experience. https://publishing.energyinst.org/topics/power-generation/engaging-contractors

5 WELLBEING

Working alone or in minimally staffed plants can bring a range of new wellbeing challenges that may not normally be an issue for people working in teams or busy workplaces. The psychological impact of lone working, alongside the potential lack of welfare facilities brought on by being in remote or difficult to service areas, are two key risks to emotional wellbeing which should be monitored and managed.

In terms of psychological health, being alone for long periods can have detrimental consequences on mental wellbeing. Feelings of stress, loneliness, isolation and lack of belonging can affect anyone and can be hugely debilitating and distracting.

The challenges for management also include identifying those in need of wellbeing support – despite a potentially 'macho' culture – meaning that creating a culture where people feel safe to 'reach out' and ask for mental wellbeing support is key.

5.1 AWARENESS RAISING

A good starting point for managing wellbeing is awareness raising. People cannot be expected to recognise or address wellbeing risks if they are not aware of what they should be looking out for. Consider mental health awareness training for lone workers and people working in small distributed teams, as well as those tasked with managing or supervising them. This will help to ensure that everyone knows the signs and symptoms to look out for, both in themselves and others. It will also be important to check whether awareness training covers lone working issues specifically, to ensure the training is targeted and relevant for the audience.

To support this, wider mental health awareness raising initiatives should also be considered, to keep people regularly reminded that it's OK to feel a certain way, but it is also important to seek help if things get difficult or prevent you living life the way you want to.

As a manager or supervisor, knowing your team is important, so that you are aware of what's 'normal' behaviour for different individuals and to help you spot the warning signs when something might not be right.

What's normal?

There are a couple of guys on the night shift that email me regularly with what's happening, frustrations, successes and anything and everything else. However, one guy never emails me. It doesn't mean something is wrong, it's just not in his nature to email. He tends to save things up for when I do a plant visit. However, one time he did email me with a concern about something. I knew in that instant it was something I needed to investigate straightaway as it was so out of character for him to reach out like that.

Energy provider

5.2 PSYCHOLOGICAL SUPPORT

Psychological support can come in many forms – either formal initiatives offered by company management or less formal support mechanisms initiated by the teams themselves.

In terms of formal support, confidential counselling provision is a popular way of providing workers with an impartial listening ear to discuss any issues they want to air. More specifically, some companies may consider offering helplines for specific challenges like drug and alcohol dependencies. For workers that prefer to speak to someone they know, mental health first aiders (who are usually also employees at the company) are another way of providing an outlet to share concerns. The discussion is still confidential, but the worker may feel more at ease speaking to someone they trust and that they feel understands the company and context within which they are both working. Online drop-in cafes and company occupational health groups also both offer other avenues to access psychological support. All of these options could be delivered online or over the telephone meaning they are accessible to lone workers.

Some companies may offer these services under the umbrella of an employee assistance programme (EAP), created to provide workers with a suite of support mechanisms designed to help their working and personal lives, as the two are rarely neatly separated.

Employee assistance programmes and lone work

Working remotely can be a huge psychological challenge for a lot of people. This is further exacerbated if you're working in a location that's out of signal, so you have no Internet connection. Following the COVID pandemic we've surveyed a lot of our workforce and found many are feeling disconnected. We therefore provide an employee assistance programme (EAP), mental health first aiders, an online drop in cafe, an occupational health group and an anonymous phone line you can ring for any concerns you may have.

Energy provider

As well as the more formal psychological support mechanisms, distributed teams might also consider setting up their own social support initiatives. The use of video conferencing software to maintain a form of face-to-face contact with remote colleagues has taken off and provides a sense of 'team' and belonging which helps reduce feelings of isolation. Other less formal means like committing to speaking to at least one other person per day can keep people feeling connected; or a weekend shift team getting a 'takeaway' meal can provide a much needed morale boost.

5.3 JOB DESIGN

To minimise the impact of lone working on emotional wellbeing, different ways of working could also be considered. When someone is working alone for a whole shift, make sure managers and supervisors are regularly checking in on them, especially for night shift workers who may feel a heightened sense of isolation knowing most people are at home or asleep. To ensure team members are not inadvertently overlooked, a diary of contact may be a helpful way of keeping track.

Another way of minimising the psychological impact of a long lone working shift is to ensure people have other tasks to complete in the time. Do not expect people to sit and monitor controls and instrumentation for 12-hours; consider what other tasks may be available to keep them stimulated, engaged and feeling positive.

5.4 WORKING ENVIRONMENT

The related issue of physical welfare, which can be compromised through a lack of simple facilities like toilets, washing stations, and somewhere to sit down with food and drink, can also take its toll both physically and psychologically. The very nature of lone working scenarios means that the environment itself can be quite extreme: for example, poor weather, rough terrain, variable temperatures, etc. Also, industrial plants can be dark places with little or no natural light, which is not always conducive to feeling positive.

For lone workers working in remote outdoor locations for long periods of time, welfare/wellbeing vans could be considered on site to provide refreshment, sanitation and shelter. For those in large industrial plants, an assessment of mood-affecting aspects such as lighting, temperature, airflow, noise and even wall colour etc. could be undertaken to ensure workers have suitable surroundings within which to work on their own for potentially long shifts.

5.5 FURTHER INFORMATION – WELLBEING IN THE WORKPLACE

For more information on psychological wellbeing in the workplace, you may find the following links helpful:

- EI *Psychological wellbeing in the workplace*, https://publishing.energyinst.org/topics/health/occupational-health/psychological-wellbeing-in-the-workplace
- Work-related mental health advice from HSE, http://www.hse.gov.uk/stress/mental-health.htm
- The UK Employee Assistance Programme Association website with advice on how to find an EAP partner. https://www.eapa.org.uk/organisational-background/
- The British Association for Counselling and Psychotherapy (BACP) website with information on counselling practice and a therapist directory. https://www.bacp.co.uk/

6 FATIGUE AND FITNESS TO WORK

Fatigue reduces our ability to do many things, and lone working can make it harder to manage fatigue risk. Fatigue affects concentration levels, decision-making, understanding, reaction times and can lead to people taking short-cuts. Fatigue can also manifest itself in a range of different mental and physical health conditions. Lone working can be an issue for fatigue in the following ways:

– Interaction with others can heighten alertness, therefore lone working should be considered as a potential risk factor.
– Working alone often means it is harder for colleagues to see or recognise the signs of fatigue and so intervention and support may be less forthcoming.
– The cumulative effect of ongoing solitary shifts may differ from accompanied forms of work – additional driving time, higher intensity work, and greater levels of stress are all possible issues that may compound fatigue levels.
– There can be less incentive to take breaks as there is no-one to be with, instead there can be a tendency to push-through to get the job done.
– Unexpectedly being asked to provide cover at a time when the person is not sufficiently rested can exacerbate feelings of fatigue.
– If a job takes longer than planned or is not going well, it can be difficult to balance the need to carry on and complete it, with the increasing risk of fatigue.
– Driving can increase fatigue particularly if there are unforeseen delays, resulting from traffic, or the job itself. Driving home alone after a job is one of the riskiest times for collisions.

6.1 FATIGUE RISK MANAGEMENT SYSTEM

To control the risks from fatigue it is essential to have a structured fatigue risk management system/plan (FRMS or FRMP). EI's publication *Managing fatigue risk using a fatigue risk management plan (FRMP)* provides comprehensive guidance on the topic, as does the recent IOGP document *Managing fatigue in the workplace*.

Many of the FRMP measures, such as limiting working hours, will naturally apply to lone workers. However, there are some areas where specific lone working issues should be considered as part of a FRMP as follows (bold text denotes typical FRMP topics):

– Fatigue risk management policy – the policy should include a statement around lone working, such as: 'the organisation strives to identify and manage fatigue issues in all personnel, including remote and predominantly lone workers.'
– Fatigue risk assessments – a key question to answer is 'to what extent are tasks undertaken by lone workers?'. Risk assessments should also consider if fatigue hazards are affected by lone working scenarios such as: not being able to share work; having to continue working as it can be difficult to provide relief; it being harder to detect signs of fatigue remotely; reduced tendency to take breaks, and not being able to share driving. Where risk control measures depend on actions by others, check whether it is realistic that these can take place in a remote scenario. For example, sharing the driving is not an option and so alternative measures should

be considered. Some companies look to minimise the amount of safety critical tasks performed by lone workers because of the effects of fatigue.

- Fatigue risk calculators (also referred to as biomathematical fatigue models) – some models require inputs around workload. When making such judgments, consider lone working scenarios where the intensity of work can be higher because it is harder to control the demands of the job.
- Working limits – consider lone working scenarios when defining the acceptable limits for working hours, overtime, number of consecutive days and nights, rest durations and breaks.
- Extended hours assessment – if the organisation operates an 'extended hours approval procedure' to enable someone to work beyond permitted time limits, it is advisable to check that the process can be applied remotely. Signs of fatigue such as yawning, heavy eyes and slower working cannot be easily checked from afar. A checklist of items could be a simple way to ensure signs of fatigue are not missed.
- Training – depending what training is in place around fatigue, it is useful to help raise awareness of lone working fatigue risk, and possibly to role-play some topics such as being asked to provide cover when you are not fit to do so.
- On-call/shift cover readiness assessment – having a checklist of fatigue-related items to run-through with a lone worker when asking them to pick-up a job can help enable them to consider their own fatigue levels. This also helps provide assurance to the company that it is managing fatigue risk. EI's document Managing fatigue risk using a fatigue risk management plan (FRMP) has 'fatigue investigation checklists' which could be adapted to serve as an 'alertness assessment' (see Annexes F.3 and F3.6 of the FRMP document).

6.2 LINE MANAGER

Lone work can make fatigue issues harder to spot and manage. Most companies provide tailored fatigue information for line managers, covering topics like causes, impact on human performance, importance of fairness, providing information etc. This section has specific information on fatigue in lone workers that is relevant to line managers.

Provide opportunities for lone workers to flag concerns about fatigue – fatigue is potentially a good topic to raise when line managers are contacting lone workers to see how they are getting on. Questions like 'How are you dealing with the dark starts/warm nights?' can help detect fatigue issues and demonstrates concern. Such conversations can create opportunities to reinforce messages and responsibilities around fatigue and may identify fatigue issues that need attention. It can be useful to keep records of fatigue-related conversations, so managers can keep track, and it helps demonstrate the risk is being managed.

Recognising signs of fatigue in lone workers – it is worth line managers looking at the shift pattern and hours worked for direct reports, this can help prioritise and identify potential issues. Sometimes conversations might highlight issues or changes in someone's personal life, such as newly acquired caring responsibilities or a new baby, both of which are examples of personal changes that may become potential sources of fatigue.

Take action – be prepared to intervene and take action, this might mean to provide relief cover, book someone into a hotel, or even stopping a lone worker from working if they are not in a fit state to do so. Avoid leaving it to the worker to make a decision, remember that

fatigue will affect their ability to make an informed and objective view, sometimes a manager needs to step-in.

6.3 FITNESS TO WORK ALONE

Many companies have a fitness for work standard that serves to ensure all personnel (including lone workers) 'can complete a task safely and without unacceptable risk to themselves, their employing company or a third party' (IOGP 470 *Fitness to work*). The organisation's standard should also consistent with IOGP's *Fitness to work* guidance.

Within company standards there is normally a requirement to perform a fitness to work risk assessment. The assessments typically look at the physical and psychological demands associated with a task or role. The outputs can be used to help define whether the work can be performed alone or should be done as part of a team. For a task to be performed alone, it might be that supplementary risk controls are needed.

Consider the likely locations of lone work; even low risk activity may not be suitable if the location is remote and where there may be a delay in making contact and triggering the emergency response. As part of the risk assessment process, it is also worth checking that being alone does not significantly impair the availability of risk controls.

Some companies that operate a remote book-on at the beginning of a shift have a set of standard questions that employees respond to around their fitness to work; these cover everything from medical issues to fatigue. Such self-declaration can provide assurance that lone workers are fit, and provides an opportunity for someone to raise a concern. Clearly this depends on there being signs and symptoms to report.

6.4 FURTHER INFORMATION – FATIGUE AND FITNESS TO WORK

For more information on fatigue and fitness to work, you may find the following links helpful:

- EI *Managing fatigue risk using a fatigue risk management plan (FRMP)*, https://publishing.energyinst.org/topics/human-and-organisational-factors/managing-fatigue-using-a-fatigue-risk-management-plan-frmp
- IOGP 470 *Fitness to work*, https://www.iogp.org/bookstore/product/fitness-to-work/
- IOGP 626 *Managing fatigue in the workplace*, https://www.iogp.org/managing-fatigue-in-the-workplace/

7 MAINTAINING FOCUS

The need to maintain alertness and deal with distractions is key for effective lone working. Working alone combines periods where there may not be much going on (e.g. walking, waiting, watching, etc.), with times where critical decisions need to be made and actions taken. Distractions are also a major reason why people can lose focus. This section outlines some of the issues and techniques lone workers can adopt to help maintain focus.

7.1 UNDERLOAD AND OVERLOAD

Underload happens when someone's attention drifts away from the task because there is not enough to keep them actively engaged. An example would be driving along a long straight featureless road in a quiet vehicle; arriving at a destination and not being able to recall route features or events are signs of underload. Seven-to-eight hours of sleep a night and a healthy diet are the best ways to combat the problem and Table 2 has some additional techniques that may help lone workers.

Cognitive overload is another problem for maintaining focus. We have a finite capacity to process information and perform tasks and as we approach our limits, our performance suffers as our cognitive abilities become overloaded. We start to disregard potentially useful information, perform slower, forget things, and make more mistakes. A lone worker confronted with a difficult or escalating situation can easily become overwhelmed, especially as it may be harder to get support that actually helps in the situation. Good work planning, task practice and NTS can help avoid and manage such issues. Table 2 also has some more potentially useful techniques.

7.2 DISTRACTIONS

Distractions are another major contributor to a loss of focus, these can result from the job itself, the wider environment, or personal issues. The following are examples of distractions linked to lone working:

- Lone worker devices that require the wearer to push a button to 'check-in' at defined intervals.
- Receiving phone calls from colleagues checking-up or returning earlier calls, etc.
- Hearing notifications on a mobile device and wondering what is, and who it is from.
- Members of the public/neighbours making enquiries.
- Being asked to perform other unplanned tasks.
- Mulling over an earlier driving incident (e.g. being 'cut-up').

Some techniques that help to maintain alertness and focus can themselves become a source of distraction – there is a fine line between when measures such as risk-triggered commentary whilst driving, or procedural checkpoints, actually interrupt our focus. Task risk assessments and task analysis provide good opportunities to identify and eliminate potential sources of distraction. Distractions that are external to the working environment are harder to manage and require workers to take action to process the distraction and maintain focus.

7.3 COGNITIVE BIAS

Cognitive bias has been identified as a factor in a range of incidents[2]. Our thinking is sometimes affected by our assumptions and beliefs about what is going on around us, and these can be biased, leading to us making mistakes. Daniel Kahneman researched bias and thinking for many years. He argued that we have two systems of thinking:

– system 1 – fast thinking which is automatic, instinctive and effortless, and
– system 2 – slow thinking which is planned, rational and conscious.

Some examples of fast thinking can be seen by completing the following:

– 3+3 = …
– Salt and …
– The capital of France is…

Fast thinking is also used widely for tasks such as:

– avoiding an obstacle whilst walking, and
– noticing anger in someone's voice or facial expression.

Examples of slow thinking are:

– 17×13= …;
– writing an order reference number given over the phone;
– following a conversation in a noisy room, and
– fault fixing.

Fast thinking helps us function normally; life would be very difficult if we applied system 2 thinking to everyday tasks such as walking. Indeed, fast thinking helps us stay safe by reacting quickly when a vehicle veers across the road in front of us. However, if fast thinking is used for critical procedural steps, problems can creep in. Taking a pressure reading on a gauge is a fairly easy task: look at the dial and see the digit that the needle is pointing at and note the reading. However, if you are primed to expect a particular number, because that is the target you are looking for, or 'what it always is', you may 'see' this instead of the rating that the needle is actually pointing at. This is us using fast thinking where slow thinking may be more appropriate.

2 Murata, A., and Yoshimura, H. (2015)

Influence of fast-thinking

Fast thinking can be very powerful, consider the 'Titchener circles' below, reported by Edward Titchener in 1901.

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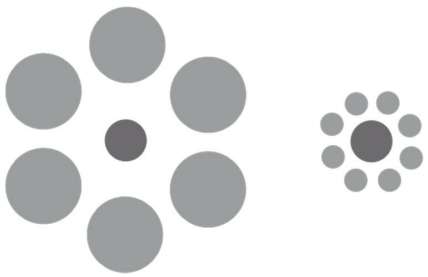

Figure 2: Titchener circles

The two darker circles appear to be different sizes – with the one on the right appearing larger, but in reality, they are the same size. This is an example of the powerful effects of fast thinking – we just see it this way and it is very difficult for us to see the darker circles as the same size, even when we know they are the same size.

Bias in our thinking often means that we are looking for information that supports our assumptions and what we want to see. We tend to disregard alternative explanations. There are various types of cognitive bias, but all can affect our ability to understand our surroundings and make effective decisions. Stress and fatigue are key factors in us experiencing cognitive bias.

Cognitive bias can be a significant risk factor for lone workers if the situation they are working in starts to become complex. Consider this example:

> An operator is sent to open a valve to reduce flooding risk. The valve is sticking and cannot be turned. After a while the operator starts getting anxious at the increasing water levels. Rather than reporting the problem, the operator uses a lever to apply extra force, and in doing so they lose their footing and fall. The operator failed to realise that they were attempting to operate the wrong valve and that it was already open. They were convinced that they had selected the correct valve as it was the one they had operated previously (bias) and did not consider that there was another valve to turn.

7.4 SOLUTIONS TO HELP MAINTAIN FOCUS

Many of the practices described in this document will have some benefit on lone workers' ability to stay focussed. NTS, selection, training, fatigue management, etc., will all contribute. Educating lone workers about underload/overload, distractions and cognitive bias will also help to raise awareness of the problems that need to be managed.

Table 2 has some example techniques that workers themselves may find helpful when dealing with workload issues, distractions and cognitive bias. Use of such techniques should be at the discretion of the worker, as the techniques may not work for everyone, but by providing this information to lone workers it should help to inform, as well as support, selection of

something they believe will help. It should be noted that the techniques themselves can become distracting; it can be a fine line between when something helps or hinders, so, again, lone worker discretion is recommended around where and when they are used.

Table 2: Techniques to maintain and regain focus

What is it?	How does it help
Take a minute – before you start work, and at key points during a job, you take a minute to compare the current situation and worksite conditions with what was planned. Can be especially useful having been distracted, or just before performing a critical task step (such as selecting which circuit to isolate)	It can be difficult to notice that a job is going away from what was intended. Taking a minute helps avoid 'tunnel vision' and breaks the thinking that may take a job in the wrong direction. It allows problems and deviations to be identified
Lone talk-throughs – as you proceed through a job, you say aloud what the task, risks and decisions are that you are confronted with	Takes you away from 'autopilot' and makes the task more of an active and engaged process Some find talking through their actions can be distracting, especially when the task is very demanding
Know your black spots – this is about knowing the times when our attention wanes – 'the post lunch dip' and driving back at the end of a job are examples. These can vary between individuals and knowing these times or situations allows you to plan around the issue	Being aware of the times when your focus is likely to drift allows us to consider prioritising when we do tasks that need ongoing vigilance or deep concentration. Sometimes you will have to do such tasks during a black spot, but targeted use of some of the other techniques in this table at those times should help
Analyse critical steps – this is about looking at a task, breaking it down into discrete steps and looking at these to identify potential errors that could happen	Helps us to prioritise focus on the critical parts of a job and to identify ways to avoid errors at each step
Decision support tools – where critical steps have been identified in a task and there are several options for how to proceed, a decision support tool can be useful to refer to	A decision support tool should help workers evaluate different courses of action. Often presented as a flow chart, it can help ensure workers escalate if there is uncertainty. These can be combined into an existing procedure
Chunking – break down the job into smaller parts that are easier to manage	Sometimes a job can feel too large or complicated. Chunking can help you maintain situation awareness by making a task more manageable and achievable

Table 2: Techniques to maintain and regain focus (continued)

What is it?	How does it help
Post-job discussions – often used for group-based tasks, this could be deployed with lone workers with a call-up from a supervisor. Technique is probably most suited to complex, unplanned or emergency work	The job may have a safe outcome, but this does not mean it was done safely. Reviewing how it went provides an opportunity to learn and make any changes necessary
Stop and seek – if you are unsure about a task, you stop and seek help. This is an organisation-level scheme that encourages people to seek help. It can be supported with the development of stop-work criteria. If someone approaches for help, saying 'thank you for asking' should be the first response as it encourages a culture where help is sought	Aims to prevent you making mistakes by making it explicit that you can stop and seek help when you are confronted with a difficult situation. It helps avoid uncertainty and approaches that may not work, such as improvisation and trial and error
SLAM – stop, look, assess, manage is a memorable acronym to improve situational awareness	SLAM aims to give you extra skills to identify risks and avoid harm. It was produced by HSE
Chronic unease – (originates from Shell) this is about looking for weak signals that things may not be alright – such as unexpected oil drips, unusual vibration in a pump – and it is also about dealing with biases in our thinking	Improves our risk perception – by encouraging you to look beyond the obvious and adopt a questioning attitude – it makes work, such as inspections and walkabouts, more of an active and engaging process

7.5 FURTHER INFORMATION – MAINTAINING FOCUS

For more information on fatigue and fitness to work, you may find the following items helpful:

- *Reducing error and influencing behaviour*, https://www.hse.gov.uk/pubns/books/hsg48.htm
- Skybrary – an aviation resource aimed a pilots has plenty of 'human performance' techniques that can be adapted, https://www.skybrary.aero/index.php/Main_Page#human-performance
- SLAM (stop, look, assess, manage), found in HSE, *Leadership and worker involvement toolkit* https://www.hse.gov.uk/construction/lwit/assets/downloads/situational-awareness.pdf
- Daniel Kahneman (2011) *Thinking, fast and slow*

8 DRIVING SAFETY

In the UK it has been estimated that around a quarter of all road traffic accidents on the public highway involve someone who was driving for work at the time (HSE, 2014), and for the majority of workers, it is widely accepted that driving is one of the riskiest activities they will undertake as part of their work. For lone workers or those in minimally staffed assets, the risk posed by driving – either inside or outside the worksite – is heightened by being alone.

Energy workers will inevitably receive call outs at obscure times (e.g. height of winter, middle of the night, early mornings, etc.) that they will need to attend to alone. Their driving performance at these times will be especially influenced by human factors such as fatigue, situational awareness, driving experience and physical fitness, etc.

Workers are also likely to receive call outs to remote locations, e.g. a battery storage installation in the middle of an otherwise disused industrial area or a wind turbine in the middle of a forest, etc. There is a need for the driver to consider their familiarity with aspects such as the location, route, road and communications protocol in the event of an emergency.

Managers and workers should also be mindful that call outs may also be in addition to an already long normal commute. For some companies there is a risk posed by worksite vehicles (e.g., quad bikes, forklift trucks, cherry pickers, etc.) that may occasionally be used by lone workers.

8.1 DRIVER TRAINING AND AWARENESS

As driving is something that many of us do on a regular basis, both for work and in our personal lives, it can feel like a very comfortable and familiar activity, possibly causing it to be overlooked as a 'high risk' work task. It is therefore important to consider driver training and awareness raising initiatives for lone workers driving at strange times and potentially in unfamiliar and challenging locations. For example, it would be important to raise awareness and understanding around one of the key driving risks – fatigue.

Driving fatigue example

An energy industry worker left the site early because he was too tired to work. While driving home (90 miles) he fell asleep. He swerved across the median, across oncoming traffic and down a ditch, rolling the vehicle over. The safety features of the car prevented serious injury or death. The worker had less than 3 hours sleep (due to a late arriving flight the night before). He felt obligated to go to work. He used a car instead of the company-provided bus service. On his way back he felt sleepy, so he stopped and took a short break, but did not sleep. 12 miles away from home, he fell asleep and the vehicle rolled over.

Taken from the Energy Institute Toolbox https://toolbox.energyinst.org/c/presentations/driver-falls-asleep-leading-to-vehicle-rollover

To complement driver training initiatives companies may also consider carrying out driving risk assessments with their drivers and consider further risk controls. For example, the need for additional training on specific driving skills may be identified, such as driving across rough terrain, rural road driving, rural hazard awareness, etc. These training needs can then be addressed, equipping the driver with the enhanced driving skills that may be required.

Another risk control is company safety culture. As outlined in Section 10 of this guidance, the prevailing company safety culture may be the only 'safety barrier' to prevent people taking risks whilst driving on their own. If people fully internalise the company safety attitudes, values and beliefs, then this culture should stay with them when they are out on the road or driving in the work site, helping to prevent workers from taking driving risks just because no one else is actively watching.

8.2 DRIVING TECHNOLOGY AND EQUIPMENT

Measures that can be taken to improve driving safety for lone workers, in addition to standard issue mobile phones and satellite navigation systems, include fitting vehicles with GPS trackers to support locating drivers on the move (also see section 4.3 for communications technology).

Companies may also want to consider fitting dash cams in vehicles. These should not just be viewed as a monitoring and management tool, but rather a tool that facilitates increased learning about any incidents or accidents that may occur.

It should also be standard practice that vehicles contain basic safety equipment like a torch, water, hazard signs, high-visibility clothing, first aid kit, etc.

Finally, for companies that have lone workers driving on the work site, closed-circuit television (CCTV) may be a useful tool for monitoring driving activity and may act as a deterrent to workers feeling tempted to take a risk.

8.3 FURTHER INFORMATION – DRIVING SAFETY

For more information on safety when driving for work, you may find the following links helpful:

– HSE, *Driving at work: Managing work-related road safety*, https://www.hse.gov.uk/pubns/indg382.pdf
– IOGP's *Guide to fatigue* website with training materials, https://www.iogp.org/guide-to-fatigue/
– RoSPA, *Introduction to managing occupational road risk*, http://www.rospa.com/rospaweb/docs/advice-services/road-safety/employers/introduction-to-morr.pdf

9 PERSONAL SECURITY

Personal security is of paramount importance in any job, but the issue can be heightened when workers are alone for long periods of time, perhaps in towns or large plants, or travelling extensively between different sites. In these situations, the risk from someone else becoming threatening is heightened because no one else is around to help. Sometimes those working for energy providers may be targeted by those that have a range of different agendas to promote.

Assuming the site is already physically secure and with robust access arrangements in place, the challenge that remains is how to equip workers with the systems and skills they need to help protect themselves when alone and find themselves in a situation that compromises their personal security.

9.1 PEOPLE SAFE SECURITY SYSTEMS

A good starting point for developing a people safe system is carrying out a personal security risk assessment. The assessment will start to understand the nature of the security risk (e.g. physical/verbal attack, personal theft, etc.), as well as when it is more likely to occur (e.g. night shift on a large site, travelling to remote locations, walking in a built-up area exposed to members of the public, etc.).

If a risk to lone worker security exists, then working in pairs may help to deter undesirable behaviour and make dealing with any conflict situation more manageable. Furthermore, if lone workers know they are attending a site with potentially difficult neighbours, it can help if they have someone that they can call to 'listen in' to the dialogue. This can happen in the full knowledge of the potentially threatening party, helping to act as a deterrent and/or a lifeline if the situation develops.

Personal security risk example

We employ a team of woodland officers who regularly visit estates to talk with private land owners. Although officers are discouraged from visiting potentially difficult customers on their own, it's not always possible to know who will cause difficulty for the officers and when. They've implemented a system, also used by social workers, that whilst workers are speaking with potentially difficult customers, they call someone else so they too can listen in on the dialogue. The customer knows someone else is there and it's felt that this 'audio observer' acts as a deterrent to any potentially difficult or aggressive behaviour. If the customer does become difficult, it also means that the listener can quickly alert the police to the circumstances whilst not further antagonising the situation.

Government agency

If personal security risk is deemed minimal, then following the normal system of work where lone workers confirm their whereabouts should provide an effective way of keeping track.

A lone worker device or physical tracking system, where lone workers log in at the start of a shift, then log out again at the end, can also provide a definitive check on worker location (see 4.3). A tracking system could be as simple as shared work diaries or publicly displayed

information boards detailing where lone workers should be, to make sure everyone knows their intended whereabouts.

Finally, it is advisable for organisations to encourage their lone workers to share any concerns they have regarding their personal security; or particular locations, shifts or people they feel uneasy with. This helps to create a form of early warning system to highlight where potential personal security risks may develop.

9.2 TRAINING

Once the appropriate systems and procedures have been developed, the next step is to provide workers with training. An initial step would be conducting a personal security training needs analysis as part of the wider competency management system.

Training topics that may be identified as valuable include general awareness around personal security, as well as conflict management. This should provide lone workers with the appropriate skills and confidence to make their own decisions about how to tackle a potentially threatening situation.

Training should also ideally underline workers' first line of defence, which is choosing to withdraw from situations if they feel at risk. However, for this type of training to be effective, the company should also operate a 'no-blame' safety culture to support individuals in taking the decision to walk away from a potentially dangerous situation without the fear of punitive action.

Other training topics may include non-verbal communications, behaving in a non-confrontational way, situational awareness and using active listening skills to help assess an emerging situation.

Finally, training might also highlight the implications of wearing items that identify you as working in the energy sector (e.g. lanyards, jackets, t-shirts, etc.). These items need only be worn when essential to do so and ideally not when travelling on the public highway between home and different remote sites.

9.3 FURTHER INFORMATION – PERSONAL SECURITY

For more information on managing workplace violence for lone workers, you may find the following links helpful:

– HSE website, *Work-related violence*, https://www.hse.gov.uk/violence/conclusions.htm

10 SAFETY CULTURE

A company's safety culture is commonly understood to be the shared attitudes, values and beliefs about safety, held by all of the people working within the organisation and particularly espoused by the organisational leaders and safety managers ('how we do things around here'). For minimally staffed assets and lone working, a safety culture may be the only 'safety barrier' between someone choosing to do the right thing, or not, when no one else is watching.

It is also important to clarify what doing the 'right thing' means. People do not typically choose to behave in an unsafe manner – but sometimes what people perceive as being the 'right thing' – e.g. trying to progress a difficult task even when it might not be safe to do so – happen because people can feel internal and/or external pressures to act because they're on their own and want to solve a problem. Whereas in a pair or small team you would have others that would shape your actions, when on your own, you are wholly reliant on your own judgement. Even if a job has usually been OK to carry out alone, sometimes a change in the situation means there may be unintended outcomes that become harder to manage without colleagues.

Knowing when to stop the job

We want people with a 'can do' attitude but we also want people to be able to say 'no'. When I issue a permit to work, I only authorise the people who I think can do the job and will also be sensible enough to turn around and stop the job if they think it's not safe. I ask myself 'will this person really understand when something isn't safe?' After all, I could be the last person to see that worker alive.

Energy provider

So, how can you confidently trust a night shift worker to drive within the speed limit across a 100-acre site when they assume no one else is on the road? What about the control centre manager monitoring displays into the early hours – will they be vigilant or will they turn to social media for company? Or the 'have a go hero' who attempts maintenance at height in what they perceive as a valiant attempt to maintain the plant's daily output? These are the types of challenges facing managers of minimally staffed or lone worker operations; the types of challenges that may be addressed through development of a strong safety culture.

A cross-sector study commissioned by the Department for Transport (DfT) found a link between a positive company safety culture, drivers' positive attitudes to driving safety and company accident liability. The study clearly demonstrated the potential power of safety culture as a mechanism for managing lone worker risk and can be found in DfT *Behavioural Research in Road Safety 2004, Fourteenth Seminar*, Chapter 11.

The challenge is therefore developing company safety culture to a level of maturity that will help workers to internalise core company safety beliefs, and do the 'right thing', whatever that may be, even when no one else is around to keep watch.

10.1 SAFETY CULTURE DEVELOPMENT

Safety culture itself is a vast concept interwoven into the very fabric of a company's structure, safety management, operations and people. In order to make it more manageable and

therefore open to development, most practical models of safety culture tend to divide the concept into a series of safety culture dimensions. These dimensions will typically include factors like safety leadership, manager commitment, reporting and learning from incidents, working collaboratively, safety competence, compliance with rules and having an ingrained healthy fear of failure to ensure people are always alert to potential risk.

There are a number of useful texts and guidance documents on the subject of safety culture assessment and development and several of the best for the energy industries are included in the references below. It is not the intention to repeat the comprehensive work already completed in this area within this publication. However, there are several areas which are deemed particularly relevant for lone working and minimally staffed assets.

10.2 LEARNING FROM INCIDENTS

Lone workers should be trusted to share any incidents or accidents that occur whilst they are on shift. This is important to enable others to learn from incidents that occurred when no one else was there, and also means the risks around lone or isolated working are highlighted. However, in order for all reporting to occur, there should be no fear of punitive action.

Learning culture

We've done a lot or work in the area of conscious and unconscious safety – when people see someone else taking a risk – they are more likely to engage in those same risks when they are by themselves. To mitigate this, we've tried to increase an openness in our reporting culture by not apportioning blame – so people are more willing to share their real risk-taking behaviours when they are by themselves.

Energy provider

10.3 MANAGEMENT AND SUPERVISION

Positive and regular management and supervision are also deemed important for developing a strong safety culture. The very nature of working in remote locations or during anti-social hours means that regular contact is more challenging, although not impossible.

Managing less visible teams

Our cleaners work through the night – they are one of the least visible teams – and so we need to actively engage with them first. We don't wait for them to come to us – we approach them and ask if everything is OK. It's all too easy to overlook the invisible team that no one sees. We need to be approachable and supportive. We need to actively demonstrate we don't fire people for reporting or raising concerns. If people think you care about them, then they will work safely.

Global tourism operator

10.4 LONE WORKING CULTURE

A related concept to organisational safety culture is the 'lone working culture'. Currently in some parts of the energy industries there is a lone working culture that pervades – meaning

people are used to working in certain parts of the industry, on certain jobs, on their own. In fact, some people are drawn to the industry because they choose to work alone or on quiet plants. This can have a positive impact on people's ability to work alone, however, it should not necessarily result in lone working being chosen if there is an option to work in pairs or more.

10.5 FURTHER INFORMATION – SAFETY CULTURE

For more information on assessing and developing your company safety culture, you may find the following links helpful:

- The EI Hearts and Minds website and safety culture toolkit designed to help develop company safety culture, https://heartsandminds.energyinst.org/
- HSE's guidance on reducing error and influencing behaviour with a chapter on understanding and developing safety culture, HSG48, *Reducing error and influencing behaviour*, https://www.hse.gov.uk/pubns/priced/hsg48.pdf
- HSE, *Common topic 4: Safety culture*, https://www.hse.gov.uk/humanfactors/topics/common4.pdf
- The Step Change In Safety's *Changing minds guidance*, providing a framework to help identify the current safety culture maturity level in an organisation along with suggestions for interventions to help improve organisational safety culture, https://www.stepchangeinsafety.net/resources/changing-minds-guidance/
- EI *Guidance on learning from incidents, accidents and events*, https://publishing.energyinst.org/topics/human-and-organisational-factors/learning-from-incidents,-accidents-and-events

11 EMERGENCY RESPONSE

A robust emergency response plan is a critical element in any safety management system, but the plan becomes even more critical when it incorporates lone workers and minimally staffed assets.

As the number of people working at a site or asset diminishes, so does the potential support network in the event of an emergency. For lone workers, or those with minimal team support, they may only have themselves or one other person to rely on in the event of an emergency. The situation will become more complex if workers are injured or incapacitated, adding an extra element of urgency and uncertainty.

In terms of emergency response guidance for lone working, companies are recommended to refer to the EI publication *Good practice guidelines for onshore wind energy developments* – the content is directly relevant to lone working in the power and utilities sector. When doing this, it is worth considering the following points:

- Exercise planning
  - Ensure that any emergency response scenarios that are to be tested consider credible lone work situations.
  - Check whether emergency response scenarios assume that there are others on site that will be able to help; consider what will happen if colleagues are not on site.
- Site-specific emergency response plan
  - Following an incident involving a lone worker, it is possible that the difficulty of getting information about the event out to the company may mean that the incident is quickly escalated up through incident management tiers.
- Locating the casualty
  - If a lone worker is incapacitated, specific information about their location may be difficult to obtain or may lack accuracy, even if tracking devices are being used. If a casualty is not at the location given to emergency services, they may not be able to search to locate the person, as this is a company responsibility.
  - If there is a chance that emergency services may attend a site where there is only a single casualty, it is important that location information given to emergency services by the company is accurate and corresponds with unambiguous signage at the site.
  - A dedicated emergency channel on a radio could be helpful in identifying the location of a casualty once responders arrive on site.
- First aid
  - Consider feasibility of lone workers carrying a first-aid kid that can be self-administered, and train them in the most likely injury scenarios.
  - A trauma pack maybe necessary depending on the risks, this might contain items such as tourniquet, dressings, scissors, etc.
- Emergency response cards
  - Simple cards held by workers on keys, wallets, phones etc. containing key contact and action information to avoid the need to rely on memory in a stressful situation.
- Mobile phone
  - Provide with the phone number written on the back to reduce confusion and aid fast response. Emphasise need to keep device charged.

- Psychological and physical impact
  - Consider providing workers with awareness raising training around the psychological response they may experience (e.g. fight, flight or freeze). This will help them to prepare for how they may react and therefore support them in managing their response.
  - Raise awareness about how they may feel post-event, especially in the absence of having other colleagues to share experiences and emotions with, which could trigger or aggravate feelings of isolation or loneliness.

Importance of first aid training and skills

A critical factor when working with only a few people is having high quality basic first aid training. If it's just you and a casualty stuck waiting for help, and you don't know exactly how either of you will react, you need to know the first aid basics, like keeping someone warm, hydrated, calm and in the best physical position. These critical basics can sometimes get overlooked amongst the raft of emergency procedures and policies and the potential panic that ensues in an emergency situation.

Energy provider

11.1 FURTHER INFORMATION – EMERGENCY RESPONSE

For more general information on emergency response, you may find the following links helpful:

- SafetyOn Onshore Emergency Response, *Good practice guidelines for onshore wind energy developments*, https://publishing.energyinst.org/topics/renewables/onshore-wind/safetyon-onshore-emergency-response.-good-practice-guidelines-for-onshore-wind-energy-developments
- HSE website, *Emergency procedures*, https://www.hse.gov.uk/toolbox/managing/emergency.htm
- HSE, *Common topic 1: Emergency response*, https://www.hse.gov.uk/humanfactors/topics/common1.pdf
- Joint Emergency Service Interoperability Programme (JESIP) five guiding joint emergency services operational principles – more detailed guidance on working closely and collaboratively with the emergency services, https://www.jesip.org.uk/five-principles

12 LONE WORKER CHECKLIST

The previous sections have outlined a series of challenges and solutions for managing lone workers and minimally staffed assets. The following provides a consolidated checklist to support organisations when assessing and managing their own lone worker risk.

Policies and procedures:

1. Do you have a lone working policy?
2. Have you shared the policy with lone workers/small teams and those responsible for managing them?
3. Have you made the key site information available to lone workers in an accessible document or folder?
4. Are risk controls available in lone working scenarios?

Competence:

5. Has a period of shadowing occurred, where trainees can watch tasks being done correctly? And have they had opportunity to practice them?
6. Has there been opportunity for trainees to visit the different types of location where they will work?
7. Has priority been given to learning critical tasks, such as emergency response?
8. Have NTS been covered in selection, training and development activities?
9. Have trainees been encouraged to gradually perform more tasks themselves, with decreasing levels of supervision according to the level of support the trainee needs?
10. Have trainees been given sufficient time to build confidence, or is the emphasis on getting individuals through the training so they can be 'productive'?
11. Have employees been assessed as fit for the role as a lone worker, as well as fit for the tasks required of that role?
12. Is there an assessment scheme that clearly indicates which tasks the employee can perform alone?
13. Is there a system for ongoing competence monitoring when personnel are working alone?

Management/supervision:

14. Have workers had sufficient time on the job before being left to work alone unsupervised?
15. Is there a lone working system in place for workers to register their arrival and departure from the worksite? Is the same process in place for lone working contractors?
16. Are workers equipped with technology they can reliably use to communicate – even when out of mobile phone reception?
17. Have lone contractors provided their plan for how they are working safely?
18. Are you able to rotate jobs/sites/activities between workers to provide a fresh pair of eyes on the task?

Wellbeing:

19. Have you provided lone workers with a confidential service to discuss mental wellbeing concerns?
20. Have you encouraged the whole workforce to recognise and raise mental wellbeing concerns?
21. Have you provided lone workers with suitable and sufficient welfare facilities?

Fatigue:

22. Does your organisation have a FRMS in place?
23. Does your fatigue risk assessment incorporate lone working risk?
24. Do you provide advice and information on how to manage fatigue?
25. Do you know what to do if a lone worker indicates they are fatigued at work?

Driving:

26. Have you provided lone workers with training on work-related driving risk?
27. Have you conducted a driving risk assessment for lone working?
28. Are all vehicles fitted with working communications technology and basic driving safety equipment (e.g. torch, water, first aid, etc.)?

Personal security:

29. Is there a system in place whereby you always know where lone workers are and who they may reasonably come into contact with?
30. Have you physically secured your site as far as is reasonably practicable from intruders or unwelcome visitors?
31. Have you provided lone workers with personal security training, for example, in conflict management?

Safety culture:

32. Has your company worked on its safety culture through training and awareness? For example, highlighting the importance of reporting? Or encouraging people to say 'no' to risky jobs?
33. Have you considered implementing a behavioural safety programme?

Emergency response:

34. Have you practiced an emergency rescue with lone workers or minimally staffed assets?
35. Are you clear on what your company needs to provide local emergency services with to support an overall efficient and effective rescue? (e.g. a grid reference, clear signposting to the site, taking the casualty to the roadside/getting them down from height, etc.)
36. Have you engaged with your local emergency services to give them notice of high-risk atypical work involving lone workers?
37. Have you provided workers with a simple emergency response card outlining the process and key contacts in the event of an emergency?
38. Have you provided all of your lone workers with high quality basic first aid training and a trauma pack?
39. Do you have mental wellbeing provision for post-traumatic stress disorder (PTSD) cases?

ANNEX A
RISK ASSESSMENT MATERIALS

Table A.1: Example lone working risks and control measures identified by a major power company

Hazard	Who might be harmed?	Control/mitigation measures
Company car/ hire car vehicle problems	Lone worker – travel by car across a number of sites	– Company car policy and hire car policy – Vehicle recovery arrangements – Mobile phone (hands free) – First aid kit – Car safety pack – Driver ensures someone knows where he/ she is, and if plans alters then someone is told
Off-site working – personal security	Lone worker – working across a number of company and third-party sites	– Plan your journey mode of transport and time of journey – Mobile phone – Ensure someone knows where you are; if plans alter, someone is told – Park in well-lit place, preferably public place (if driving) – Prior to meeting a client, investigate him/ her, e.g. are they who they claim they are – Do not carry valuables unless necessary
General site hazards	Operator carrying out routine plant checks (low risk)	– Routine activity – PPE – Routine communications – control room informed of operator's activity in advance – Radio contact with the control room – Operator informs control room if higher potential/unusual situations arise and next course of action agreed with shift leader
Maintenance/ other task-based hazards (specific to particular task)	Technician/other worker carrying out task	– Task-based risk assessment – Consideration of activities where people should not work alone, and buddy systems where necessary – Radio contact where required – Establish supervision-level and what contact is required

Table A.1: Example lone working risks and control measures identified by a major power company (continued)

Hazard	Who might be harmed?	Control/mitigation measures
Contractor maintenance/ other task-based hazards (specific to particular task)	Contractor carrying out task	– Task-based risk assessment – Consideration of activities where people should not work alone, and buddy systems where necessary – Arrangements for start and end of work contact with station personnel – Radio contact where required – Establish supervision-level and what contact is required – Periodic contract monitoring to check control measures are implemented
Contractor – office cleaning (out of hours)	Cleaner carrying out the tasks (low risk)	– Task-based risk assessment – Consideration of activities where people should not work alone (see Annex A.2) – Contact with station personnel at start and end of work – Further contact requirements established with station personnel, where necessary
Security personnel	Security guard	– Contact with station personnel (control room) at start and end of work – Radio contact all the time – PPE (going into site locations) – Company training (control of people coming onto site; basic security; incident reports) – Site emergency/security procedures
Out of hours working	Office personnel, contractors, staff	– Contractors book in at control room – Security inform control room of staff remaining out of hours – Weekends, etc. – contact with station personnel (control room) at start and end of work – Task based assessments for maintenance and other appropriate activities

Table A.2: Example list of UK legal requirements where lone working may be prohibited, identified by a major power company

Situation	Regulation	Requirement
On or near any live conductor when it is unreasonable to make it dead	Electricity at Work Regulations (1989)	' ... supervision or accompaniment by persons skilled in resuscitation and isolation measures, may form part of the precautionary measures'
In a confined space, e.g. areas that have restricted access or egress, and where the danger of accumulation of hazardous gases, vapours, mists or lack of oxygen exists	The Confined Spaces Regulations 1997	'Suitable and sufficient arrangements for the rescue of persons ... (and resuscitation)' ' ... and a person keeping watch outside and capable of pulling the person out'
Fumigation work	Control of Substances Hazardous to Health (COSHH) – Schedule 9	' ... notification of police and inspectors when, where and by whom fumigation will be carried out'
Erection of scaffolding	The Construction (Design and Management) Regulations 2015	'under supervision of a competent person'
Prescribed or dangerous machinery	Provision and Use of Work Equipment Regulations 1998 (PUWER) Safe use of woodworking machinery approved code of practice	Supervision of young persons without sufficient training
Pesticides	The Control of Pesticides Regulations 1986	' ... uncertificated users of pesticides must work under the direct supervision of a certificate holder'
Young persons	The Health and Safety (Young Persons) Regulations 1997	'provide adequate supervision for inexperienced and immature persons appropriate to the risks ...'
Diving operations	Diving at Work Regulations 1987	Supervision of diving operations

Table A.3: Summary contents list for site description document

Site location, description and adjacent sites Management structure and responsibilities Health, safety, environment and security: – Induction – Access and egress, including gate/door codes – Permit to work system – Specific hazards: electrical, dropped objects, chemicals, arc flash, hazardous substances and explosive atmospheres – Hazardous activities: work at height, lifting operations, confined space entry, manual handling – Lone working – Emergency response – Environmental risks: run-off, contamination, spill kits – First aid – Communication – Incident reporting – Personal protective equipment (PPE) – Welfare – Waste

ANNEX B
NON-TECHNICAL SKILLS MATERIALS

B.1 RAIL EXAMPLE FOR HOW TO INTEGRATE NTS

Integrating NTS into your competence management system – an example process from the rail industry (based on the structure in RSSB's publication: *A Good practice guide to integrating non-technical skills into rail safety critical roles*; www.rssb.co.uk)

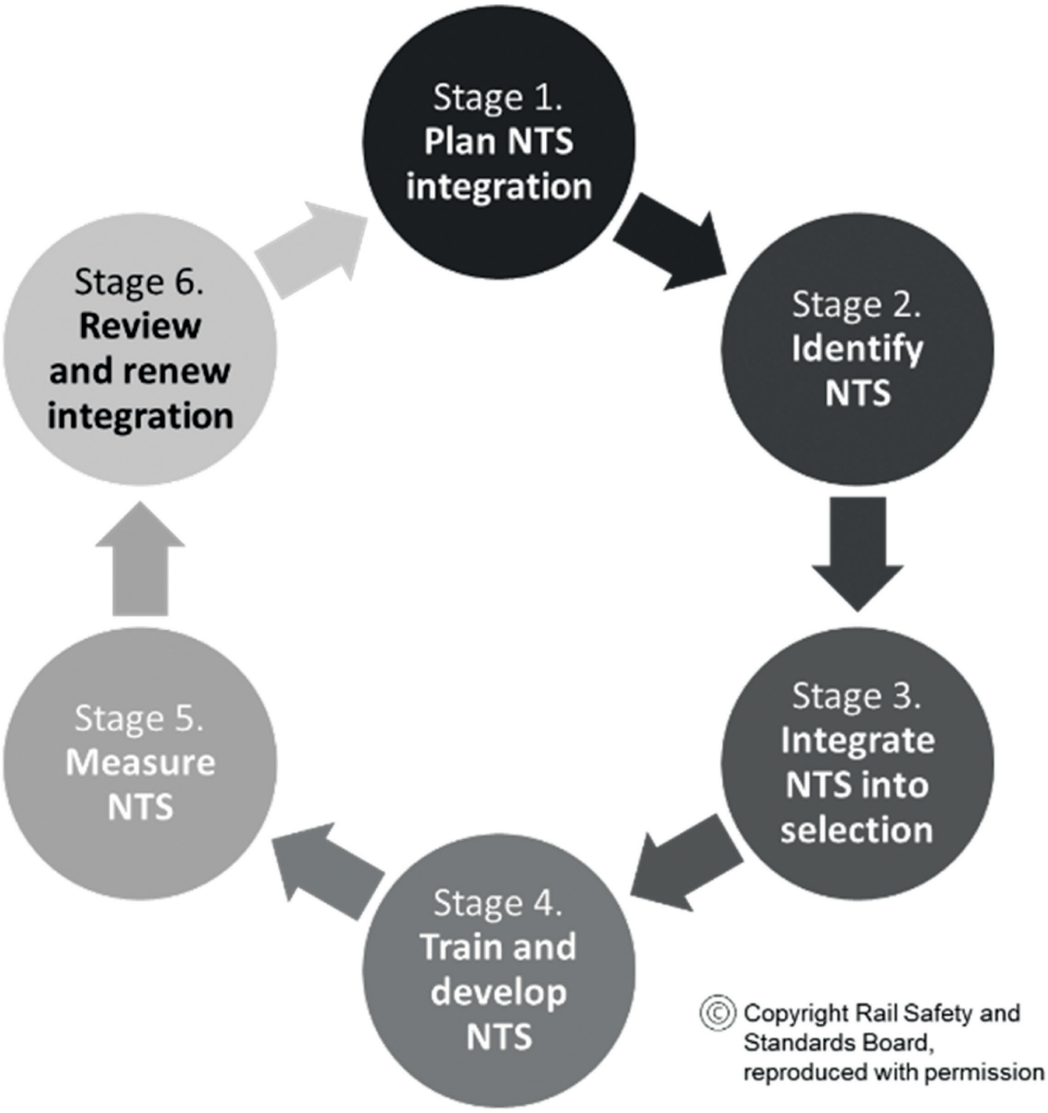

Figure B.1: Non-technical skill lifecycle

Stage 1 – Plan NTS integration: An integration strategy is often needed – equipping the workforce with NTS typically requires a significant amount of work. Many companies treat the implementation of NTS as a formal change programme. Management-level input is often required from operations, maintenance and human resources when planning to integrate NTS. Think about resourcing and how to prepare the organisation to embark on a formal NTS programme.

Stage 2 – Identify NTS: Start by identifying the technical tasks for the job from job descriptions, procedures and training. For each technical task consider what actions are associated with good and poor performance – i.e. what must be done (or avoided) when someone is doing that job alone? This should produce a set of positive and negative behavioural indicators for each task. The next step is to establish what NTS skills are needed. This is done by linking the task, indicators and NTS skills categories. You could update competence assessment standards at this point by adding behavioural examples and associated NTS.

Stage 3 – Integrate NTS into employee selection: Compare the NTS identified for the job (from stage 2) with existing selection methods used as part of recruitment (interviews, tests, etc.), and consider whether the selection methods adequately measure the NTS. For example, a personality assessment may be appropriate to determine levels of conscientiousness, and tests of attention may help when assessing situational awareness. Having reviewed the existing selection methods, you may find some updates are required.

Stage 4 – Train and develop NTS: A training needs analysis will help identify any gaps in how existing training delivers NTS. Experience has shown that NTS are best trained as part of the normal training that is given for technical tasks wherever possible. Sometimes bespoke activities are required, for example, to develop the NTS 'dealing with conflict or aggressive behaviour', a role-play could be used. Some companies review their existing training to identify ways to integrate NTS, making sure that, across the whole training package, each NTS has been covered.

Stage 5 – Measure NTS. Update competence assessments to incorporate NTS, make sure there is some flexibility if integrating behavioural indicators – sometimes there are several successful ways a task can be done. NTS can be measured in personnel through observation, walk/talk throughs, interview, self-assessment, simulation and by looking at incident history.

Stage 6 – Review and renew NTS. This stage is about checking if the NTS work is effective and re-invigorating it as necessary. Mainstream training evaluation techniques can be used to assess the impact of NTS.

Table B.2: Illustrative non-technical skills for a selection of gas main and service repair work

Technical task	Non-technical 'behavioural indicators'	Associated non-technical skill
Identify source of gas escape	Systematic approach taken to sampling site locations for gas readings Findings recorded on a schematic layout of site (e.g. pavements, roadway, ignition sources such as lampposts identified, wind direction noted)	Conscientiousness – systematic and thorough approach
Secures site	Establishes site barriers, lighting and signage	Conscientiousness – positive attitude towards rules and procedures
Plans repair	Considers if pressure reduction is necessary by assessing volume of escaping gas Requests pressure reduction as matter of routine	Decision making and action – diagnosing and solving problems
	Considers need for site attendance by controlling engineer	Decision making and action – effective decisions
	Reviews repair options (pros and cons of stopple, bag-stop and squeeze-off considered)	Decision making and action – effective and timely decisions
Execute repair	Digs cautiously, pausing to take gas readings	Workload management – multi-tasking and selective attention and staying calm under pressure
	Correctly identifies source of leak	Situational awareness – maintain concentration
	Ensures necessary conditions are met prior to repair being made	Conscientiousness – positive attitude towards rules and procedures
Monitor site conditions	Repeats site gas readings and updates initial schematic layout with newer gas readings to identify changing conditions, updates approach accordingly	Situational awareness – anticipation of risk Conscientiousness – checking
Seeks to enter residential premises to reinstate gas	Attempts every property, explaining reason to enter to ensure no gas leaks Asks neighbours about other vacant properties	Communication – listening, assertiveness and clarity Self-management – confidence and initiative Co-operation and working with others – dealing with conflict or aggressive behaviour

ANNEX C
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ANNEX D
ABBREVIATIONS AND ACRONYMS

AR	augmented reality
ATOC	Association of Train Operating Companies (now Rail Delivery Group)
BACP	British Association for Counselling and Psychotherapy
CCTV	closed-circuit television
COSHH	Control of Substances Hazardous to Health
DfT	Department for Trasnsport
EAP	employee assistance programme
EI	Energy Institute
FRMP	fatigue risk management plan
FRMS	fatigue risk management system
GPS	global positioning system
HSE	Health and Safety Executive
IOGP	International Association of Oil and Gas Producers
IOSH	The Institution of Occupational Safety and Health
JESIP	Joint Emergency Service Interoperability Programme
MR	mixed reality
NTS	non-technical skills
PPE	personal protective equipment
PSC	Power Systems Committee (EI)
PTSD	post-traumatic stress disorder
RoSPA	The Royal Society for the Prevention of Accidents
RSSB	Rail Safety and Standards Board
SIM	subscriber identification module
SLAM	stop look assess manage
VR	virtual reality

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