

Annual Review of Environment and Safety 2018

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1. Executive Summary

The Annual Review of Environment and Safety (AROES) aims to review progress against AWE's top-level issues over the past year (January to December 2018) and to highlight key areas for focus over the coming year. Previous reviews of safety and environment were held separately, but it was deemed beneficial to henceforth hold a single and joint AROES given the number of issues with combined regulatory interest.

The previous annual reviews highlighted issues around timeliness and quality of delivery, regulatory compliance, resource challenges, work control, ageing infrastructure and legacy waste. Progress has been made in addressing all issues and root causes, although many remain open and work remains ongoing. The Structured Improvement Programme (SIP), which integrates several of the remedial activities, remains on track for the Chief Nuclear Inspector's (CNI) assessment in November 2019.

During 2019, leadership commits to focus on increased engagement, planning, programme integration, project management, resourcing and internal governance to ensure the timely progression of remedial action plans for the above key themes. Longer-term solutions coupled with well-structured communication and engagement activities are recognised as vital to ensure changes are sustainably implemented.

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3. Abbreviations

AC	Authorisation Condition
AE	Abnormal Event
ALARP	As Low as Reasonably Practicable
AROES	Annual Review of Environment and Safety
ATO	Authority to Operate
CSG	Criticality Safety Group
DAP	Duly Authorised Person
EA	Environment Agency
EMIT	Examination, Maintenance, Inspection and Testing
EMS	Environmental Management System
ESH	Environment, Safety and Health
ESIP	Electrical Safety Improvement Programme
FAP	Forward Action Plan
FARM	Functional Assurance Review Meeting
GTG	Get to Green
HASS	High Activity Sealed Source
HAW	Higher Activity Waste
HEPA	High Efficiency Particulate Air
HSE	Health and Safety Executive
IR	Internal Regulation
ILW	Intermediate Level Waste
INF1	Incident Notification Form 1
LC/AC	Licence Condition
LLW	Low Level Waste
LLWR	Low Level Waste Repository
MDP	Ministry of Defence Police
MSP	Management System Procedure
MSS	Management System Standard
NDA	Nuclear Decommissioning Authority
NNL	National Nuclear Laboratory
NRM	Nuclear Risk Management
ONR	Office for Nuclear Regulation
PRS	Periodic Review of Safety
RA	Radioactive
RASCAR	Radioactive Substances Regulations Compliance Assessment Report
RGP	Relevant Good Practice
RICC	Regulatory Interface Coordination Centre
RIM	Regulatory Interface Meeting
RW	Rolling Wave
SIP	Structured Improvement Programme
WRAT	Wastes Requiring Additional Treatment
WSO	Work Supervisory Officer

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4. Introduction

AWE continuously measures and evaluates its environmental and safety performance, which is reviewed throughout the year at various leadership, shareholder and regulatory governance meetings. The purpose of the Annual Review of Environment and Safety (AROES) is to review AWE's top-level issues from the past year (January to December 2018), ensuring that action plans exist for timely remediation and to highlight key areas for Leadership focus over the coming year. The AROES also fulfils an ISO14001:2015 requirement to annually review the performance of AWE's Environmental Management System (EMS).

Previously, the annual reviews of safety and environment have been held separately. However, as the proportion of topics with combined regulatory interest steadily increases, it is deemed mutually beneficial to AWE and all its regulators to henceforth hold a single and joint AROES. All key metrics and issues identified and evaluated over the past year covering both environment and safety are covered within one of the Framework for Nuclear Safety Performance topics: programme delivery and events, routine control of hazards and organisational capabilities.

5. Sustained Excellence of Operation (Programme Delivery and Events)

5.1 Periodic Review of Safety

During 2018, the Periodic Review of Safety (PRS) programme delivered the A90 [REDACTED] PRS submissions, completed the [REDACTED] PRS remediation works and completed the A45 [REDACTED]; it is noted that submission dates have needed to be adjusted. Criticality Safety Group (CSG) resource has been a significant challenge for several programmes including PRS; an integrated, resource loaded schedule was developed for the CSG enabling optimal prioritisation of a limited resource. Other notable achievements in 2018 included production of an integrated ONR Regulatory Submissions Plan and approval of a Nuclear Risk Management (NRM) scope definition (NRM aims to maintain live safety cases across all nuclear facilities and work to a revised PRS model that will introduce interim reviews to identify shortfalls and develop the appropriate fixes in a timelier manner).

However, there were several challenges within the PRS programme during 2018 that required mitigation through an increased focus on planning, project management, resourcing and internal governance:

- ❑ Many improvement activities (shortfall remediations) had not been undertaken at the time of assessment submission; this is a Licence/Authorisation Condition (LC/AC15) compliance issue;
- ❑ Incomplete Nuclear Facility Safety Cases have resulted in a significant amount of further substantiation work being required before the PRS Assessments could be completed;
- ❑ Submitting PRS Assessments to previously committed deadlines before the remediation work has been fully defined has resulted in growth in the scope of work required;
- ❑ Priority safety improvements in ATC were identified by the ONR following discussion with AWE which required implementation in challenging timescales to maintain continued operations.

Recognising the challenges are still being remediated, the overall delivery of PRS activities remains a key focus for AWE in 2019, with specific deliverables as follows:

- ❑ Commence transformation into the future PRS Operating Model (Nuclear Risk Management);
- ❑ Deliver remaining Phase 2 PRS Assessments [REDACTED] and Aldermaston Site);
- ❑ Deliver the remaining priority safety improvements in the Assembly Tech Centre (ATC);
- ❑ Delivery of safety remediation work resulting from the PRS Assessments in A90, [REDACTED] A45, [REDACTED] and Aldermaston Site;
- ❑ Improving the schedule adherence of quality safety submissions.

5.2 Construction and Commissioning

AWE recognises that ageing infrastructure is both costly to operate and requires an increasing level of effort to continually minimise any safety and environmental risks posed to employees and the public. AWE's Site

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Optimisation Strategy (which includes the Estate Strategy Plan) seeks to rationalise the site infrastructure footprint to be fit for purpose both today and for the foreseeable future; this includes decommissioning and demolition of old facilities and constructing replacement facilities such as the Hub and MMF, as required. Following rebaselining of the Mensa project, all MOD milestones have been completed to date and the project is currently on track. Furthermore, praise was received from external ISO14001:2015 auditors for the exemplary environmental management employed at Mensa. The Pegasus project also achieved its 2018 contractual milestone on time and the project is currently on track. The Burghfield Flood Alleviation Scheme is completing construction in January 2019 and work is now progressing onto handover, planting and landscaping. Major flood risk to AWE Burghfield has been mitigated through this scheme since April 2018.

As part of our Capital Projects Construction Delivery strategy, we have increased the outsourcing of the CDM Principal Contractor role which has resulted in an increase in our productivity. Although we have had to adapt our approach in the way we monitor and review the Principal Contractors arrangements we have maintained our high standards. We have utilised a risk-based approach and focused on leading indicators to deliver improved Construction Hazard/Risk management. This is supported by strengthening our ESH information in our contract documentation and further enhanced by good Leadership engagement. Throughout the year we have maintained our excellent performance, at the end of 2018 Capital Projects had only one OSHA recordable injury resulting in an end of year rate of 0.11 and zero RIDDOR reportable injuries.

5.3 Waste

In 2018 AWE maintained compliance with LC/AC32 (Accumulation of RA Waste) and LC/AC33 (Disposal of RA Waste), whilst significantly reducing its RA liabilities, especially with respect to legacy waste. During the last 12 months AWE has successfully removed over 1080 tonnes of hazardous waste, 48 tonnes of solid RA waste and processed 320m³ of RA effluent in support of ongoing LC/AC compliance and Environmental Permitting Regulations (EPR) requirements and completed a phased programme of legacy source disposal that started in April 2009 and concluded in November 2018. During this time 2733 units were disposed of with an amassed activity of 2.5x10¹² Bq. Specific 2018 accomplishments include:

- ② Disposal of a legacy [REDACTED] high activity sealed source (HASS) from [REDACTED] irradiation facility and associated reductions in liabilities under Phase 13 of the legacy source disposal programme of work;
- ② Removal and disposal of 130 wastes requiring additional treatment (WRAT) oil containers from A45;
- ② Disposal of 39 legacy [REDACTED] for incineration;
- ② Disposal of 27 legacy RA oil containers from building [REDACTED] for incineration;
- ② Disposal of 265 RA redundant items under Phase 14 of the legacy source disposal programme of work.

The removal of these items has resulted in a significant radiological and environmental risk reduction on the site and eliminated business costs associated with the management of these items i.e. routine inspections, statutory leak testing, mustering, maintenance of records, storage costs etc. AWE is also currently on track to achieve the 2018-2020 waste-related environmental objectives, including certain stretch targets.

Several challenges have been encountered during 2018; all remedial activities are on track:

- ② Document quality with regards to hazardous waste identified a need to increase the waste demanders knowledge base. This was addressed at a Community of Practice and will be monitored going forwards.
- ② A corporate awareness campaign is underway to address inappropriate general/recycling waste segregation, supplemented by location specific data to target specific areas of concern. This will be monitored through the Veolia reporting processes going forward.
- ② Safety documentation is being generated to bring the onsite RA AWG696 High Inventory Waste transfer container back into use, following complexities in underpinning safety justifications.
- ② Disposable coffee cups are being withdrawn from use across AWE in 2019, as a recycling trial in July 2018 raised hygiene issues with the cup recycling units and concluded that the costs outweighed the benefits. Reusable cups have been issued to staff; this will significantly reduce waste volumes generated.

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The following activities are scheduled over 2019 to fulfil legislative requirements and regulatory commitments:

- ☐ Preparations to allow Intermediate Level Waste (ILW) transfers to Sellafield to commence in April 2020;
- ☐ Removal of legacy RA waste oils from [REDACTED] and RA waste acids from [REDACTED] to NNL in [REDACTED]
- ☐ Removal of RA Pyrochemical waste from [REDACTED]

5.4 Higher Activity Waste

Close-out of the Higher Activity Waste (HAW) programme is scheduled over several years. During 2018, AWE continued to focus on safe storage whilst preparing for treatment through the HAW Programme activities. Progress has been made with physical improvements to both the stores and the arrangements for how AWE satisfies itself that the inventory is stored safely with risks remaining As Low as Reasonably Practicable (ALARP). The installation of new air handling units to provide a controlled storage environment was completed in 2018 and commissioning is due to complete in early 2019. Development of the surveillance regime has continued, and new review techniques were introduced to identify drums requiring interventions to remain safe during storage.

In December 2018 a capability came online to monitor waste currently held as HAW, including high density waste, and resentence drums to the Low-Level Waste (LLW) stream if criteria are met. Given the number of candidate drums, this offers a significant opportunity to reduce the HAW hazard through disposal to the Low-Level Waste Repository (LLWR) and realise space in the stores, thus negating the need for further stores for the short to medium term.

Progress has also been made to enable treatment and storage of up to 5000 HAW drums at the Sellafield Ltd capability; commitments made to the ONR regarding shipment are on target. MoD is now contracting with the Nuclear Decommissioning Authority (NDA) for the provision of the treatment service and with the LLWR Ltd to provide transport logistics including the Type B Package Licensing. AWE and Sellafield Ltd have collaboratively made progress on candidate drum selection to maximising hazard reduction whilst maintaining safety and environmental compliance. Implementation plans continue to be developed for a dedicated logistics centre required for the transfer programme.

The development of an AWE-owned small-scale packaging solution for some wastes has delivered the design for manufacture of the process, a prototype final package and an Interim Letter of Compliance from Radioactive Waste Management Ltd (required for disposal). The delivery phase of the project is being tendered. The waste to be treated by this capability is in a highly robust waste-form and is also covered by the surveillance regime. In addition, AWE remains an active participant in the NDA Integrated Project Teams for future treatment of HAW.

5.5 Decommissioning

Despite an ongoing pause on high hazard decommissioning operations in [REDACTED] (it was recognised the Safety Case required review), progress has been made in 2018:

- ☐ Six [REDACTED] were moved into Modular Containment Structures (including the draining of oil), reducing the risk of RA release and allowing close out of ONR Issue 6063;
- ☐ Assaying of pyrochemical ILW drums was completed; [REDACTED] drums were transferred to ILW stores;
- ☐ [REDACTED] screed removal is progressing and currently 80% complete;
- Decommissioning wastes continue to be steadily dispatched from facilities. In 2018, 233 LLW drums, 24 Pac Tec bags, 36 waste packages and 38.8 tonnes of “out of scope” waste was removed, including 44 drums and 8 waste packages’ worth of legacy waste.

Moving into 2019, a key focus area is the delivery of the Decommissioning Safety Case 1 that on implementation will allow commencement of high hazard decommissioning operations. Other key focus areas include continuation of [REDACTED] above ground drain removal, completion of the Modification Safety Report to permit removal of the below ground drains in [REDACTED] and completion of the final abatement HEPA filter replacement in the [REDACTED] Space Extract System.

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5.6 Environmental Permit Compliance

A total of 8 environmental permit non-compliances were received within year, all low-level CCS3's or CCS4's:

- ☐ January 2018: Management of Mobile Radioactive (MRA) Sources (two CCS3 breaches)
- ☐ April 2018: Management of HEPA filter systems (two CCS3 breaches; see section 6.4)
- May 2018: Open-source RA store at Burghfield (one CCS4 breach)
- ☐ May 2018: Exceedance of suspended solids and pH at Outfall 5, Burghfield (one CCS3 breach)
- ☐ May 2018: Exceedance of suspended solids at Outfall 8, Burghfield (one CCS3 breach)
- ☐ September 2018: Management of Records for Pangbourne Pipeline (one CCS4 breach)

Remedial activities for all breaches were either completed in year returning the permit status to green (MRA sources and outfall exceedances) or remain ongoing and on-track (open-source store at Burghfield and management of HEPA filters, see section 6.4 for further information). The breach in September 2018 was identified during a routine inspection, but only recently confirmed – at the time of writing an action plan is being developed. The EA are kept updated on the status of the non-compliances at a bi-monthly L3 RIM.

Work is also underway to address changes within environmental legislation in 2018 that will impact AWE. Crown Immunity for Water Abstraction will cease in September 2019 after which AWE will be required to hold a licence. Guidance on the Requirements for Release from Radioactive Substances Regulation (GRR) was issued in 2018; AWE is now expected to implement and maintain a live Site-Wide Environmental Safety Case (SWESC) and Waste Management Plan (WMP) for all AWE RSR-permitted sites, including the Pangbourne Pipeline, by the end of 2023, noting that regulatory review of the SWESC and WMP is required before this deadline.

5.7 Abnormal Events and INF1s

AWE believes in and continues to focus upon an open reporting process. A total of 3118 abnormal events (AEs) occurred during the period January-December 2018. This is a marginal reduction compared with previous years (see Annex A), following an increased focus on proportionality in the AE process. The majority were security related (24.9%), that is AEs where controls have captured anomalies with regard to site passes, physical security (unsecured documentation) or breaches of zonal policy. 4.6% were electrical-related, which may be explained by the heightened awareness in electrical-safety following improvement activities in this area and 5.7% environmental. 37 AEs were subsequently reported as INF1s to the ONR.

Trends in environmental AEs are evaluated against environmental aspects (see Annex A). A notable reduction in AEs has been observed this year for both controlled and RA waste, aqueous discharges and land quality. However, there was a marked increase in the number of AEs against resource and storage use. Refrigerant gas-related AEs fall into this category and an increased number of AEs relating to failed air-conditioning units was observed over the summer due to the long and sustained period of hot weather, as well as from an increased awareness of SF₆ following a training drive. However, total refrigerant gas losses remains comparable with previous years, as air-con unit failures typically result in low-volume losses. Investigations are underway to explore opportunities to reduce the number of refrigerant-gas related AEs.

5.8 OSHA and RIDDOR Statistics

In 2018, AWE had a total of 4 RIDDOR reportable injuries (3 long term absences >7 days and 1 major injury; see Table 1, Annex C for details), resulting from AWE operations involving staff, contractors and the Ministry of Defence Police (MDP). This is comparable with previous years. No RIDDOR Dangerous Occurrences occurred in 2018. The rolling 12-month RIDDOR rate has remained between 0.030-0.046, which is considerably below the 0.080 construction sector external benchmark (see Figure 4, Annex C).

In 2018, AWE had a total of 21 OSHA recordable injuries (see Figure 5, Annex C), primarily resulting from slips and trips or musculoskeletal issues. Of these injuries, only 30% were contractor-related; a marked improvement from previous years where 70% of OSHA injuries were within the contractor community, resulting in substantially higher OSHA rate. An elevated number of injuries were observed in January and July 2018, attributed to an increased number of slips, trips and falls as well as musculoskeletal, but not due to the

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same root causes. This resulted in AWE’s 12-month OSHA rolling rate ranging between 0.304-0.362 during 2018. However, AWE remained within the world class benchmark of 0.35 for 11 months of the year, with a continuing focus on all injuries and their actual and potential causes to minimise the injury rate to the lowest possible level.

5.9 Health and Wellbeing

AWE is also committed to improving the mental health and safety of its staff and contractors. A fulltime Health and Wellbeing lead was appointed in mid-2018. Since then a health and wellbeing strategy has been signed-off by the Executive, with rollout events planned mid-March where AWE will demonstrate its commitment by signing a “Time to Change” pledge. Further activities to raise awareness of the importance of mental health and wellbeing are planned throughout the year.

Radiological dose data for 2018 is presented in Figure 3, Annex B. The data is compared against previous cumulative collected effective doses for high risk employee exposure groups in 2016 and 2017. The Q4 2018 neutron dose data or results from pending investigations will only become available in March 2019 and are therefore currently excluded, however the total cumulative collected effective dose across 2018 is expected to be significantly lower than previous years, given the running rate across the remainder of the year. This is primarily due to a reduce volume in [REDACTED] decommissioning operations during 2018 (which would normally significantly contribute to the cumulative operative dose), as well as the removal of high-dose rate box-line holdings in A90. The latter resulting in a reduction in the building’s radiological safety objective (RSO) from 75 mSv to 35 mSv.

6. Control of Hazards

6.1 Control and Supervision of Work

The Control and Supervision of Work at AWE was a named focus area in the 2017 Annual Review of Safety (AROS). Numerous improvement activities have been undertaken and continue to increase the robustness of AWE’s arrangements and implementation of them. Procedural documents for Control and Supervision of Work have been reviewed, updated for consistency and aligned with the requirements of the standard (which will be issued in 2019). Updates to MSP1526 and MSP702 have been published. Several communication events have been completed to make Authority to Operate (ATO) Holders and their management teams aware of the updated arrangements; further events are planned for 2019. The compliance matrix for monitoring performance on meeting the LC/AC26 (Control and Supervision of Operations) requirements is currently progressing through internal governance; once accepted the matrix will be rolled out in 2019.

The Work Supervisory Officer (WSO) curriculum has been reviewed and revised following consultation with SMEs. The revised WSO training material was completed in December; it will be piloted in January and February with the current WSOs, members from SET and NTR as well as SMEs who have had input into the classroom-based training scenarios. It should be noted that the extant training material is available, and training continues to be delivered as required.

Progress has been made to complete the work required to address issues raised from the 2016 Internal Regulation (IR) inspection. The only remaining open issues are around the compliance monitoring, which are due to go to FARM on 21st January 2019 with implementation thereafter, the other is with HR regarding the Workday and Minerva interface. One outstanding issue from the 2016 IR audit relating to WSO training is currently being assessed against the progress described above before the anticipated closure.

LC/AC26 improvement activities have been included in the Safe Operations (Safe Ops) workstream of the SIP. SIP activities have been added to the LC/AC26 GTG plan to ensure a joined-up approach. The plans and the progress made against the activities are shared with the Regulators at the Level 3 RIM.

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6.2 Non-Nuclear Risk Assessment

Following an extensive review of Non-Nuclear Risk Assessment in 2016, it was found that the efficiency and effectiveness of the risk assessment process could be improved. The review identified several areas for improvements including disproportionate assessments, inconsistency in application of controls, duplication, inflexible training and culture and communication. As a remedial activity, a single non-nuclear safety assessment procedure with the focus on proportionality was developed. This provides tools to apply the procedure pragmatically to the level of hazard and risk, allows for Safety Case learnings to be joined up with non-nuclear assessment and overall enabled a far more streamlined approach to risk assessment. The procedure was trialled in laboratory and workshop facilities and following some improvements is now being implemented across AWE sites; not only with the focus on technical improvements but the wider change it brings in terms of culture, behaviour, accountability and ownership. Progress in implementation across AWE is currently being reviewed.

6.3 Maintenance Backlog

The planned and breakdown maintenance backlog has been reduced by 16% overall during the year. Furthermore, zero LC/AC28 (Examination, Maintenance, Inspection and Testing (EMIT)) tasks have gone beyond their final date without having been risk assessed and managed via the corporate LC/AC22 (Modification and Experiment on Existing Plant) change control process (AM(PE) 6020).

The maintenance backlog in December 2018 was 1.00% (the target is 0.75%). The focus on further reducing the backlog continues; a new process of raising and managing interventions associated with poor delivery performance has been implemented, which has already produced results (e.g. within Machine Tools). Work is also ongoing to change how the maintenance backlog is measured and reported to increase visibility of where improvements are required and allow benchmarking against external industry.

6.4 HEPA Filters

In April 2018, AWE received a joint ONR and EA Letter of Enforcement regarding AWE's management of HEPA (High Efficiency Particulate Air) filters. Industry relevant good practice (RGP) has matured over time as new potential mechanisms of failure relating to filter age have become apparent. AWE's arrangements have relied on regular and frequent testing of filter performance to ensure they haven't degraded and whenever filter performance has reduced, these filters have been changed. AWE has committed to review their arrangements and management of HEPA filters against RGP and implement improvements, where required.

AWE has provided the ONR and EA with a project plan, technical report and options appraisal process as part of its commitment to address the regulatory actions identified in the enforcement letter. Some 2,000 HEPA filters across both sites are being reviewed to determine whether they are to be replaced, removed because they are not needed, or to remain in place if there is sufficient justification. Higher priority HEPA filters in nuclear facilities are being considered first. This review will be completed by August 2019 and will also include non-nuclear facilities. In addition, AWE is reviewing its nuclear ventilation management arrangements, with findings due March 2019. Currently, the project remains on-track and is supported by ongoing liaison with both regulators at a L4 HEPA Filter RIM.

6.5 ESIP

Since 2017 an elevated number of electrical-related abnormal events (AE) has been observed due to heightened awareness following a campaign on electrical safety, one of which resulted in a prosecution for AWE. An Electrical Safety Improvement Programme (ESIP) is being delivered, focusing on:

- Resource and Accountability – review of the electrical safety organisation and member behaviours;
- Control – review of AWE's procedures and those of its Supply Chain, including work control and risk assessment; meaningful trending on AEs;
- Competency – clear training and competency requirements for roles;

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- Verification – External peer review and alignment with industry good practice; development of metrics for ongoing performance monitoring.

Immediately following the A90 Flashover, all live electrical work was halted whilst a review of the risks posed from live working was carried out. Numerous talks and behavioural workshops have been delivered on live working awareness and the importance of continual risk assessment; these workshops will be repeated as ESIP progresses to measure the impact of improvement activities. A review of management documentation and electrical safety code is underway to improve clarity and alignment with Health and Safety Executive (HSE) documentation and industry relevant good practice. A full-time Senior Electrical Authority has also been appointed, a role accountable for the continuous improvement of electrical safety at AWE. A review to identify further areas for improvement is due for completion in March 2019. The resultant improvement activities will be linked with other improvement programmes and disciplines across the business (e.g. SIP, Mechanical Safety) to maximise shared learning and consistency.

6.6 Emergency Response

AWE's Emergency Arrangements for Aldermaston and Burghfield, under LC/AC11 and other related legislation, were assessed by the regulatory bodies in 2018 and deemed as adequate. A continual training and assessment exercise programme remains in operation, allowing for identification of learnings in environment, safety and security, to ensure the emergency response remains efficient and effective. In addition, an improvement programme is ongoing to uplift the emergency arrangements, which is part of the LC/AC improvement program. Requirements capture and gap analysis activities are currently ongoing and will generate a forward action plan to be delivered via the Site Response Group strategy.

6.7 Dangerous Goods Transport

Dangerous Goods Transport (DGT) is being transferred to Waste Management and Decommissioning under the MSP1536 and Asset Change Request (ACR) process. A new role of Facility Manager DGT has been created and appointment made as part of the steps to ensure competent resource is in place at AWE. Current status of LC/AC5 is considered green, no issues to report.

6.8 Explosives

Following an Assurance Safety Compliance Review of the Explosives Tech Centre (XTC), a formal safety inspection of HEFF was conducted in 2018 and a report of the findings issued. Areas identified for improvement were housekeeping, control of waste streams and explosives fundamentals. Improvement plans are currently being developed and will be tracked on For@ction. A programme of training is in development to upskill personnel in requirements and behavioural expectations. The Explosives Safety Manual is being uplifted to clarify requirements and improve ease-of-use.

During the previous AROS, several issues were identified:

- The explosive [REDACTED] was identified as a disposal risk due to potential fluoride emissions. It has since been determined that fluoride emissions are negligible during burning operations, thus not an issue.
- The sensitivity of [REDACTED] is a risk. AWE remains unable to dispose of [REDACTED] as a result, but a programme of work is underway to identify appropriate controls measures for safe handling of the material.
- ☐ The explosives accounting process required standardisation. QMAS has now been standardised and training is being rolled out to users.

7. Positive ESH Culture (Organisational Capability and Leadership)

7.1 Structured Improvement Programme

The Structured Improvement Programme (SIP) is now well understood in terms of its content, structure and importance. It remains a key focus to transform AWE to the nuclear industry leader for safety by 2022.

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Progress remains on track for assessment of whether AWE will be removed from enhanced regulatory attention in November 2019.

7.2 People Programme

The People Programme in 2018 has focused heavily on projects to increase the robustness of AWE's organisational capability, namely clarity of training and competence and a review of the Nuclear and Environmental Permitting Requirements (EPR) baselines. In December 2017 ONR issued AWE with an Enforcement letter relating to AWE's LC/AC36 process and controls, namely consistency and quality of application across AWE and adequacy of governance. A dedicated project manager and LC/AC36 Technical Authority have been appointed. Get-to-Green plans have been developed, which are on track to provide revised MSP1536 arrangements, a Control of Management of Change register and a single and consolidated Nuclear Baseline for AWE by April 2019. Work is also underway to align the EPR and Nuclear Baselines, recognising that benefits of the improvement programme outlined above can also be leveraged in the EPR Baseline and that closer alignment would increase clarity for roles that are listed on both baselines.

The baseline review project is complimented by additional focus on competency requirements, assessment and recording. Weaknesses emerged following Oracle-Minerva migration in 2017, which resurfaced this year resulting in a decision by AWE to briefly turn the Site Status to red. A comprehensive improvement project is underway; similarly, a dedicated project manager and LC/AC10 and LC/AC12 Technical Authority have been appointed. Get-to-green plans are on track, which will provide:

- ☐ A clear path to develop, assess and implement competency requirements, which will be detailed in job and position profiles, allowing management to assess staff against clear requirements. The initial operating capability has been prioritised to cover safety/environment related baseline role activities.
- ☐ A plan to systemise provision of underlying curriculum, courses, training content and delivery for these competency areas.
- ☐ Development of system and data architecture to underpin initial operating capability and maintain data integrity and configuration, with a maturity path to a more comprehensive system solution for final operating capability.

7.3 Key Skills Shortages

A shortage of Safety Assessment Specialists was noted during the previous AROS and several other key skill shortages were identified during 2018, namely Peer Review and Engineering Duly Authorised Persons (DAP). Increasing resource and prioritising demand in these areas has been a key focus in year, as detailed below. Overtime levels of personnel within critical resource groups are being tracked and actively managed to minimise impact on wellbeing.

Safety Assessment and Peer Review: Prior late deliverables have caused a "bow-wave" of Safety Submissions, causing concern that the Safety Assessment and Peer Review sub-functions would not be able to accommodate the large work load moving forwards. ONR was noted to voice similar concerns about their ability to support the correspondingly large volume of assessment and permissioning activities. Remedial activities include:

- ☐ Establishment of a coordination team within the Programme Management Office, supported by an Executive Regulatory Commitments Steering Group;
- ☐ Workshops held with ATO Holders, project leads and function leaders to agree safety and business priorities, understand resource requirements, agree moves and understand impact of changes made;
- ☐ Production of a Regulatory Submissions Plan (formally issued to the ONR on 18 December) that meets safety and business needs. PMO are prioritising specialist safety and engineering resource as required.

The above changes have been assessed as having no impact upon nuclear safety, which will be formalised in a 1536 proforma. Performance against the Regulatory Submission Plan will be monitored, and changes managed via formal change control with monthly agreement from the PMO. Opportunities to streamline the assessment process are being explored. In the longer term, a move towards the new PRS Operating Model (Nuclear Risk Management) aims to smooth the demand and prevent the reoccurrence of assessment bow-waves.

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Criticality resource remains an ongoing concern to both AWE and the wider Nuclear Enterprise. Work continues both internally and in collaboration with industry/academia to improve both the short and long-term picture within this niche discipline.

Engineering Duly Authorised Person (DAP): Engineering DAP shortages were identified in PTC, UTC and SET. As of January 2019, all roles within PTC now have coverage. Although the current position still falls short of the aspirational goal (two-person coverage per role for resilience) there is a low frequency of demand for most of the interventions. The UTC role is currently vacant; it is also a low demand intervention but ongoing HEPA filter improvement activities makes this a high priority to resolve. The new DAP role in SET has full coverage. DAP roles are currently voluntary, making it challenging to attract persons with the right experience; work continues towards resolving this issue.

RA Waste Officers: A resource risk has emerged in-year with RA Waste Officers. Mandatory baseline requirements continue to be met, but a high attrition rate makes meeting the aspirational headcount challenging. Recruitment can be a long process and suitable candidates must have DV clearance and follow a SQEP arrangement. Improvement plans are being developed.

7.4 AWE Management System

AWE received an improvement notice from the ONR regarding its Management System in 2017. Phase 1 of the remedial Management System project was successfully completed in October 2017. Since then, the project has been subsumed into the wider Structured Improvement Programme (SIP) as one of the four SIP workstreams, as many root causes were identified as being directly attributable to the Management System and associated processes.

Progress to date has been steady. Accountability for the management system now resides singularly with the Head of Quality, managed through the deployment of updated LC/AC17 arrangements. Options for changing the Management System database platform (Nimbus) are being studied; considerations are still embryonic, but close alignment of the system with Ozone (perhaps via the use of SharePoint) is key. New training courses are currently under construction, designed to increase awareness of the Management System, as well as providing detailed training for document owners, authors and process owners/managers. Analysis of documentation within the existing system has identified over 20% for removal with more under review, based on the validity and value the documents provide to the user community. The 16 core processes are being streamlined and where appropriate industry standard processes are being introduced; this approach will be mirrored further down the process where applicable. Control over changes to processes and documentation are now governed by the procedure that was introduced in response to the ONR improvement notice; this continues to be pragmatically refined and enhanced in line with business operations. Further governance has been introduced in the form of process measurement, assessment via internal/external audit and formal process owner reviews, which all form part of the revamped management review process introduced in October 18. To ensure changes are embedded, communication and engagement activities are deployed using Prosci and ADKAR change management tools. Plans are in place to help process leads embed the changes within their areas.

In summary, the Management System SIP workstream has progressed over 2018. Overall system integrity has been improved, verified through the closure of the ONR improvement notice and issue, and a successful ISO9001:2015 external audit. Improvements will continue over the course of 2019, in line with the SIP programme.

7.5 Refresh of Licence Condition Management Standards

Following a specification regarding the production of safety case documentation, AWE took the opportunity to review all its nuclear Licence Condition arrangements. The specification was successfully suspended in July 2018 and all cornerstone LC/ACs have been through extensive review, governance and NSC (completed in September). Standards have been prepared for inclusion into the management system following LC/AC17 review processes and await final governance acceptance in January 2019. There are several exceptions (LC/AC10, 11, 12 and 36) which require development of subordinate arrangements prior to release; these are

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being developed by relevant owners and overseen via internal governance (FARM). LC/AC35 requires ONR approval, with a revised copy being sent to the regulators post-NSC. Executive reviews have been completed for Cornerstone LC/ACs; further meetings are programmed for the remaining complex LC/ACs (LC/ACs 6, 7, 10, 11, 12, 24-26, 28, 34 and 35) running up to the end of February. Monitoring documents have been developed for all cornerstone LC/ACs, with the remainder LC/ACs scheduled for completion by January. Notwithstanding the exceptions highlighted, the LC/AC Executive Reviews and issuing of the LC/AC Standards will be completed during Q1 2019.

7.6 Environmental Management System

AWE's Environmental Management System is accredited to ISO14001. In April 2018, AWE successfully transitioned to the new 14001:2015 standard, following the close out of two major non-conformances raised in October 2017. Following a further surveillance visit in October 2018, 4 minor non-conformances remain open at the end of 2018 on the topics of:

- ☐ Control of Contractors (Competencies and Obligations)
- ☐ Management of records
 - Management of Ozone Depleting Substances and Fluorine-gases
- ☐ Data analysis and evaluation

Remedial action plans are underway to address the above and all on track.

7.7 Learning from Experience

Incremental improvements have been made to AWE's LC/AC7 arrangements during 2018 to ensure the process remains fit for purpose, focusing on reporting, training, guidance notes and roles and responsibilities, notably:

- ☐ Widened communication of AWE Alerts and RLIs to include Coulport and Teutates
- ☐ Developed a programme to assess implementation of arrangements and compliance across AWE
- ☐ Established a reporting loop for Operational Experience and Learning Group alerts
- ☐ Revision of MSS1507 and MSP1507
- ☐ Enhancements to the Investigator Training Programme
 - Recruited two full-time Senior Investigators and trained more than 100 new investigators
- ☐ Developed and implemented an internal governance regime for investigations

A get-to-green (GTG) plan is in place and on track that will address remaining audit non-conformances, outcomes from internal and external regulatory assessments, user needs and general process improvements.

In the later part of 2018, concerns were raised regarding the timeliness of investigations; further analysis indicated that on average investigations took more than 70 days to complete. As a result, significant changes were made to the Abnormal Event procedure (MSP1507), mandating a 10-day turnaround period for all levels of investigation starting from when an event is raised electronically (see Figure 6, Annex D). A more stringent accountability and escalation framework has also been introduced so senior leadership are notified more quickly, coupled with a revised risk assessment matrix (see Figures 7 and 8, Annex D, respectively). The new process came into effect 3rd December 2018; initial thoughts are that the process is working, but rollout of communications across AWE has been slow. An improved awareness campaign is currently awaiting deployment. User feedback is currently being gathered, which will determine future enhancement steps.

The FOR@ction system replacement project is ongoing. A new system has been identified, known as ITRAC; once implemented it will be accessible internally and externally on all Ozone devices, which should lead to more timely reporting. To ensure the product once released is fully functional, high quality, logical, intuitive and user-friendly, adequately tested and fit for purpose, the implementation will complete in April 2019.

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8. Conclusions

Work remains ongoing to remediate issues identified in the 2017 AROS and those which emerged this year, all around the themes of timeliness and quality of delivery, regulatory compliance, resource challenges, work control, ageing infrastructure and legacy waste. Progress has been made in addressing all issues and root causes; whilst many remain open, action plans exist that for the greater part are on track including the SIP that remains on track for the CNI assessment in November 2019. ESH-related improvements not arising from issues were also delivered in year, such as an increased focus on health and wellbeing. Over 2019, leadership will focus on continuing progression in the above key themes, including specifically:

- Timely delivery of PRS activities
- Further progression with high-hazard waste (HAW) and decommissioning
- Ongoing reduction in the backlog of planned and breakdown maintenance
- Maturation and delivery of the E-SIP
- Improvements to AWE's management of HEPA Filters
- AWE's Site Response Group capability and resilience
- Control and Supervision of Work (LC/AC26) improvement activities, including electrical
- Continued implementation of the new non-nuclear risk assessment process
- Progression with the People Programme (Competence Framework and Baseline Review)

9. ANNEX A – Abnormal Event Performance Data and Trends 2018

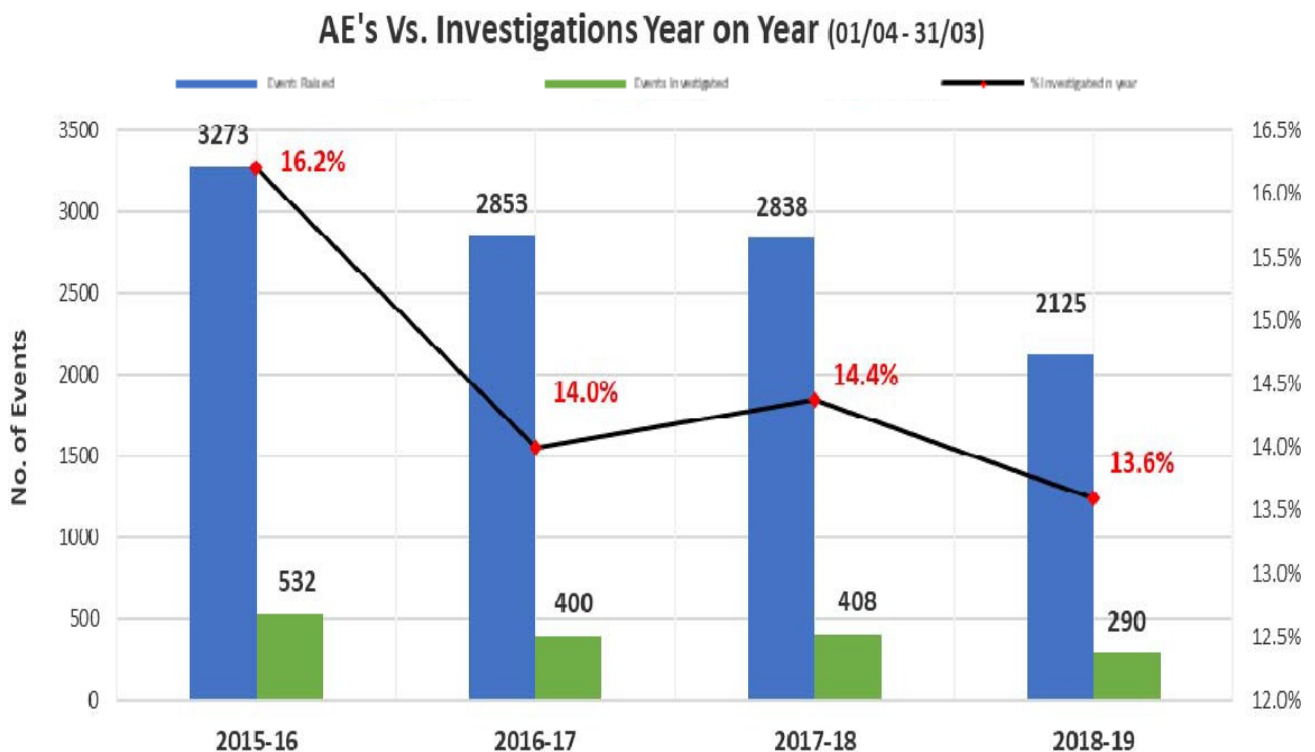


Figure 1 Total number of AEs reported year-on-year, covering the period 1st April to 31st March, including the percentage of AEs that were fully investigated

Table 1 Top AE by type in 2018, across AWE

Top Events by Type	Incident Types (Description)
Security Passes	Failure to undertake personnel exit briefs, non-return of site passes
Low Voltage Electrical	Trip amp failures, parts failures, poor installations, damaged equipment and known deviations from process
Fire Alarm Activation	Unplanned automatic activation of fire alarms, resulting in deployment of emergency services. Mainly as a result of fault-panel malfunctions
Injury	Typically minor injuries involving slips, trips and falls, hand and head abrasions and muscular strains
Criticality	Typically CIDS transgressions
Physical Security	Typically classified documentation left in an unsecured state i.e. on desks, printers, not locked/filed away in correct storage containers
On Site Driving	Poor behaviours, use of mobile devices whilst driving, failure to stop for pedestrians at designated crossings, unauthorised use of designated parking bays, speeding
Breaches of Zonal Policy	Attempted entry into restricted areas with prohibited items e.g. USBs, mobile phones, Sat Navs, Smart Watches etc.

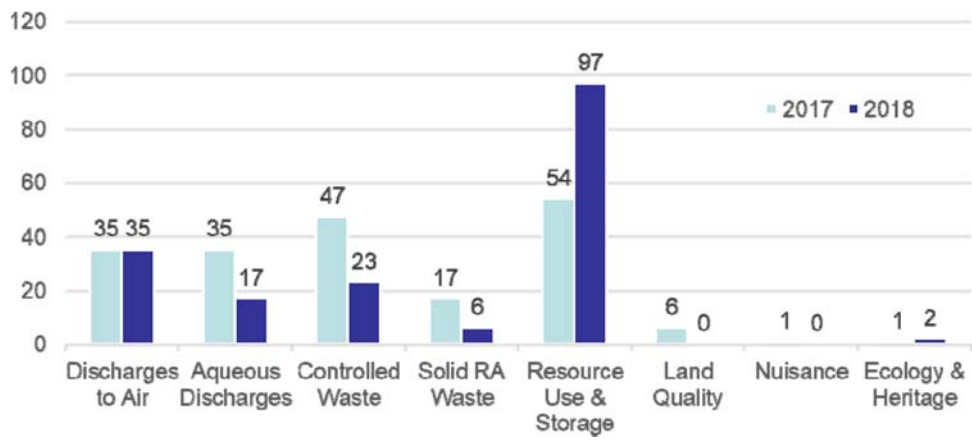


Figure 2 Total number of environmental AEs reported across 2017 and 2018 (January to December), categorised by environmental aspect

10. ANNEX B – Corporate Radiological Dose Data

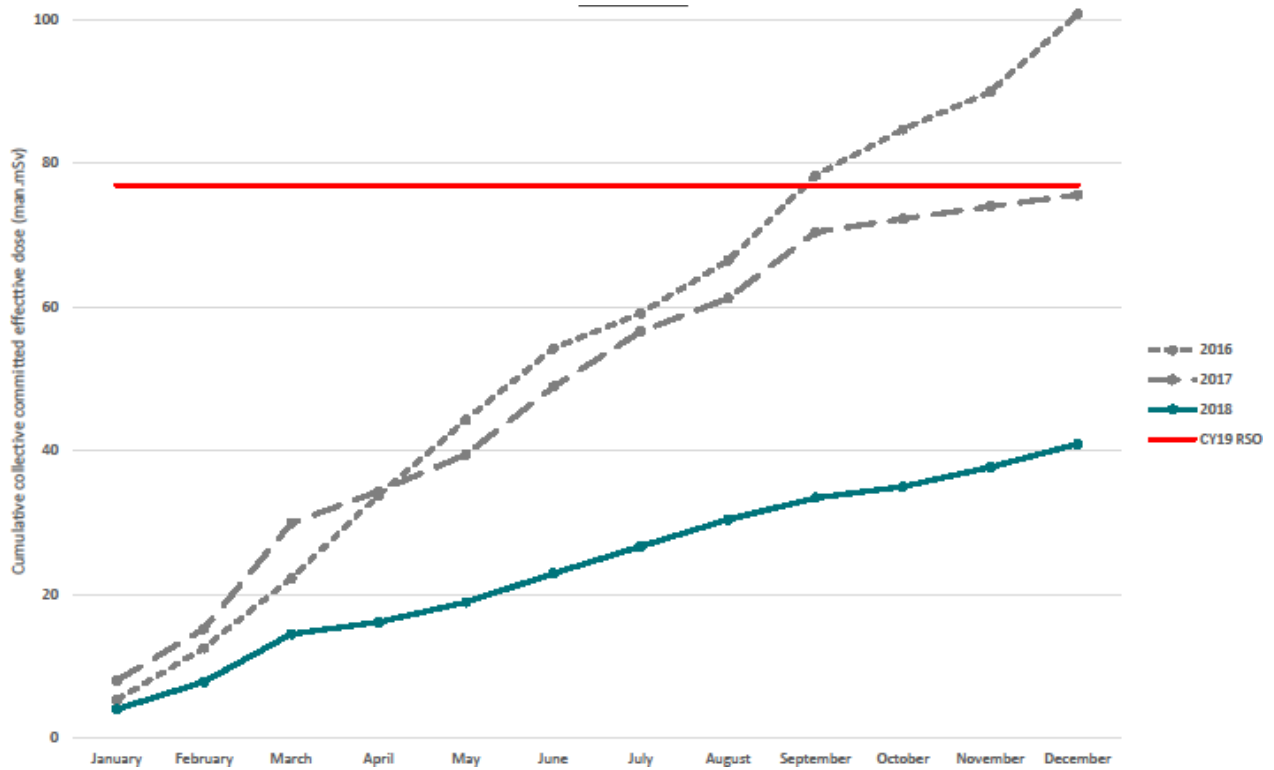


Figure 3 A comparison of the cumulative collective committed effective dose in higher risk employee exposure groups for the years 2016-2018. Note: The above data does not include the Q4 2018 neutron doses or results from pending investigations; this data will be available March 2019.

11. ANNEX C – RIDDOR and OSHA Metrics for 2018

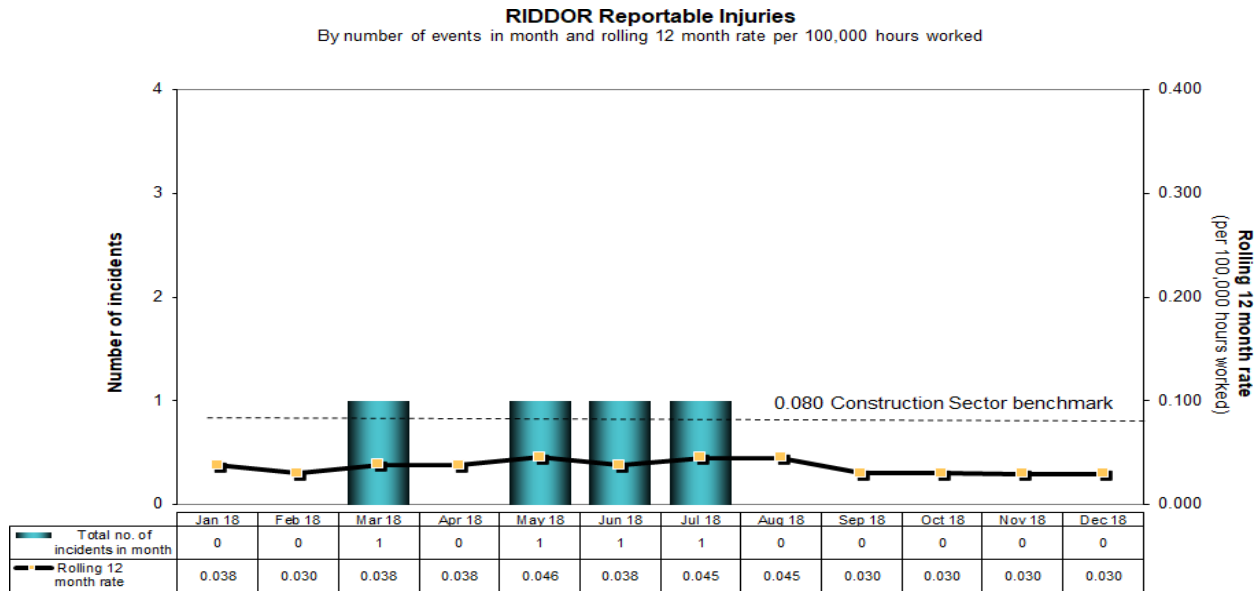


Figure 4 RIDDOR reportable Injuries in 2018 relating to incidents arising from AWE operations involving the following populations: staff, contractor and MDP where appropriate. Please note not all events reported by MDP to the HSE under RIDDOR are included here (e.g. injuries sustained due to the MDPs selection of body armour for their officers).

AE Number	Date	RIDDOR	Brief Details	Person Type	Injury Type	Body Part	Injury Cause Category
1-3U8FVY	19/03/2018	LTA > 7 Days	Slipped on a patch of ice in court yard which wasn't gritted. IP dislocated knee.	Staff	Dislocation	Knee	Conditions underfoot (outdoors - weather related)
1-3WB9CK	11/05/2018	LTA > 7 Days	Housekeeper tripped over raised concrete road whilst walking between buildings.	CW	Dislocation	Shoulder	Conditions underfoot (outdoors - uneven surface)
1-3X3OWW	04/06/2018	LTA > 7 Days	Car hit a cyclist at the R61 roundabout resulting in the cyclist being taken to hospital.	Staff	Dislocation	Collarbone	Cyclist collision or fall
1-3Y3USE	04/07/2018	Major Injury	Fell off bike during offsite UK Challenge preparation resulting in fractured elbow.	Staff	Fracture	Elbow	cyclist collision or fall

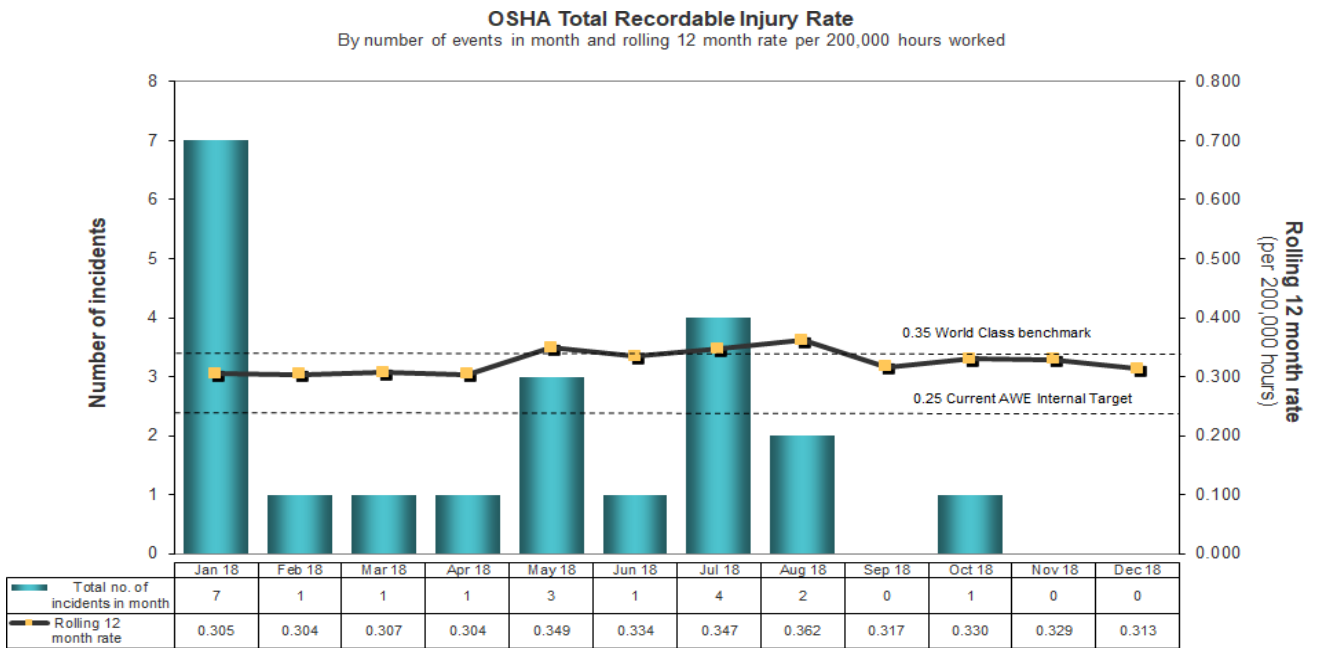


Figure 5 OSHA recordable injuries in 2018 relating to incidents arising from AWE operations involving the following populations: staff, contractor and MDP where appropriate.

12. ANNEX D – New Process for Abnormal Event Investigation

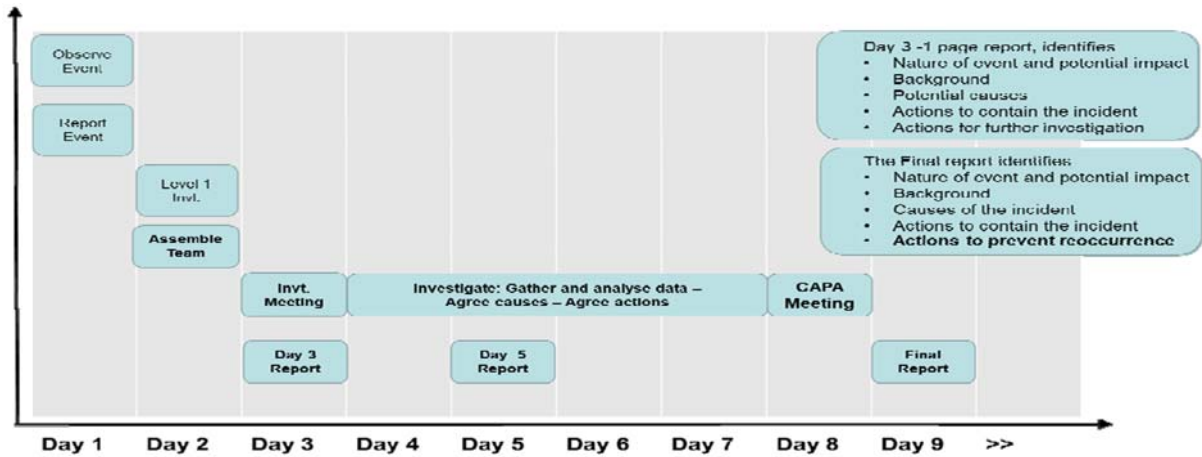


Figure 6 Newly introduced timeline for investigation of abnormal events, mandating a close out of investigations within 10 days from when the event is first reported

	Who	Reporting	Escalation period
Level 1 events	AOM / Line manager	Tech Centre Head Head of function	Discuss at daily/weekly governance meeting
Level 2 events	Tech Centre Head Head of Function	Director responsible	Within 24 hrs
Level 3 events	Director	COO	Within same working day
Level 4 events	Director	CEO	Within 1 hr

Figure 7 New accountability and escalation framework for reporting/investigation of abnormal events

Likelihood of reoccurrence	Hazard Severity			
	Minor	Serious	Major	Catastrophic
Almost Certain	Yellow	Yellow	Orange	Red
Frequent	Yellow	Yellow	Orange	Red
Occasional	Green	Yellow	Orange	Orange
Remote	Green	Yellow	Yellow	Orange
Rare	Green	Yellow	Yellow	Orange

Figure 8 Revised risk assessment matrix for reporting/investigation of abnormal events