



Office for  
Nuclear Regulation

**Nuclear Safety and Radiological Safety  
Events Reported to ONR April 2015 to  
December 2017**

Version 2, June 2019

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# Version control

Version	Date	Description of Change
1	12 March 2019	First issue
2	12 June 2019	Amended to include an additional INES 1 event previously reported as an INES 0 (AWE 23/07/2015).

# Section 1: Introduction

## Purpose and Content of the Report

This publication provides information relating to incidents and events reported to ONR during the period April 2015 to December 2017. The report aligns with our strategic theme: “*Inspiring a climate of stakeholder respect, trust and confidence*” as well as the expectations of the UK Regulators’ Code in relation to regulating in an open and transparent manner. This report covers the period from our last published events report in 2015 up to our intended annual reporting of events from 2018 onwards. The first of these new annual events reports, covering 2018, will be published later in 2019.

ONR’s dutyholders are required to report nuclear and radiological safety incidents and events<sup>1</sup> in accordance with current legislation, namely the Nuclear Installations Act 1965 and the Nuclear Industries (Dangerous Occurrences) Regulations 1965. Notwithstanding legal obligations, an open and positive reporting culture for all incidents and events is something we strongly encourage across the industry. We take a proportionate regulatory approach to the events notified to us, paying particular attention to those with safety significance requiring regulatory action. The vast majority of events are of no safety significance, however the reporting of such events may provide opportunities to identify additional actions that dutyholders or ONR can take to improve overall safety. For the purposes of this report we have referred to all incidents and events as simply ‘events.’

In the report we have focussed on the more safety significant events, utilising the International Atomic Energy Agency (IAEA) International Nuclear and Radiological Event Scale (INES) as the internationally recognised communication tool designed

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<sup>1</sup> Incidents are notified under Licence Condition 7: Incidents on the site. Events are those that are classified in accordance with the International Nuclear Event Scale (INES). Not all incidents notified under LC7 constitute an event on the INES.

for this purpose. The report provides details of those events with safety significance, the dutyholder's response and the subsequent action taken by ONR for each event.

UK law requires nuclear dutyholders to comply with very high standards of safety in order to protect the workforce and public from harm. In this reporting period there have been no events reported to us that have been classified on the INES as greater than INES Level 2 (incident). Section 2 details all the INES Level 1 and 2 events reported to ONR over the period. Section 2 also captures the five events reported to us that have met the requirements for reporting to Government in accordance with the Ministerial Reporting Criteria (MRC). None of the events in this report had any detrimental effect on public safety or the environment.

Section 3 details transport events notified to ONR which were not related to nuclear sites but were classified as INES Level 1.

The dates within the tables refer to the date when the event occurred as opposed to the date the event was reported to ONR. In addition, we have included figures for events reported to us deemed to have had no safety significance with the aim of capturing learning. The strong level of reporting by the industry provides an indication of the wider safety performance and information in relation to the culture of reporting and learning by those we regulate. Section 4 provides the numbers of such events reported to ONR.

The report also provides details of how ONR's incident and event reporting process works and the level of attention that we pay to each event. The structure of the report lists INES Level 1 and 2 events by site rather than in chronological order to enable clearer understanding of the events reported by each site.

Conventional health and safety events and events relating to security are outside of the scope of this report which is limited to nuclear safety or radiological events that are subject to the INES classification scheme. Conventional safety events involving industrial injuries are reported to ONR via the Reporting of Injuries, Diseases, and Dangerous Occurrences Regulations (RIDDOR) 2013. Security events have not been included because of the sensitive nature of the information involved.

## Event Reporting and ONR Response

We publish guidance on the type of events that we expect dutyholders to report to ONR and the process for doing so. The full guidance is available on the ONR website at [www.onr.org.uk](http://www.onr.org.uk), however, a summary of the process is given below.

The type of events reported to us fall into one of five categories:

1. Nuclear safety - covers events involving plant and equipment issues that have an impact on nuclear safety
2. Radiological safety - covers events where personnel have been involved or could have been potentially exposed to radiation outside of normal working levels
3. Transport - covers events relating to the movement of radioactive material
4. Safeguards - covers events relating to accounting for and control of nuclear material
5. Security - covers security related events

A full description of the event codes is provided in our published guidance.

When an event is reported to ONR, we allocate an ONR inspector to review the event and decide on an appropriate course of action. This takes place for all events reported to us regardless of the perceived significance and, as a minimum, we will review the actions taken by the dutyholder to ensure that these are appropriate. We may also decide to undertake a review of the event during a dedicated site visit or as part of our routine site inspections. In some instances, for example if the event has potentially serious consequences or if it is a repeat occurrence, we may decide to undertake a formal investigation, which may lead to formal enforcement action.

For all events we require the dutyholder to submit a follow-up report that details findings from their investigation into the event. Typically, this will include identifying the root causes of the event and actions taken to prevent a repeat. As a minimum we will review the report and may require further work to be done based on the outcome of the dutyholder's investigation.

There are exceptions to the above process associated with the notification by dutyholders of so called AN01 events. These are events with no potential safety significance but which appear likely to attract, or have attracted, significant national media or public attention. An example within this criterion would be if emergency services attend a nuclear site with flashing blue lights and sirens. Providing that the event is not a consequence of site activities, for example a worker medical issue, then we do not expect any further action by the dutyholder and we will not follow up on the event. Statistics for AN01 events reported to us are provided in Section 4.

## The International Nuclear and Radiological Event Scale (INES)



The INES is a communication aid to help general understanding of the nuclear safety significance of an event and the impact it has had in three different areas: on people and the environment, on radiological controls and barriers at facilities, and on defence in depth. The INES ranges from 0 to 7, with 7 being the most significant. How events are graded is described in detail in the INES Users' Manual, which is available on the IAEA website, [www.iaea.org](http://www.iaea.org). In addition, there is information contained within Table 1 of the guidance associated with the general criteria for rating events in INES.

At the lowest level the events reported at INES 0 / below scale have no safety significance. This means that the event did not meet any of the criteria listed below. However, these events may still be important in identifying potential weaknesses in defence in depth and radiological controls and barriers at facilities. It is by analysing these events that dutyholders are able to maintain and improve safety performance.

For the events reported at INES 1- Anomaly, this usually means that there have been minor problems with safety components but with significant defence in depth remaining.

Defence in depth comprises a series of independent physical and/or non-physical safety barriers (inherent features, equipment and procedures) aimed at preventing faults in the first instance, and ensuring appropriate protection or mitigation of accidents in the event that prevention fails. Defence in depth should prevent faults, or if prevention fails should ensure detection, limit the potential consequences and stop escalation.

For events reported at INES 2 - Incident there are a number of criteria that may have been met including:

- exposure of a worker in excess of the statutory annual limits, namely the Ionising Radiations Regulations 2017;
- significant radioactive contamination within a facility in an area not expected by design; and/or
- significant failures in safety provisions but with no actual consequences.

Over the reporting period there were 1192 INES Level 0 (no safety significance), 49<sup>2</sup> Level 1 (Anomaly), and three Level 2 (Incident) events reported to ONR by operators of nuclear facilities. In addition, 54 INES Level 0 (no safety significance) and five INES Level 1 (Anomaly) transport-related events were reported to ONR by organisations not operating nuclear facilities.

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<sup>2</sup> The figures have been updated to include an additional INES 1 event previously reported as INES 0 in version 1 of this report (AWE 23/07/2015).

## Ministerial Reporting Criteria

Certain events reported to ONR are of sufficient significance to be reported into Government and we have identified these events in our report. During the period a total of five events met the Ministerial Reporting Criteria and are described within Section 2 of this report. Such events are also reported on our website on a quarterly basis, so many of these details are already in the public domain. The criteria are given below.

ONR Publication Criteria	Description of Criteria
a	<p>Dangerous occurrences reportable under the Nuclear Installations (Dangerous Occurrences) Regulations 1965. Summary of occurrences from Regulation No 3 are as follows:</p> <p>3(a) any occurrence on a licensed site involving the emission of ionising radiations or the release of radioactive or toxic substances, causing or likely to cause death, or serious injury, on or off the site.</p> <p>3(b) any occurrences during transport causing or likely to cause death or serious injury or the breach of containment of a transport package.</p> <p>3(c) any explosion or fire on a licensed site affecting or likely to affect the safe working or safe condition of the nuclear installation.</p> <p>3(d) any uncontrolled criticality excursion.</p>
b	<p>Confirmed exposure to radiation of individuals which exceed or are expected to exceed, the dose limits specified in Schedule 3 to the Ionising Radiations Regulations (IRRs) 2017.</p>

ONR Publication Criteria	Description of Criteria
c	Examination, inspection, maintenance, test or operation of any part of the plant revealing that the safe operation or condition of the plant may be significantly affected.
d	Abnormal occurrences leading to a confirmed release to atmosphere or spillage of a radioactive substance which exceeds or is expected to exceed, the limits set out in Column 5 of Schedule 7 to the IRRs 2017, except where the release is in a manner specified in an Authorisation under the Environmental Permitting Regulation 2010 or Radioactive Substances Act 1993.
e	Abnormal occurrences leading to a release or suspected release or spread of radioactivity, on or off site, which requires special action or special investigation by the Operator.

## Section 2: Significant Events by Site

### Operating Facilities – Defence Sites

#### AWE

#### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
19/05/15	As part of the arrangements in place for decommissioning operations, the dutyholder was required to perform independent verification associated with movement of materials on the site. It became apparent that such independent verification had not been performed for a move that took place and hence constituted a breach in the extant operating rules in place.	All relevant operations on the site were suspended and a recovery plan put into place. The dutyholder identified a number of actions from their internal investigations including reviewing the operating rules.	ONR requested the dutyholder not to resume any operations related to this area until they had demonstrated learning from the event and implemented measures to prevent recurrence. ONR followed up the event with a site visit and considered the actions taken by the dutyholder to be appropriate.

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
23/07/15	A review by the dutyholder of the safety case for the decommissioning of high hazard areas revealed that it was not up to modern standards. As a result, faults had been potentially inappropriately analysed, with implications for the adequacy of engineered and procedural mitigation measures.	The dutyholder suspended all related decommissioning activities until the safety case had been revised using modern standards for assessing the risk arising from decommissioning activities.	ONR reviewed the actions taken by the dutyholder and was satisfied with the conservative approach being taken in suspending operations until the safety case had been revised. ONR routinely monitored the development of the revised safety case and assessed the adequacy of the changes made prior to the restart of decommissioning activities.
27/05/15	There was uncertainty as to the exact radioactive content of historic material in a tank due to the content being estimated rather than confirmed by sampling. This led to uncertainty on the adequacy of controls put in place.	A number of actions were identified by the dutyholder. The dutyholder undertook a re-assay of the tank as part of these actions, confirming that the fissile content of the tank was considerably lower than previously estimated.	ONR monitored the dutyholder's response to the event. Following testing, it was deemed no further action was required, on the basis that the outcome of the dutyholder's investigation identified that the tank did not pose a significant hazard.

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
12/07/16	During maintenance activities within a glovebox the operator noticed damage to the glove he was using. Appropriate contingency arrangements were immediately followed on discovery of the damage. Contamination was found on the elbow of the operator's coverall which was removed and disposed of appropriately.	The dutyholder followed up the event internally to understand the mechanisms of particular failures and to look for trends.	ONR was onsite at the time and so followed up the event immediately. ONR considered that the dutyholder's initial response was appropriate. ONR was content with the dutyholder's actions to understand the causes for glove failure and to reduce the future failure rate, and therefore took no further action.
01/12/16	During maintenance on a Public Address (PA) system, a fault was found which affected the signal used in the criticality incident detection and alarm system (CIDAS). No operations that could cause a criticality were being undertaken during the maintenance.	The dutyholder embargoed fissile operations on site whilst the fault in the system was investigated. The dutyholder diagnosed and rectified the fault and updated maintenance instructions to address learning from the event and investigation. The dutyholder also implemented plans to upgrade the CIDAS.	ONR considered the initial actions taken by the dutyholder to be appropriate. ONR continued to monitor the dutyholder's progress, in resolving the fault, via routine regulatory interactions.

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
03/02/17	<p>During maintenance on a secondary fan in a ventilation system, a wiring link was discovered that should not have been there. This would have meant the fan kept running even if the main fan for the system was turned off.</p>	<p>The dutyholder's investigation determined that the link may have been put in place temporarily and inadvertently left in place. The dutyholder identified a number of corrective actions to improve their maintenance arrangements and carried out checks on other similar plant to confirm the error did not exist elsewhere.</p>	<p>As a part of its routine engagements with the dutyholder, ONR followed up this event during the subsequent inspection and was satisfied that the dutyholder's investigation had been thorough. Additionally, appropriate consideration had been given by the dutyholder to other similar plant and this had been surveyed to ensure no such similar condition existed elsewhere in the facility. All corrective actions proposed by the dutyholder were judged to meet ONR expectations. Accordingly ONR was satisfied that the dutyholder had adequately responded to this event.</p>

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
27/04/17	<p>During maintenance work on a ventilation system, it needed to be isolated electrically. The system failed unexpectedly causing the automatic shutdown of other ventilation systems. The fault was traced to the power supply units.</p>	<p>Operators were evacuated from the affected plant areas; access was prevented until the issues were investigated and rectified.</p> <p>Two of the three power supply units failed during testing. These power supply units are obsolete components so new like-for-like power units were found to replace them and a new modern unit was identified.</p>	<p>ONR followed up the event on site and was satisfied with the approach taken by the dutyholder. ONR continued to monitor the dutyholder's progress via routine regulatory interactions.</p>
12/06/17	<p>Following the implementation of a new computer system for managing training records it was found that data transfer errors had occurred affecting the accuracy of training records. This potentially impacted on the ability of the dutyholder to ensure the suitability of personnel to carry out nuclear safety significant tasks.</p>	<p>On discovering the data errors, manual checks were instigated on the training records of personnel involved in nuclear safety significant tasks. Any errors found were corrected and training records confirmed as correct.</p> <p>Checks were then expanded to include the training records of all personnel</p>	<p>ONR reviewed the dutyholders initial response to this event and was satisfied that the errors in training records had been identified at an early stage and that nuclear safety had not been compromised. ONR continued to monitor the situation to ensure the effective implementation of the corrective actions.</p>

## Devonport Royal Dockyard Limited (DRDL)

### Significant Events Reported to ONR: INES Rating 1 – Anomaly

Date	Event Description	Dutyholder Response	ONR Action
17/09/15	<p>A Royal Navy crew member fell from height sustaining injuries, requiring rescue and recovery. Emergency service access to retrieve the individual required access of multiple emergency service vehicles to the site and also operation of the dockside crane. These particular emergency recovery activities had not been catered for in the operating rules for the site.</p>	<p>The plant manager, supported by two Dockside Operations coordinators, remained present on site throughout the response to ensure actions did not compromise the arrangements needed to ensure nuclear safety as described in the safety case. Following the event, improvements were made to ladders and access arrangements across site and to arrangements for emergency response.</p>	<p>During follow up to the event, ONR noted that the emergency vehicle movements on site were managed well despite there being no emergency arrangements or formal decision making protocols in place. ONR also followed up the event and concluded that vertical ladder arrangements required improvements. Improvements were subsequently made to fixed ladders and the ways that they are checked and maintained to align with the relevant British Standard.</p>

## Significant Events Reported to ONR: INES Rating 1 – Anomaly

Date	Event Description	Dutyholder Response	ONR Action
22/01/16	A height limit control safety function in place to ensure safe crane operations was found to not be subject to sufficient periodic testing to confirm its reliability as a safety function.	All lifts using dockside cranes were limited to less than 6 tonnes until a suitable test was derived and executed. Enhanced guidance and training of safety and design engineers was introduced to reinforce the need for clear traceability and ownership of examination, inspection, maintenance and testing requirements for structures, systems and components.	ONR considered that the corrective action taken by the dutyholder was appropriate. ONR followed up the event during a site inspection and was satisfied by the outcome of the dutyholder's internal investigation.

### Significant Events Reported to ONR: INES Rating 1 – Anomaly

Date	Event Description	Dutyholder Response	ONR Action
13/05/16	<p>A breach of procedures occurred when the contents of a submarine’s Active Waste Tanks were discharged ashore and it was identified that the volume discharged was in excess of limits contained in operating instructions (OIs). If this volume is exceeded for any reason operating instructions are in place that limit crane operations over the submarine reactor compartment and vehicle movements within the facility under specific plant conditions, as a result these operating instructions were also compromised.</p>	<p>The Licensed Site Induction Training was updated to raise awareness of the need to undertake Dockside Management training. The regularity of the Dockside Coordinator rounds was increased. The dutyholder’s internal investigation identified actions to ensure that no residual effluent remains in the Waste Tanks after emptying.</p>	<p>ONR followed up the event onsite and confirmed that the dutyholder’s investigation report would be shared with all those involved in this type of operation and that actions would be raised to agree preventative action. ONR oversaw the satisfactory close out of these actions.</p>
03/06/16	<p>A safety backup on a portal crane correctly operated when the jib was being brought to the vertical position during the crane parking procedure. The protection backup activated because the control functions of the crane had not operated as intended.</p>	<p>A corrective work order was raised, the protection systems reset and the control system adjusted and tested to ensure that the system performed as per the design intent.</p>	<p>ONR followed up on this event to confirm that correct procedures were in place and understood by operators and that the system had been restored to its design intent.</p>

## Operating Facilities – Operating Reactor Sites

### *Dungeness B*

#### Significant Events Reported to ONR: INES Rating 1 – Anomaly

Date	Event Description	Dutyholder Response	ONR Action
12/11/15	During a review of the safety case, it was found that the steam release reactor trip system was susceptible to failure in the event of a potential fire in the vicinity of the air receivers associated with this system.	The dutyholder undertook an assessment to provide an interim justification for continued operation and as an interim measure installed physical protection into the air receivers to protect them in the event of a fire. In the following months further assessment work was undertaken and a full justification for continued operation was developed requiring the implementation of a number of changes to be implemented within a year of the initial finding.	ONR followed up this issue during pre-planned site interventions. No further regulatory action was deemed necessary in light of the appropriate dutyholder response.

## Significant Events Reported to ONR: INES Rating 1 – Anomaly

Date	Event Description	Dutyholder Response	ONR Action
16/09/16	During testing of the additional feed system diesel engines, it was found that the diesels could not operate as intended during high ambient temperatures.	An interim justification for continued operations was developed, which required the improvement of cooling to the building in which the diesels were located. The maintenance schedule was also improved to ensure conformance.	ONR followed up this issue during pre-planned site interventions. No further regulatory action was deemed necessary in light of the appropriate dutyholder response.
24/01/17	During testing Superheater Safety Relief Valves were found to potentially not be qualified against high ambient temperatures that may occur in the boiler house. This could undermine the steam release safety case.	An interim justification for continued operation was developed incorporating the necessary engineering changes.	ONR followed up this issue during pre-planned site interventions. No further regulatory action was deemed necessary in light of the appropriate dutyholder response.

## Significant Events Reported to ONR: INES Rating 1 – Anomaly

Date	Event Description	Dutyholder Response	ONR Action
09/05/17	<p>Upon arrival at Sellafield, a Fuel Transport Flask from Dungeness B was found to have bolts only tightened up to 'hand tight'. The flask design is such that the lid shield is retained in place by chocks which are independent to the bolts in question. Consequently it is likely that during a severe accident the lid would remain in place because of the shield chocks. Nevertheless, the transport package was not compliant with the relevant transport manuals.</p>	<p>The dutyholder performed a root cause analysis to determine the cause and found it to be procedural use and adherence. The dutyholder created a corrective action plan to determine and complete the steps required to correct the issue.</p>	<p>ONR issued an enforcement letter and required a resolution plan to be made to prevent reoccurrence of this incident. In April 2018 ONR inspected the station's progress against their resolution plan and judged that they had taken appropriate action to address the requirements of the Enforcement Letter through amendments to process documentation, equipment and training. Consequently ONR closed the regulatory issues raised.</p>
23/03/17	<p>Support for a length of pipework in the Auxiliary Cooling Water system was found not to have been installed. Without this support the pipework may have failed in a seismic event.</p>	<p>The dutyholder produced an interim justification for continued operations which was based on the temporary fitting of scaffolding either side of the valve to provide suitable restraint. The dutyholder has since installed further permanent supports.</p>	<p>ONR followed up the issue during planned regulatory interventions and was satisfied with both the remedial action taken as well as the dutyholder investigation into the event.</p>

### Significant Events Reported to ONR: INES Rating 1 – Anomaly

Date	Event Description	Dutyholder Response	ONR Action
28/12/17	Review work undertaken to improve the lifetime operation of boilers revealed that some safety assumptions were not accurate.	Interim work has been done to justify the safety of continued operation of the reactor and changes made to the operating instructions.	ONR considered that the dutyholder had implemented reasonably practicable measures in the short term but that further improvements could be made in the future. ONR is continuing to monitor the improvements being made to the safety case.

## Hartlepool

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
17/07/15	During the testing of a number of cooling water non-return valves, a number of valves failed to close as expected. This was found to be caused by the build-up of oxide deposit inside this type of valve.	The dutyholder performed maintenance on the valves to ensure their continued operation and set out an action plan to initially clean the valves of the oxide deposits, then fully replace all this type of valve with stainless steel equivalents.	ONR conducted follow up enquiries into this event and monitored the implementation of the corrective actions.
01/12/15	A door in a trench between Reactors 1 and 2 was found to be open causing higher than expected readings of carbon dioxide levels in Reactor 1 during a blowdown of Reactor 2.	The dutyholder re-secured the door using a chain and a padlock and identified future work to ensure no repeat events which included: painting the door to make its nuclear safety significance clear; labelling the doors to ensure they are only used when appropriate; and assessing the labelling of similar doors in the area.	ONR conducted follow up enquiries into this event. Due to the low risk of the event and the subsequent action plan presented by the dutyholder, ONR determined no further regulatory action was required.

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
15/12/15	<p>During the return to service of Reactor 1, high CO2 readings were detected on a number of boiler penetrations. It was revealed that CO2 was leaking from a small crack on a weld. Non-Destructive Testing revealed rogue material within the weld.</p>	<p>On discovery of the defect the reactor was depressurised and a thorough investigation into the cause was undertaken. Following a detailed investigation, the dutyholder found that the welding defect had been present since manufacture. To remedy this issue, a review into CO2 leak monitoring has been performed with a number of suggestions made to ensure leaks are understood and fixed.</p>	<p>ONR conducted follow up enquiries into this event. ONR concluded that the weld repair was subject to appropriate controls and oversight in accordance with relevant good practice. The monitoring of the dutyholder's investigation was also added to ONR's routine regulatory work programme to ensure appropriate learning from the event.</p>

## Heysham 1

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
12/07/16	During a routine calibration check, a safety system differential pressure transmitter was found to be out of calibration. This resulted in a situation where the actual boiler low feed flow trip setting was 10kg/s instead of the required 14.4kg/s.	The dutyholder declared the transmitter as unavailable and set it into a tripped state. Following this a replacement transmitter was installed and calibrated. A review was performed on other units of the same type and no issues were found.	ONR undertook further enquiries into the event and was satisfied with the dutyholder's response.

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
03/04/17	<p>While carrying out outage deluge testing of the turbine a suspected pressure surge occurred on the fixed jet fire system (FJFS) which resulted in a significant flange leak resulting in a large influx of water into the turbine hall basement. Unit 2 was manually shut down on the evening of 3rd April, following the implementation of suitable mitigations to compensate for the unavailability of the FJFS. Very shortly afterwards, a hydraulic oil leak developed on a valve on a section of hydraulic pipework, which resulted in oil ignition when some of the oil came into contact with high temperature pipework below. The oil ignition self-extinguished within a minute and remained extinguished, but as a precaution, Lancashire Fire and Rescue Service was summoned to site.</p>	<p>The dutyholder shut down the operating reactor and extended the outage on the shutdown reactor. The dutyholder conducted an in-depth investigation into the event and highlighted a number of corrective actions to prevent recurrence as well as a recommendation for other operating stations to review their arrangements. The investigation highlighted that the direct cause was due to a significant volume of air that had accumulated in the FJFS Main; as a result, water hammer induced a pressure surge when the system underwent routine test. The dutyholder conducted a review for all possible sources of air ingress and rectified as necessary.</p>	<p>ONR conducted follow up enquiries into the event. The monitoring of the dutyholder's internal investigation and resulting action plan was added to our routine regulatory work programme to ensure appropriate regulatory oversight of the required actions.</p>

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
25/11/17	The reactor tripped automatically. This was triggered by an earth fault occurring on a Unit Auxiliary Transformer which eventually led to conditions resulting in the automatic tripping of the reactor.	The dutyholder conducted an investigation into the event. Following this the dutyholder created a workstream to modify the engineering components to ensure that the root cause does not occur again.	ONR specialist inspectors reviewed the adequacy of the dutyholder's internal investigation. ONR was satisfied with the dutyholder's response and action plan.

## Hinkley Point B

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
21/11/16	<p>A fire occurred within an electrical cabinet in a switchroom within the Control Building. The fire was limited to a single board within the cabinet and was promptly extinguished by the on-site fire team. Both reactors were unaffected and essential post trip cooling plant remained available.</p>	<p>The dutyholder performed an investigation to discover the cause, which was found to be rainwater ingress via rooms above the cubicle. The dutyholder repaired the roof and conducted a review of roof conditions over electrical cubicles.</p>	<p>ONR conducted follow up enquiries and advised the dutyholder that progress towards compliance would be monitored by ONR as part of normal regulatory business and an ONR Issue was raised to monitor completion of the identified improvements.</p>

## Sizewell B

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
04/11/17	During an inspection of the build-up of boric acid conducted as part of outage operations, deposits of boric acid were identified in the vicinity of a steam generator channel head drain line.	The dutyholder performed an investigation to identify the source of the boric acid, which was found to be a pin-hole leak within a weld area. The dutyholder also removed the affected weld material and repaired the area. Following the event an action plan was put in place to address the risks from this type of weld.	ONR conducted follow up enquiries into the event. The monitoring of the dutyholder's internal investigation and action plan were added to our routine regulatory work programme. ONR provided close oversight of the repair of all four steam generators and required that an adequate safety case was in place prior to agreeing the reactor's return to service.

## Torness

### Significant Events Reported to ONR: INES Rating 1 – Anomaly

Date	Event Description	Dutyholder Response	ONR Action
4/06/15	<p>Three fuel plugs of lower thickness than required in the safety case were found to have been used in the reactor. Although this did not cause problems during reactor operation it could have caused problems in lifting and handling of the fuel assemblies during low power refuelling. This had occurred because the embargo on use of these fuel plug types had not been included in the relevant documentation and so was not apparent to station staff.</p>	<p>The dutyholder immediately stopped handling of the three fuel assemblies until a safe means of addressing the issue had been identified. After reviewing options, it was decided that the three assemblies should be removed one at a time at the end of future scheduled outages.</p>	<p>ONR undertook a review of the dutyholder's arrangements for addressing the issue and was satisfied with the actions taken. ONR followed up implementation of the corrective action as part of routine regulatory work.</p>

## Significant Events Reported to ONR: INES Rating 1 – Anomaly

Date	Event Description	Dutyholder Response	ONR Action
05/09/15	A newly installed variable speed drive (VSD) controller on a gas circulator failed to get the circulator to the correct speed during a routine test.	A technical review was instigated by the dutyholder which included representatives from the supplier of the VSD. It was concluded that the cause was likely to have been mechanical. Following extensive testing and fault finding, all gas circulators and VSD controllers were successfully returned to service.	ONR was satisfied with the actions taken by the dutyholder and followed up the event as part of routine regulatory work.
27/04/16	During a non-routine operation, the Temporary Operating Instruction put in place to maintain safety was deviated from because the operators undertaking the work judged that the deviation was a more conservative approach.	The dutyholder reinforced the standards and expectation of procedural use and adherence and decision making. The dutyholder also included a module on Formal Decision Making in the Fuel Route Engineer Curriculum.	ONR undertook follow up enquiries into this event and concluded that nuclear safety had been maintained throughout the operation and appropriate actions had been taken by the dutyholder in response to the event.

## Sellafield, Decommissioning, Fuel and Waste

### *Sellafield*

#### Significant Events Reported to ONR: INES Rating 2 - Incident

Date	Event Description	Dutyholder Response	ONR Action
15/08/16	While carrying out digital imaging using X-rays, a radiographer was exposed to radiation because the radiography equipment was activated while he was still in the area.	<p>The radiographer's dosimeter was taken for analysis and the team involved were prevented from carrying out further work. Analysis indicated that the radiographer received no exposure beyond that expected for the planned radiography task.</p> <p>Sellafield Ltd carried out a Management Investigation and subsequently a Board of Inquiry into the event. The individuals involved were disciplined, re-trained and re-assessed before being allowed to resume radiography work.</p>	<p>ONR investigated the event and found that it occurred due to the failure of the individuals carrying out the task to comply with the prescribed systems of work and also a failure of Sellafield Ltd to ensure adequate control and supervision. ONR issued a formal enforcement letter to Sellafield Ltd requiring them to ensure that their arrangements for the management and conduct of radiography on site and the improvements identified in the investigation were fully implemented.</p> <p>As the radiographer received no exposure beyond that expected for the planned radiography task, this event did not meet Ministerial Reporting Criteria.</p>

## Significant Events Reported to ONR: INES Rating 2 - Incident

Date	Event Description	Dutyholder Response	ONR Action
08/01/17	A worker's hand was contaminated during routine high active sampling, resulting in a dose higher than the annual dose limit for skin under the Ionising Radiation Regulations.	Sampling operations at the plant were embargoed and the plant shut down until the source of the contamination was identified. The dutyholder initiated an investigation to identify the source of contamination.	<p>ONR followed up the event with a formal investigation and concluded that the primary cause of the event was inadequate procedural adherence by the individuals involved. ONR issued a formal enforcement letter to the dutyholder and a formal verbal warning to the two employees involved.</p> <p><b>This event met the Ministerial Reporting Criteria.</b></p>
05/02/17	This event is the subject of ONR's prosecution of Sellafield Ltd for offences under Section 2 (1) of the Health and Safety at Work etc. Act (1974). At the time of producing this report, the matter remains subject to active court proceedings so ONR cannot comment any further for legal reasons. Updates on the proceedings are posted on our website at <a href="http://news.onr.org.uk/">http://news.onr.org.uk/</a>	No comment due to active court proceedings.	<p>No comment due to active court proceedings.</p> <p><b>This event met the Ministerial Reporting Criteria.</b></p>

*Sellafield***Significant Events Reported to ONR: INES Rating 1 - Anomaly**

Date	Event Description	Dutyholder Response	ONR Action
06/01/16	During planned maintenance, it was discovered that pumps used as part of the systems to detect increased levels of hydrogen (H <sub>2</sub> ) were not running, and had been in this state for a number of days. The fault had not been identified in the Plant Control Room.	The detection system was restored to full operation. The maintenance on the analysers was then completed as per the maintenance instruction. All other analysers on plant were checked and recorded.	ONR considered the immediate actions taken by the dutyholder to be adequate. ONR undertook a fact-finding investigation into the event and as a result issued the dutyholder with a formal enforcement letter to ensure compliance with Licence Condition requirements.
09/03/16	During maintenance activity on a ventilation system, it was necessary to use an alternative partial (temporary) ventilation system. Due to problems with restoring the permanent ventilation system caused by water ingress during maintenance, the partial ventilation system was used for longer than operating rules allowed.	The liquor was drained and the ventilation flow was restored; there were no safety consequences from the event. The dutyholder identified actions including undertaking a review of plant drawing/configuration assessments and undertaking an assessment on flowmeter substitution arrangements. These recommendations were placed in the dutyholder's corrective action programme.	ONR considered the immediate actions taken by the dutyholder to be adequate. ONR monitored the completion of the action plan developed by the dutyholder from its own investigation.

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
25/05/16	During fuel assembly transfer from a transport container to storage in a controlled area, there was a failure in the lifting equipment resulting in a fuel element being dropped within the confines of the storage container.	The area was evacuated while an initial damage assessment was performed. No alarms sounded confirming that there had been no loss of containment and no damage was visible. The fuel element was subsequently secured and sealed within its storage container. The dutyholder conducted an internal investigation into the lifting fixture failure and identified a number of corrective actions to prevent recurrence.	ONR confirmed that the fuel element containment had not been breached and that the element was secured and sealed in its storage container. ONR followed up the event with a fact-finding inspection and considers that the dutyholder's response to the event, and its internal investigation, were adequate.
28/03/16	During first use of testing equipment that uses a radioactive source, a maintenance engineer received unnecessary exposure to radiation from the equipment but below legal limits. This was due to inadequate installation of shielding and shortfalls in the documentation for operational controls of the equipment.	The dutyholder identified corrective actions which included the review of the management system arrangements for the identification, procurement and utilisation of equipment of this nature and the production of a task-specific risk assessment for the activity.	ONR followed up this event through routine regulatory interactions. This event was considered as part of ONR's investigation of a later radiation event that occurred on 15/08/2018 which resulted in a formal enforcement letter being issued to the dutyholder.

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
28/02/17	<p>During repair work in an instrument calibration facility, a source was raised from its shielded enclosure, which should not have occurred.</p> <p>Maintenance staff were not present in the irradiation cell at the time.</p>	<p>The “radiation present” alarm sounded and the system was made safe with the source lowered back into the shielded enclosure. The calibration cell door was then locked to prevent access and the keys secured with the Central Radiological Protection team.</p> <p>The design of the equipment was modified to prevent a reoccurrence of the fault. The plant was then inspected and tested.</p>	<p>ONR considered the immediate actions taken by the dutyholder to be appropriate. ONR followed up the event through routine regulatory engagement.</p>

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
14/06/17	During bulking of samples of nuclear material, a bottle was accidentally dropped by an operator resulting in a spill on the laboratory floor.	The area was evacuated and barriered off. Immediate monitoring of the operator showed that there was no personal or skin contamination; the contamination was limited to their laboratory clothing only. The laboratory area affected was decontaminated. Following the event, the dutyholder implemented changes to minimise the likelihood of a similar event occurring in the future, including embargoing the use of the type of sample bottle involved in this incident in favour of a bottle with a more robust seal and with a smaller capacity.	ONR considered the immediate actions taken by the dutyholder to be adequate. ONR followed up the event with a meeting on site and was satisfied with the steps the dutyholder had taken to minimise the likelihood of a repeat event.  <b>This event met the Ministerial Reporting Criteria.</b>

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
20/10/17	<p>An audit of chemicals in a laboratory on the Sellafield site identified a small number of bottles containing non-radiological chemicals that had degraded over time to form crystals that posed the theoretical risk of self-detonation.</p> <p>As part of normal UK protocol, support from the Ministry of Defence Explosive Ordnance Disposal (EOD) was requested. On arrival at the site, the EOD inspected the chemicals and some were disposed of in a controlled manner.</p>	<p>On discovery of the chemicals, the facility was evacuated and the Sellafield Emergency Control Centre mobilised. Following the event, the dutyholder instigated a site wide search for similar chemicals. Further materials were identified and a similar disposal process was then followed.</p>	<p>ONR conducted follow-up enquiries on site and considered that the dutyholder responded well to the event, taking prompt and appropriate action, and adopting a precautionary approach in responding to the risk. However, the dutyholder should have implemented arrangements to avoid the event in the first place. ONR issued a formal enforcement letter requiring the dutyholder to review its arrangements for managing waste chemicals on site.</p> <p><b>This event met the Ministerial Reporting Criteria.</b></p>

## Dounreay

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
14/04/16	The amount of fissile material contained in a low level waste (LLW) drum was found to exceed operational limits. There were no safety implications as a result of the breach.	A site wide embargo on solid LLW operations was put in place while arrangements for the management of LLW on site were reviewed and revised. This included the conditions for waste acceptance on site, which were updated to emphasise the required consignor/consignee interactions.	The event was followed up in the course of routine interactions with site; ONR was satisfied that the dutyholder had taken appropriate action.
19/09/16	During the moving of a redundant glove box, radioactive material was released onto the floor of the plant. Some protective clothing of the individuals involved was also found to be contaminated. No activity-in-air monitors were however triggered, and there was no detectable intake of radioactive material by any of the people involved in the incident.	After an initial Health Physics Survey, the plant was made safe for re-entry. A recovery plan was put in place to identify and clean up the contamination. Guidance and a hierarchy of approach to be used when consigning bulk and non-standard waste items was produced.	ONR undertook follow up enquiries into the event and considered the initial response to be appropriately managed by the dutyholder. ONR examined the dutyholder's subsequent investigation and resulting improvement plan and was satisfied with the adequacy of the response and progress of the actions which senior management of the licensee committed to address. The implementation of the actions was monitored as part of ONR's routine interventions.  <b>This event met the Ministerial Reporting Criteria.</b>

## Dungeness A

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
24/02/15	During the repair of a sump pump in one of the transfer trenches from the Spent Fuel Ponds, it was found that the water level was above the water level probes indicating that the probes were defective. It was found that the probes were not included on the appropriate maintenance schedule.	A sample of the water confirmed that the excess water was not from the spent fuel ponds. However, pond water treatment was stopped as a precaution and the water probes in both transfer trenches were tested. It was found that the second trench probes were operating as expected and only the probes in one trench needed repair.	ONR undertook follow up enquiries to review the actions undertaken by the dutyholder and deemed them adequate.

## Harwell

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
19/10/15	<p>A consignment of depleted uranium dispatched by Harwell was found to contain caesium-137 contamination on one item. This was not declared in the manifest making the transport classification incorrect.</p>	<p>The dutyholder undertook an investigation into the root cause of the event. Historic records of this item did not reference Cs137 and monitoring of the item prior to shipment did not identify the presence of Cs137. Revised procedures were put in place which include better scrutiny and confirmation of historic records.</p>	<p>After conducting follow up enquiries ONR issued an enforcement letter to ensure that corrective actions were undertaken and this was followed up during subsequent regulatory interventions.</p>
26/04/16	<p>A drum was consigned to Sellafield in error. The drum had a similar coding to a drum that was supposed to be consigned. Sending the incorrect drum was in breach of the intended drum's transport classification.</p>	<p>The dutyholder modified procedures to ensure no repeat of the event. An audit programme was established.</p>	<p>After conducting follow up enquiries ONR issued an enforcement letter to ensure that corrective actions were undertaken and this was followed up during subsequent regulatory interventions.</p>

## Oldbury

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
02/11/15	During desplitting operations (cutting the cooling fins off fuel elements to better pack them in fuel flasks) a fuel element became stuck in the desplitting machine. A pneumatic hand tool was used in an attempt to release the element. During this operation the fuel element broke into two pieces.	Work was halted. A recovery plan was put in place and the fuel recovered successfully. Additional air and water sampling was carried out which indicated no increase in activity above expected levels. The dutyholder's investigation indicated that operating instructions may not have been followed.	ONR followed up this event during a routine inspection and was satisfied with the response and corrective actions taken by the dutyholder.
23/01/16	During an operation to remove the lid of a flask in the cooling pond, the lid did not come away from the flask due to two of the 16 bolts that keep the lid on remaining in position.	Following underwater camera inspection of both the flask crane lifting systems and the flask integrity, a recovery plan was put in place to safely return the flask to the Washdown Bay. The flask crane was then withdrawn from service pending detailed, engineering inspection of the lid lifting equipment and flask.	ONR followed up this event during routine inspections and was satisfied with the response and corrective actions taken by the dutyholder.

## Capenhurst

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
20/08/16	A transport cylinder received on site failed its 'goods inwards inspection' as a valve was not engaged to the extent required.	The cylinder was impounded and tagged until the valve was authorised to be changed. A new incoming check-sheet was developed to ensure adequate oversight. In addition, the consignor of the container was informed and as a result amended their procedures to reduce the likelihood of human error.	ONR followed this event up during an inspection of transport arrangements and was satisfied with the action taken by the dutyholder in generating revised check sheets and informing the consignor.
28/03/17	Contamination was detected outside of a 'Controlled Area Contamination' zone.	The dutyholder performed a local investigation to determine how the contamination occurred. The cause was concluded to be human error and briefings were undertaken to reinforce contamination control.	ONR followed up this event during planned interventions and was satisfied that actions taken by the dutyholder were in line with ONR's expectations.

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
12/05/17	Process equipment was found to be out of calibration. This was due to a scheduled calibration exercise being missed whilst the equipment was in extended maintenance. The process equipment had been brought back into operation before the issue was identified.	Upon identification of the issue the dutyholder turned off the steam to the Feed Station until the equipment could be proved to be within calibration limits. The test procedures have been revised to make the requirement clearer.	ONR followed this event up during planned interventions and was satisfied that actions taken by the dutyholder were in line with ONR's expectations.
08/06/17	A number of items in a store for contaminated equipment were found to be potentially stored in a noncompliant way. This was due to unclear wording in a Safe Operating Condition document.	The dutyholder rectified the issue by ensuring the items in the store met the intended requirements of the document. The document was then updated to provide clarity. Furthermore an improved accountancy system was introduced to the store.	ONR followed up this event during planned interventions and was satisfied that actions taken by the dutyholder were in line with ONR's expectations.

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
10/08/17	During a plant walk down, it was observed that some carbon filled chemical absorber traps had been moved to storage without the proper documentation being completed to confirm that it was safe to do so.	The dutyholder initially issued a directive to cease movement of traps. Following this the working instructions for trap movements were revised to ensure compliance. Training was conducted on the revisions and signage was improved.	ONR conducted follow up enquiries into the event. ONR was satisfied with the actions of the dutyholder and continued monitoring the dutyholder's response through routine regulatory interactions.
09/10/17	As a result of an audit by the dutyholder, it was identified that shipments of samples of uranium hexafluoride (UF6) in small bottles did not satisfy the requirements of IAEA transport regulation SSR-6, relating to pressure requirements within the container.	Following discovery of the non-conformance, the dutyholder suspended all consignments. The method of closing the associated transport containers was revised to ensure future compliance. The learning from the event was shared with other URENCO sites, and the new approach was adopted worldwide.	ONR reviewed the investigation and actions taken by the dutyholder and was satisfied that the response was adequate. ONR monitored the dutyholder's response to the event during routine regulatory interactions.

## Section 3: Transport events not related to Nuclear Licensed Sites

During the reporting period 59 transport related events were reported to ONR by organisations not operating nuclear facilities. Five of these events were rated as INES 1 Anomalies and the remainder were rated as having no safety significance. Details of the events rated as INES 1 and the action taken by ONR are given below.

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
23/11/2015	Vintage Tiger Moth parts imported from Australia activated portal alarms in UK due to low levels of radioactive material contained in the dials.	Parts were repackaged appropriately for onward transport.	ONR contacted the Australian Competent Authority and consignor with details of incident. No further action was deemed necessary.
03/12/2015	Inadvertent transport of a radioactive source in a container believed to be empty, resulting in no appropriate documentation or display of relevant placards on transport vehicle.	Details of radioactive source were obtained and package returned with appropriate paperwork and transport placards.	ONR required the consignor to undertake a review of procedures to prevent a reoccurrence. ONR confirmed the adequacy of the actions taken.

## Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
30/12/2015	A small number of drums in a consignment of naturally occurring low level radioactive material being transported for disposal were found to have evidence of a small amount of liquid seepage on the side of the drums.	<p>Drums involved were quarantined and transport vehicle inspected and monitored for contamination. Drums were subsequently released for disposal and no evidence of contamination was found on the transport vehicle.</p> <p>The dutyholder (consignor) undertook an investigation into the event to prevent any reoccurrence.</p>	ONR reviewed the actions taken by the dutyholder and followed up on site to ensure the actions taken to avoid a reoccurrence had been completed.
23/02/2016	A shipment of copper metal recycling material from the UK had a trace amount of radioactive contamination sufficient to activate portal alarms on arrival in Belgium	<p>The consignor company was not aware of the copper being contaminated and so was unaware of the correct procedures to follow. The levels of radioactivity involved were low. The consignor agreed a treatment and disposal route with consignee and Belgian authorities.</p>	Advice was provided by ONR to the consignor of what to do in the event of a similar issue occurring in future.

### Significant Events Reported to ONR: INES Rating 1 - Anomaly

Date	Event Description	Dutyholder Response	ONR Action
08/06/2016	Inadvertent transport of radiopharmaceuticals in a container believed to be empty, resulting in no appropriate documentation or display of relevant placards on the transport vehicle.	Once the error was realised the driver was contacted and appropriate paperwork produced and supplied to the driver, and labels and placards displayed for the remainder of the journey.	ONR was content that appropriate action had been taken as soon as the error had been identified.

## Section 4: Number of Events categorised as INES 0: below scale/no safety significance

Site	Nuclear	Radiological	Transport	Safeguards	AN01	Total
<b>AWE</b>	46	4			15	<b>65</b>
<b>BAe Systems</b>	11	2	1		6	<b>20</b>
<b>EDF Barnwood</b>	4		3			<b>7</b>
<b>Berkeley</b>	6				3	<b>9</b>
<b>Bradwell</b>	4	1			5	<b>10</b>
<b>Chapelcross</b>	6	2			10	<b>18</b>
<b>DRDL</b>	35	2			4	<b>41</b>
<b>Dounreay</b>	3	1	1	2		<b>7</b>
<b>Dungeness A</b>	6		3	1	7	<b>17</b>
<b>Dungeness B</b>	61	2	2			<b>65</b>
<b>GEH Amersham</b>		1	18			<b>19</b>
<b>GEH Cardiff</b>			2			<b>2</b>

Site	Nuclear	Radiological	Transport	Safeguards	AN01	Total
Harwell		2	3	2	13	20
Hartlepool	47		1		2	50
Heysham 1	27		4	1		32
Heysham 2	17		2	1	1	21
Hinkley Pt A	6	3			9	18
Hinkley Pt B	26				1	27
Hinkley Pt C	1				4	5
Hunterston A		2			3	5
Hunterston B	30	1	1			32
LLWR	4		4		2	10
Oldbury	2			1	7	10
Rolls Royce Derby	7	4				11
Rosyth	5					5
Sellafield	405	22	7	10	8	452
Sizewell A	2			1	2	5

Site	Nuclear	Radiological	Transport	Safeguards	AN01	Total
<b>Sizewell B</b>	59					<b>59</b>
<b>Springfields</b>	4	1	8	2		<b>15</b>
<b>Torness</b>	34	1	3	1	3	<b>42</b>
<b>Transport Sector</b>			54			<b>54</b>
<b>Trawsfynydd</b>	5	1		4	3	<b>13</b>
<b>Urenco Capenhurst</b>	11	6	7	1	10	<b>35</b>
<b>Winfrith</b>		3		4	1	<b>8</b>
<b>Wylfa</b>	18	1	5	5	8	<b>37</b>