

5 Mar 12

## **SITE EVENT REPORT COMMITTEE (SERC) - ANNUAL REPORT FOR 2011**

### References:

- A. NB BP 19 (Issue 3) - Reporting and Recording of Nuclear and Radiological Events.
- B. JSP 518 Issue 3.1 - Authorisation Condition 7 (Incidents on Site).
- C. SERC annual report for 2010, BNSO 105.4.
- D. NRPA-3-11 (PORT) - NRP Event Reporting.

### **Purpose**

1. The purpose of this report is to update the Site Safety Committee on nuclear and radiological event reporting and to provide a summary of trends and emergent issues at HM Naval Base Devonport during 2011.

### **Scope**

2. This report covers all nuclear and radiological events that occurred on the MOD owned Naval Base Site during 2011 that were reported in accordance with Reference A<sup>1</sup>. This satisfies the Naval Base Commander's (NBC) requirements in accordance with Reference B. Feedback regarding the SERC Targets set at Reference C and Targets for the SERC to work towards during 2012 are also included in this report. This report follows a similar structure to that used in recent years, one that has received favourable feedback from recipients.

### **Evolution of event reporting at HMNB Devonport**

3. The arrangements for Nuclear and Radiological event reporting currently in use have remained largely unchanged since their introduction in the latter part of 2006. The changes introduced since 2006 have been evolutionary in nature, the most significant being the introduction of a new event cause code structure in 2007 when the previous arrangement was proving difficult to work with and of little benefit. Since its introduction in 2007, experience with the new cause code structure has been satisfactory. With over four years experience of the revised code structure it has proved that it adequately meets our needs, is easily understood, easier to work with and is broadly similar to the Babcock Operating Experience Feedback (OEF) cause code structure in use throughout 2011. This structure had been anticipated to underpin a joint MOD/Babcock Devonport cause code structure provisionally agreed with the Babcock OEF team and proposed for a Common Event Capture Process at the Devonport Site. The team responsible for introducing a new OEF database and software for use across the Babcock business at the beginning of 2012 has chosen a different course and some commonality is actively being sought. In anticipation of achieving some integration with the Babcock system, the Nuclear Site Event Reporting (NSER) form has been amended to include a field for Babcock OEF Event Numbers to enable cross referencing, but otherwise the MOD NSER arrangements are unchanged from 2010.

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<sup>1</sup> The report does not cover the DRDL Site for which The Company has separate arrangements.

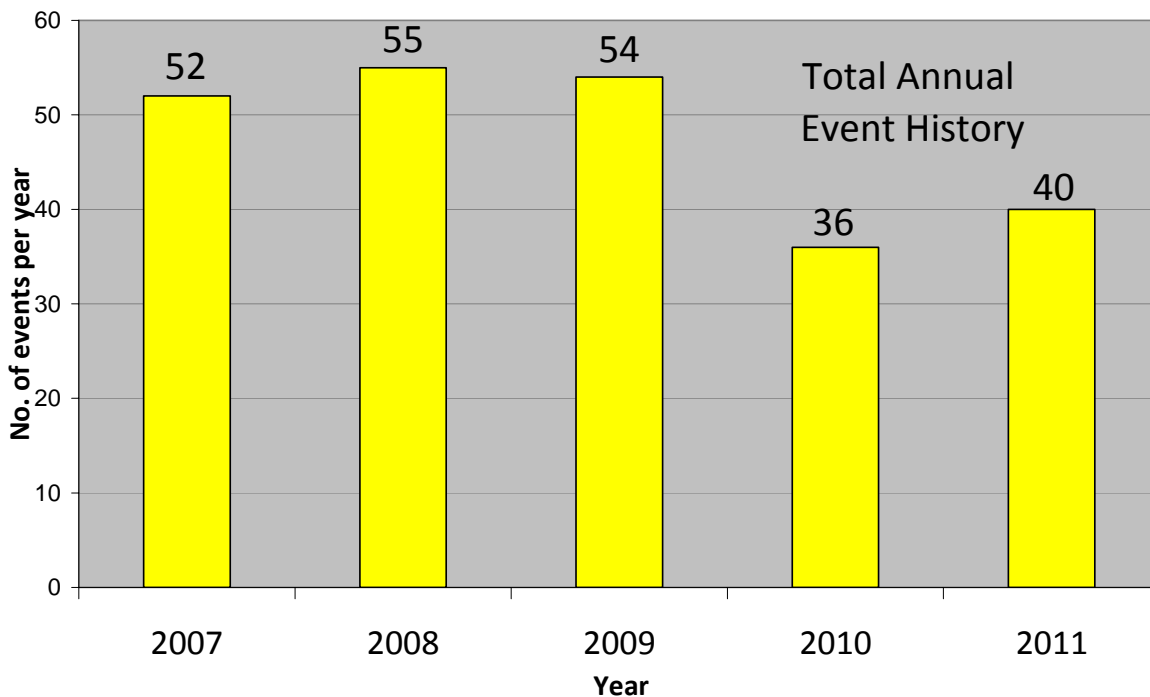
## Event list

4. A list of nuclear and radiological events reported during 2011 is at Annex A. The list includes a basic description, event cause, event consequence code and remarks where appropriate. In some cases the assessment is provisional pending ongoing investigation, implementation of recommendations and/or agreement by the SERC.

## Event history analysis

5. As per the practice adopted since 2006, this report considers trends for nuclear and radiological events reported to the SERC over the preceding 5 years, in this case 2007 up to and including 2011. To enable a direct comparison, events prior to the introduction of the revised cause code structure in 2007 (BP19 Issue 1) have been re-assessed against the current tree structure for event cause (reproduced at Annex B). A high proportion of the events have been allocated more than one Immediate Cause (IC) and Underlying Cause (UC) codes which should be considered when comparing the total number of events in any one year against the total number of IC codes for the same period.

6. **History.** A total of 40 events were reported during 2011. The 5 year history is:



**Figure 1. Number of events over the past 5 years.**

It can be seen from the event history at Figure 1 above that the number of events reported in 2011 is broadly similar to that seen in 2010 and remains less than the preceding 3 years. Similar fluctuations in the number of events have been noted in the past (50 events in 2004 followed by 35 in 2005 and 32 in 2006). Two of the factors that may have contributed to this reduction are considered below. Firstly in 2009, there were 8 events related to Diesel Generator (DG) derived shore supplies when submarines required primary and alternative shore supplies energised from independent sources over an extended period. In 2010, such supply

arrangements were not required on the MOD Site and there were no shore supply failure events reported. In 2011, this shore supply arrangement was implemented to support one particular maintenance activity without incident. Secondly and subjectively in discussion with the TXB PAG Chairman, it is assessed that apart from routine maintenance work, there was a lower level of nuclear activity at the TXB Berths in 2010 and 2011 in comparison to 2009. With less non-routine nuclear activity it would be reasonable to expect an associated reduction in the number of events.

7. **Event Consequence (EC).** All events during 2011 were allocated an EC code in accordance with Reference A. This functions on a sliding scale from EC Code A, the most severe, to EC Code D. This is used in conjunction with a Task Frequency Code in order to determine the Level of Investigation to be attached to the event; Trend, Root Cause Analysis (RCA) or Board of Inquiry. During the period 2007 – 2010, most events fell within the two lowest EC code categories. 2011 saw 2 NSERs categorised as Category B<sup>2</sup>, NSER 01/11, Core Position 14 Tube Extension Toroid leak and NSER 20/11, the Active Materials Facility (AMF) Active Drain Tank (ADT) found to be submerged in water, indicating that the tank had overflowed into the bunded area. These events are discussed in greater detail later.

8. **RCA.** RCA was undertaken for 10 events, including some events where only a trend investigation was indicated but where the SERC Chairman in consultation with the Responsible Officer judged that it would be beneficial to conduct a deeper investigation. One event was subject to a Ship's Investigation which was forwarded to the SERC; in this instance the Ship's Investigation did not significantly add to the understanding of the event provided by an external investigation.

9. **NRPA Event Reports.** NRPA Event Reports were required for 4 events on the MOD Site at Devonport during 2011 in accordance with Reference E; for comparison 8 were required in 2010 and 10 in 2009.

### **Breakdown of events by type and immediate cause code analysis**

10. Events are categorised using the system described at Reference A. Three broad categories of cause are used for analysis of events.

- Equipment related event.
- Work control related event.
- Personnel failure event.

11. Each of these categories is then sub-divided to into three or four Immediate Cause (IC) codes. Applicable IC codes are allocated to each event. Thus it is possible that a single event may be allocated more than one IC code and could for instance be allocated more than one cause code under the personnel failure heading. The IC codes for events occurring over the past 5 year period are tabulated in Table 1. It should be noted that some events are still under investigation and for the purposes of producing this report provisional ICs and UCs (where applicable) have been allocated based on the current understanding of the event.

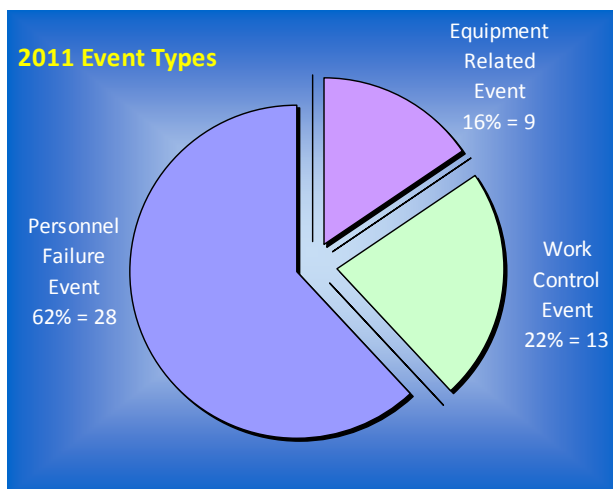
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<sup>2</sup> Cat B Consequence = Serious actual or potentially serious event. Cat B Description = Significant impact or potential for significant impact on safety or regulatory compliance. Investigation would be required to maintain compliance. Includes HSE reportable events.

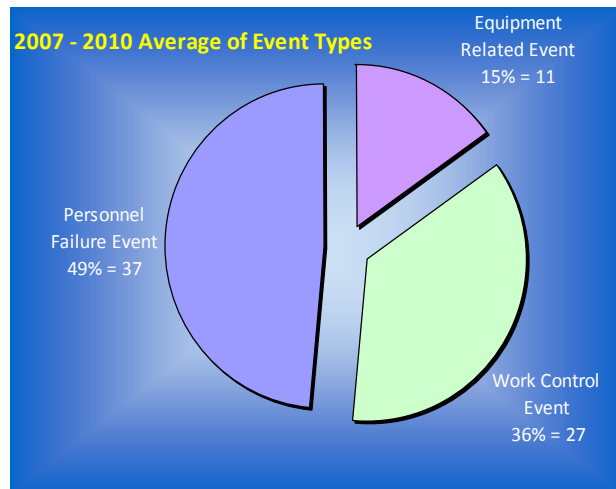
Initial Code	Description	2011		2010		2009		2008		2007	
		No.	%	No.	%	No.	%	No.	%	No.	%
1.1	Equipment breakdown	5	9	3	6	13	17	6	6	6	8
1.2	Equipment not fit for purpose	3	5	4	7	4	5	2	2	5	7
1.3	Equipment correctly specified, incorrectly used	1	2	0	0	1	1	1	1	1	1
2.1	Preparation planning related event	7	12	6	11	7	9	9	10	16	21
2.2	Written control related event	4	7	10	19	11	15	20	20	18	24
2.3	Verbal control related event	2	3	0	0	1	1	6	6	6	8
3.1	Persons not adequately SQEP	4	7	0	0	5	7	4	4	4	5
3.2	Incorrect action taken despite suitable guidance	22	38	25	46	24	32	33	33	14	9
3.3	Persons not available	2	3	2	4	1	1	5	5	0	0
3.4	Poor safety culture/ awareness	8	14	4	7	8	11	13	13	5	7

**Table 1. The number of events for each IC code over the last 5 years**

12. A comparison of cause codes allocated for the year 2010 against the average for the period between 2007 to 2009 is illustrated in the pie charts below.



**Figure 2. 2011 Event Types**



**Figure 3. 2007-2010 Average of Event Types**

13. The 2011 pie chart at Figure 2 is broadly similar in breakdown to that from 2010. As a percentage of the total number of IC codes allocated, personnel failure is up on 2010 from 57% to 62% whilst work control is down from 30% to 22%. Equipment related events have risen from 13% to 16% and are close to the rolling 5 year average of 15%.

14. Events prior to the latter part of 2007 were retrospectively allocated IC codes from the current system by making a judgement based on the text of the investigation but without immediate knowledge of the events, thus perhaps failing to assign personnel failure codes that would now be allocated. Following in depth investigator training undertaken by some SERC

members, there is increased awareness of human factors issues such as training, availability and performance and this is reflected in the Committee’s discussion and consideration of events. At least in part, these factors are thought to explain the step increase in the identification of personnel failure as a cause since the beginning of 2008.

### Immediate Cause code analysis

15. **Trends.** Table 1 and Figure 4 provide a breakdown of the Immediate Causes of these events. Incorrect action taken despite suitable guidance (3.2) remains the most significant IC. This is followed by poor safety culture/awareness (3.4) and planning (2.1) and equipment breakdown (1.1).

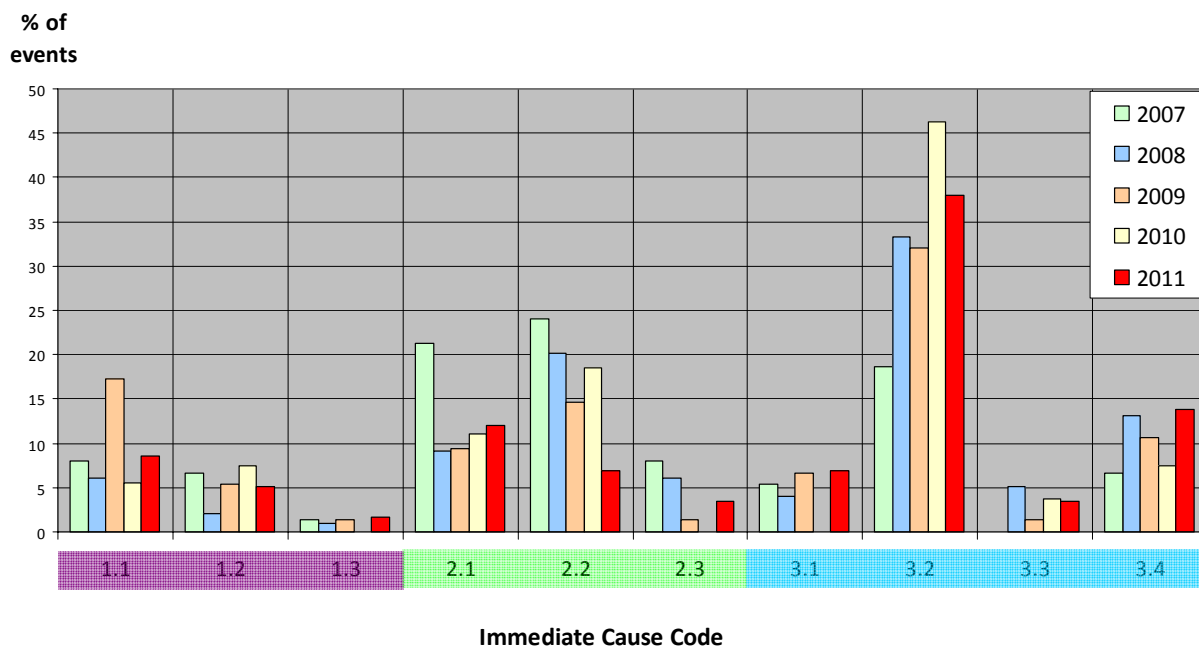


Figure 4. Immediate Cause as a percentage over a 5 year period

16. When considered in greater detail, the most frequent Underlying Causes<sup>3</sup> for these particular IC codes are:

- Personal error (3.2.1)
- Ineffective written control (2.2.2)
- Ineffective plan or preparation (2.1.2)
- Failure to comprehend risk present / impact on safety (3.4.2)
- Not made to specification (1.1.3)
- Action not completed in full (3.2.3)

### Event process performance

17. Figure 5 shows the number of overdue events. Experience has shown that an interval of 4 to 5 weeks between SERC meetings achieves a satisfactory balance. This allows sufficient

<sup>3</sup> It should be noted that at the time of writing, the underlying causes allocated to a number of events are a provisional assessment in the absence of final reports.

time for issues to be progressed and remain in focus whereas with a longer interval personnel do not give sufficient attention to addressing events, forget about the issues and a backlog develops. To that end, during 2011, the SERC met 12 times. Subsequently the number of overdue events has remained low during 2011 due to the continued effort of SERC members to progress towards resolving NSERs whilst facing many competing demands on their limited resources. Also contributing significantly to the low number of overdue events is the continual and ongoing work by the SERC Secretary to chase up outstanding issues and the generally positive response from those being hastened. Due to the number of potential reasons for delays, it would be unrealistic to expect further reductions in the number of overdue events.

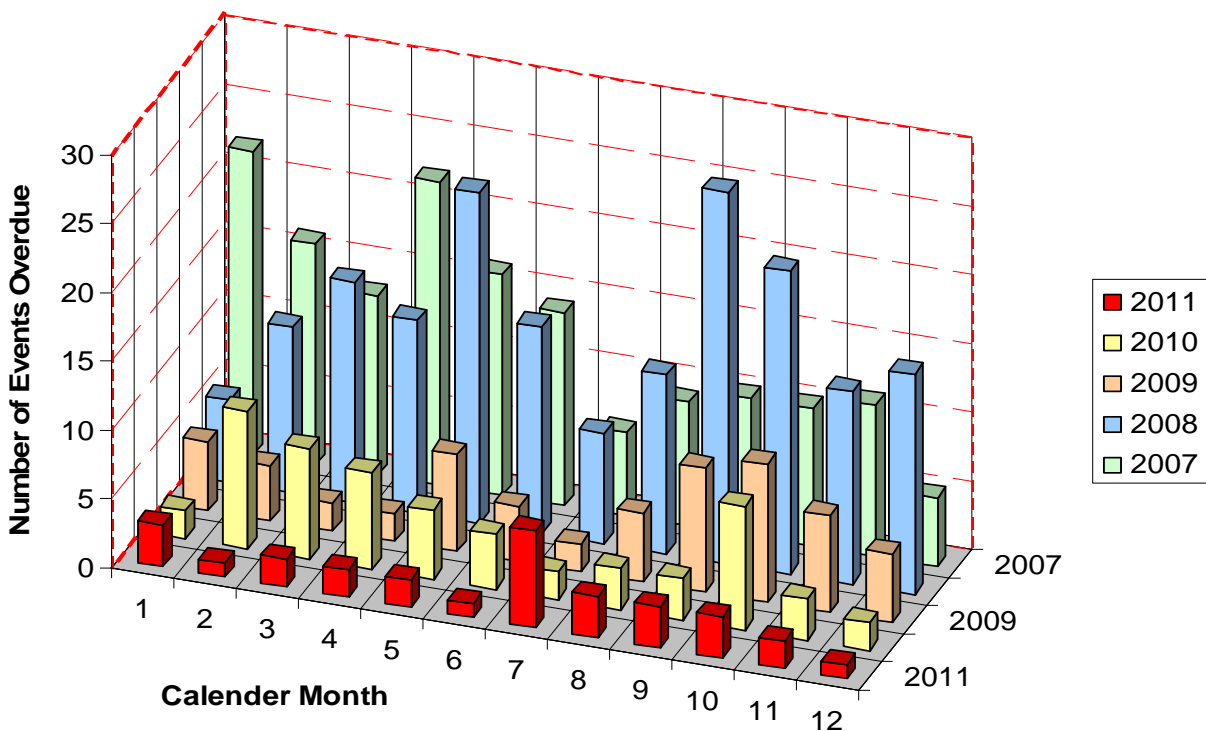


Figure 5. Number of NSER submissions overdue each month<sup>4</sup>.

18. Historically, some events have been open for up to 4 years. By the beginning of 2012, all of the 2010 NSERs and 50% of 2011 NSERs had been closed out. Typically, 6 months is allowed to address recommendations emerging from an event. Given that, in some cases implementation of a design change or a technical investigation may require more time and that the SERC does not consider an event closed until the recommendations have been addressed and changes implemented it not is unreasonable to expect that, at any time, there will be approximately 6 months worth of events open. Allowing for a similar number of events raised during 2011 and 2010, a figure in the range of 15 – 20 at the end of 2011 is not unexpected.

<sup>4</sup> Overdue NSER submissions include overdue Part 1, Part 2, Part 3 and Part 4 aspects of the NSER.

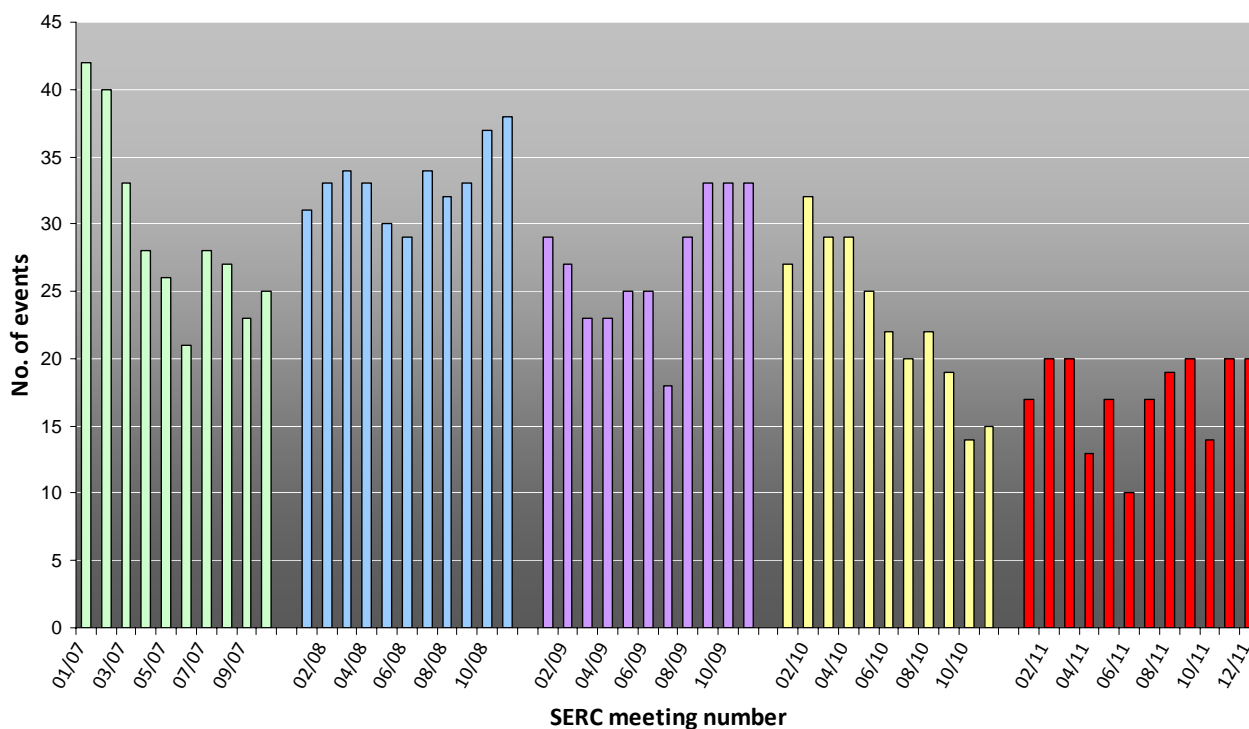


Figure 6. Number of NSERs remaining open following a SERC meeting<sup>5</sup>.

19. Figure 6 illustrates the number of events open following each SERC meeting. The SERC Secretary has actively and repeatedly chased members for submissions. The success of this action is evidenced by the reduction in the number of events open following a SERC meeting during 2011. Whilst the total number of events raised in 2011 was slightly higher than the previous year, the graph demonstrates a reduction in the average number of events remaining open.

### Events of note

20. **Overflowing of Active Drain Tank.** Over the weekend 17<sup>th</sup> - 20<sup>th</sup> June 2011 a fresh water tap was inadvertently operated and left running within the Defiance AMF which caused an ADT to overflow. Initially, the overflow was into the tank bund and then to the Naval Base sewer via cracks in the seals around high level bund penetrations. NSER 20-11 was raised to cover this event. It is estimated that approximately 12 m<sup>3</sup> of water was lost from the bund and constituted an uncontrolled release of potentially radioactive effluent into the sewer. The event was reported to the Environment Agency and to Plymouth City Council by the Naval Base Radiological Protection Advisor (RPA). Samples of the liquid that had overflowed into the bund were taken. These were analysed for radiological activity and the results were not above the Minimum Detectable Activity (MDA) for [REDACTED] or gross beta detection. Though the sewer is an approved radioactive disposal route – the release constituted a breach of the Naval Base Approval certificate issued by the Environment Agency (EA). As a bounding case estimate it is assumed that 12m<sup>3</sup> of effluent escaped from the bund into the sewer with a specific

<sup>5</sup> A nuclear site event report is deemed open until the SERC endorse the submitted Part 4 of the NBQ703 form. Endorsement is only granted once the implementation of the recommendations is complete.

activity concentration at MDA. This represents an unauthorised discharge of 16.8 kBq of Cobalt 60 and 0.79 MBq of other radionuclides (including tritium) – which constitutes approximately 5% of the permitted activity limit per year for this authorised disposal route. The investigation determined that the working environment within the AMF was excessively cluttered at the time of the event, the Examination, Maintenance, Inspection and Testing (EMIT) arrangements for the tank indication and alarm systems and the bund itself were inadequate and recent system modifications had not been adequately controlled or sufficiently recorded. Many recommendations have emerged from the investigation into this event. These include work to review the adequacy of level indication and alarm systems on safety related and environmentally implicated tanks elsewhere on the Naval Base and a review of some maintenance activities. The ADT was taken out of use immediately following the event. It remains out of use and will not be returned to service.

21.



22. **Transportation of Radioactive Material.** Although not identical, there were three events (NSERs 03/11, 26/11 & 35/11) that involved the incorrect movement of potentially contaminated items between the Licensed and Authorised Sites where the correct processes and arrangements were not complied with fully. This included the movement of items between the sites without using dedicated Health Physics Group (HPG) transport, a requirement for moves on the MOD Site. In part this arose because the arrangements for internal movements of items within the Babcock owned site differ from those required for movements of items between the Babcock and MOD owned sites. Other factors were a combination of unfamiliarity with the task including a failure by some personnel to understand that although externally clear of contamination, an item could still be contaminated internally, and miscommunication between the persons carrying out the task and SRC health physics. Staff involved have been reminded of the correct processes and currently, Senior Health Physicist (Facility Operator) (SHP(FO)) is reviewing the process of transferring active material between sites.

23. **Control of Radioactive Material.** Three events (NSERs 10/11, 27/11 and 30/11) concerned failures in the control of radioactive waste. Two of the events noted discrepancies in the doserates recorded on the associated documentation for waste transferring from the MOD Site to the Babcock Site. Investigation showed that this could be attributed to differences in equipment used for monitoring. This issue has been resolved by implementing the use of common equipment for monitoring of waste on both sites. The remaining event was identified



by departmental checks and controls that revealed earlier lapses in control and administration. It is encouraging to note that all three events were revealed by standard checks that emphasise the importance of “defence in depth”.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

25. **Safety Culture/Awareness.** There has been an increase in the number of safety culture related events where personnel have not fully considered the implications of their actions (NSER 31/11 – Alarms muffled and NSER 17/11 – Alarm switched off). Other events relate to personnel failing to appreciate the consequences of not fully completing their actions (NSER 23/11 – DC Shore supply cables damaged by contact with scaffolding & NSER 39/11 – Sump float indication hanging off the wall following bracket removal and failure to subsequently replace). Safety Culture provides an organisation with the resilience required to potentially avert an event or mitigate the consequences. The Naval Base continues to work closely with Babcock to improve the Safety Culture across the site, particularly in the promulgation of lessons identified within the Time Out For Safety (TOFS) forums.

**Update on events from earlier years - 2008 – Primary Coolant Discharge (PCD) hose failure**

26. As reported in previous years, the investigation into the November 2008 PCD hose failure (NSER 49/08) identified a number of design issues with the existing hose arrangements that required to be addressed. After a protracted design gestation, at the time of writing the 2010 report, procurement of new double walled hoses and associated components for a prototype installation was underway. Forecasts indicated that the introduction into service of the new design was anticipated within a couple of months. Thus, it is most disappointing to report that at the time of writing this report (February 2012) and approaching 3½ years since the original event, the replacement design has yet to be installed, let alone commissioned. This situation is unsatisfactory.

27. A design review of the proposed arrangements as they stood in early 2011 identified a number of shortcomings that had not been identified earlier in the design process. This necessitated a significant redesign including a change of hose size and a complete re-thinking of hose support arrangements between the discharge gooseneck on the submarine and the cope edge valve. The re-design has yet to complete full due process. Yet again, it is reported that the new arrangements should be ready for first use in a couple of months.

28. This state of affairs has arisen due to insufficient middle management focus on resolving the issues in a timely manner. The SERC Chairman has expressed his concern about the glacial rate of progress through his line management to CBS who in turn has highlighted the issue to NBC. To reflect the importance that he attaches to the introduction of the new PCD hoses, NBC has listed it as one of his top management priorities with an expectation that a first installation is complete during Spring 2012.

29. Meanwhile, whilst the original design hoses continue in service, the procedural revisions introduced following the 2008 failure to reduce the probability of a repeat event remain in place. Likewise, the permissioning regime requiring a senior member of CBS Staff to inspect all PCD hose installations at the TXB prior to first use continues.

#### **Update on events from earlier years - 2009 – DG derived shore supplies.**

30. During 2009, a number of events were raised as a result of failures of DG derived shore supplies affecting the MOD Site. The Babcock maintained and operated generators are sited on the Babcock Site and able to support submarines on both sites. Following joint investigation of these events, a get well programme was initiated whose scope was widened to include other elements of the electrical infrastructure. The results of the get well programme have been mixed. During 2011 submarines on the MOD Site at Devonport have not reported any losses of supplies as a result of Base infrastructure related problems. A [REDACTED] was supported by shore DG derived supplies without incident, this being an activity that has been problematic in previous years. From a low point when only 2 out of the 8 installed DG sets were available in 2009, 5 sets were available for the majority of 2011, however, despite only limited running hours, a further failure in the latter part of the year reduced availability to 4 which remains the current position. One generator set (DG5 in the SRC) has been out of service for over 5 years whilst 8DG2 at 9 Dock has been out of action for approaching 3 years. Defect rectification and plant re-commissioning is not afforded high priority and is slow. It is reported that work to return 2 of the 4 out of service sets is nearing completion.

31. Work undertaken has included re-roofing the building in the SRC housing 4 of the sets and exhaust system replacement following degradation discovered during the re-roofing. Work has also included replacement of a neutral earth breaker (damaged by water ingress from a leaking roof). In an effort to proactively seek out and address developing and un-revealed problems, a programme of deeper, intrusive electrical maintenance at a nominal 10 yearly periodicity has been introduced requiring the release of normally energised electrical switchgear/plant. Alongside this work, a programme to replace some obsolescent control items with modern equivalents has been initiated.

#### **Update on events from earlier years - 2010 - Provision of continuous cover during nuclear repair**

32. Although an event of note, at the time of writing the 2010 SERC Annual Report, the investigation into this event was not complete. NSER 34/10 related to a major section of the procedure approved by the TXB PAG covering a nuclear repair that was undertaken in December 2010 that called for continuous working. During the course of the repair unnecessary additional risk was incurred due to shortcomings in planning, resource support and equipment failure. The investigation report found that a combination of inflexible working arrangements, commercial pressure and a reluctance to commit resource to 24/7 working or release resource from other commitments were the key drivers for the resource related lost time. It was noted

that if it had not been for the flexibility in skills provided by service personnel further delays would have occurred. A working group has been established to take forward the recommendation generated by the report.

### **Other SERC issues**

33. **Information exchange with Faslane.** The improved exchange of information with Faslane noted in the 2010 SERC report has continued during 2011. A number of Faslane events have been discussed by the SERC and circulated to Devonport based personnel who may have lessons to learn from them. These events have prompted a number of checks to be undertaken at Devonport.

34. **DEVFLOT participation in the SERC.** It is worthy of note that the DEVFLOT engagement with the SERC during the past two years has been proactive and most effective, representing a significant improvement on earlier years. The DEVFLOT member has proved to be a valuable focal point in providing information to the SERC, informing significant elements of the SERC deliberation on events and seeking answers to questions. DEVFLOT's regular newsletter to Marine Engineering Staff has been a valuable means of feeding information and lessons emerging from events back to Ship Staffs. Other items have been communicated to DEVFLOT units by signal and letter.

### **Future development – review of progress**

35. Reference C identified 2 areas for future development:

- a. The development and implementation of a common initial event capture arrangement working with Babcock should be taken forward.
- b. Expansion of the number of trained investigators.

36. **Common Event Capture.** The intention of Common Event Capture is to ensure that all events (not just the narrow range of nuclear and radiological safety events considered by the SERC) occurring on the Babcock and MOD sites at Devonport are initially captured onto a common system and that any data analysis/trending may be conducted across all of these events. The envisaged arrangements will utilise the recently introduced new Babcock OEF system, but some further work is necessary to meet MOD requirements and enable valid comparisons across the sites. Improvements to design, style and functionality, suggested enhancements and NBC requirements were initially considered by Babcock. In the interests of creating a common reporting system across the whole Babcock community including Faslane and Rosyth, a commercial software solution was chosen by the Company. The new reporting system went live on the Babcock Devonport Site on 12 Jan 2012. Very significant BNSO effort has been directed towards Common OEF Capture during the past 12 months with NEO2 working closely with the Babcock OEF Team. Nevertheless, despite the timely highlighting of several problematic areas by NEO2, there still remain several issues that prevent a general release across the Naval Base: production of a joint OEF Functional Procedure to cover the revised processes, software issues (file attachment, permissions, email notifications, for example), stakeholder (event owner) training, user familiarisation training and lectures. All of these concerns are being pursued to ensure that the implementation of a common capture process is conducted on the MOD Devonport Site in a measured, deliberate and co-ordinated manner when the necessary arrangements are in place to support the process. Whilst the Naval Base has been unable to go live at the same time as the Babcock Devonport Site, NEO2,

assisted by NEO1, continues to liaise closely with the Babcock OEF Team, effectively functioning as MOD OEF Engineers. In this role NEO1 and NEO2 process events to the relevant owners, in much the same way as the previous system. DII access to the Babcock AIRSWEB OEF database has recently been enabled and MOD event owners are now able to complete their own events, significantly reducing the burden on NEO1/2. There remains a requirement to complete a closeout review of each event and it is envisaged that, to ensure intelligent evaluation, trend monitoring and feedback, that this review will continue to be conducted by a suitably qualified and experience person. As the stakeholders become fully integrated within the OEF system and awareness of the drive towards common capture gains momentum amongst the general Base population it is anticipated that there will be substantial rise in Naval Base Events being reported, capturing more of the events or incidents across the Devonport Naval Base. There is an expectation of providing a safer working environment through lessons learnt and improved operating experience feedback.

**37. Expansion of the number of trained investigators.** A number of organisations involved with the Submarine Enterprise have encountered difficulties with the provision of suitable staff training for event investigators, particularly that required for more substantial and complex investigations. Only a small pool of trained investigators is required, but commercial courses tend to focus more on legal aspects and less on learning from experience. During the 2007 to 2009 period, a number of MOD staff at Devonport undertook the Independent Investigators Course at AWE Aldermaston, a Course that was found to equip them well for the investigation and learning from experience task. Due to changes at Aldermaston, it was not possible for any Devonport personnel to undertake the AWE Course in 2010 and, despite earlier indications, no Devonport personnel were able to undertake the Course at Aldermaston during 2011. The most recent communications with AWE indicate that Investigator Courses are currently being planned for 2012 and that there is a good prospect that a small number of Devonport Staff may be able to be accommodated. Meanwhile, one member of the BNSO team has recently completed a one day IOSH recognised investigator's course delivered by a the Devonport and Western Area Health and Safety Group. The course provides a valuable introduction to investigation skills and the attendee, who has been involved in a number of smaller investigations, reported back favourably.

## **Future development – 2012**

38. The main focus for development during 2012 will be to complete the introduction of Common Event Capture on the MOD Site at Devonport, building on the work undertaken during 2011. Although a significant amount of work has been undertaken, the system remains in a state of flux as changes are made to align it with the user requirements. Until the system is authorised and achieves the level of functionality required by the Naval Base it will not be possible to provide an accurate forecast as to when the Common Event Capture arrangement will be fully implemented.

39. Once Common Event Capture has been implemented, and with NEO1 and NEO2 already working alongside the Babcock OEF team, the aspiration is to improve the feedback to staff and learning from events working alongside Babcock in a more "joined up" manner. The intended physical co-location of some Captain Base Safety Staff with Babcock Director of Nuclear Safety and Quality Staff during 2012 has the potential to aid this process.

40. Staff and course availability permitting, it is intended to provide investigator training to more SERC members.

## **Freedom of Information (FOI) Act**

41. No FOI requests were received at HMNB Devonport for SERC information during 2011. As has become the practice since the receipt of an FOI request in 2007, a redacted version of the SERC Annual Report for 2010 has been published on the MOD internet site.

## **Ministerial reporting**

42. There have been no requirements for Ministerial reporting under Reference A during 2011.

## **Conclusions**

43. The number of events reported has been a lower than the 2007 -2009 levels but up on 2010. Similar fluctuations have been noted in the past. Two of the factors that may have contributed to this are; the 2008 and 2009 figures included numerous Diesel Generator (DG) derived shore supply failures and it is assessed that apart from routine maintenance work, there was a low level of nuclear activity at the TXB Berths in 2010 and 2011 in comparison to 2007-2009.


44. As observed since 2008, personnel failure features more strongly as an immediate cause than in earlier years. Although in some instances this has been due to poor performance by individuals, the increase seen in events relating to Safety Culture this year is potentially due to the scrutiny and probing of these issues by SERC members and those undertaking investigations. Other sites have reported similar findings.

45. Incorrect action taken despite suitable guidance (IC 3.2) was the largest contributor when considering event immediate cause, then poor safety culture/awareness related events (IC 3.4) and planning related events (IC 2.1). ICs 3.2, 3.4 and 2.1 have featured in a majority of events reported over the past 5 years.

46. The SERC performance improvements in terms of the number of outstanding events and the number of overdue events achieved up to the end of 2010 has been sustained during 2011.

47. The primary focus for development during 2012 will be to continue the work with Babcock to complete the introduction of Common Event Capture on the MOD Site at Devonport.

*Signed on Original*

  
Lieutenant Commander, Royal Navy  
SERC Chairman  
Annexes:

- A. Nuclear and Radiological Events Reported During 2011.
- B. Event Cause Classification Code Trees.

## SERC ANNUAL REPORT 2011 GLOSSARY

<b>Abbreviation</b>	<b>Definition</b>
AC	Authorised Condition
AMF	Active Materials Facility
APD	Air Particle Detector
AWE	Atomic Weapons Establishment
BNSO	Base Nuclear Safety Organisation
CBS	Captain Base Safety
CCB	Cable Connection Box
CE(M)	Control Engineer (Mobile)
COM 1 KPI	COM 1 Key Performance Indicator
COMDEVFLOT	Commodore Devonport Flotilla
CTCRM	Commando Training Centre Royal Marines
DA	Design Authority
D/QHM	Deputy Queens Harbour Master
DCBS(N)	Deputy Captain Base Safety (Nuclear)
DDF	Devonport Distribution Facility
DEVNUSAFE	Devonport Nuclear Safe Plan
DG	Diesel Generator
DNSR	Defence Nuclear Safety Regulator
DRDL	Devonport Royal Dockyard Limited
DSC	Directorate of Safety & Claims
EA	Environment Agency
EMHQ	Emergency Monitoring Headquarters
EPD	Electronic Personal Dosimetry
FAP	Forward Action Plan
FLAGO(SM)	
FOI	Freedom of Information [FOI Act 2000]
FOST	Flag Officer Sea Training
FP18-01-126	Functional Procedure 18-01-126
HMNB	Her Majesty's Naval Base
HMNB(D)	Her Majesty's Naval Base (Devonport)
HP	Health Physics
HPG	Health Physics Group
HPG(W)	Health Physics Group (Waterfront)
IC	Immediate Cause
IPR	Independent Peer Review
IRR 99	Ionising Radiation Regulations 1999
LC	License Condition
MAXIMO	MAXIMO (trade name)
ME Staff	Marine Engineering Staff
MESM	Marine Engineering Submarine
MG	Motor Generator
MOD	Ministry of Defence
NABUST	Nuclear Accident Back-Up Support Team
NARIMS	
NARO	Nuclear Accident Response Organisation
NB BP	Naval Base Business Process

NBC	Naval Base Commander
NBQ	Naval Base Quality
NBQF	Naval Base Quality Form.
NBRSD	Naval Base Radiation Safety Department
NCF	Nucleonic Calibration Facility
NE0	Nuclear Engineer Officer
NSGLU	Normal Sea Going Line Up
NP	Nuclear Procedure
NPPT	Nuclear Propulsion Project Team
NRPA	Nuclear Reactor Plant Authority
NSCC	Nuclear Safety Co-ordination Committee
NSER	Nuclear Site Event Report
NUB	Nuclear Utilities Building
MA	Medical Assistant
OEF	Operating Experience Feedback
OPDOC	Operational Documentation
PAG	Procedure Authorisation Group
PCD	Primary Coolant Discharge
PET	Primary Effluent Tank
█	█
PRS	Provisioning Review Statement
PSA	Probabilistic Safety Assessment
PS	Plant State
QHM	Queen's Harbour Master
RAMP	Revalidation Assisted Maintenance Period
RC	Reactor Compartment
█	█
RCA	Root Cause Analysis
RCL	Radio-Chemistry Laboratory
RMTL	Radioactive Material Transfer Label
RPA	Radiation Protection Advisor
RPS	Radiation Protection Supervisor
S2022a	Material State Defect Report Form
█	█
SHP(RPA)	Senior Health Physicist (Radiation Protection Advisor)
SHP(FO)	Senior Health Physicist (Facility Operator)
SIRS	Ship Installed RADIAC System (Radiation Detectors)
SMA	Safety Management Arrangements
SOP	Standard Operating Procedures
SOUTH DSU	South Distribution/Supply Unit
SQEP	Suitably Qualified & Experienced Person
SRC	Submarine Refit Complex
SSHP	Ship Staff Health Physics
TLP	Torpedo Loading Party
TRAMS	Transportable Monitoring System
TXB	Tidal X Berth
TXBFO	Tidal X Berth Facility Operator
UC	Underlying Cause
VLLW	Very Low Level Waste

**NUCLEAR AND RADIOLOGICAL EVENTS REPORTED DURING 2011**

NSER	Description of Event	Event Date	Cause	Event Code A-D	Freq Code	Remarks
01/11	[REDACTED]	13 Jan 11	Equipment Related Event	B	4	NRPA Event Report raised. [REDACTED] Defect repaired by Base Staff. Ships Staff commended for their vigilance.
02/11	On the morning 13 <sup>th</sup> January 2011 NBRSD received a call from the NARIMS service desk informing them that the Devonport Servers were all indicating a power failure had occurred. It was confirmed that NARIMS connectivity was still available via backup systems. Investigation identified that a programme of electrical testing was being carried out that had required the isolation of various circuits within S056 over a period of 3 days. This could have put the facility out of use without the knowledge of the emergency response organisation.	14 Jan 11	Work Control Related Event	C	2	This Event was subject to Root Cause Analysis.  The NARIMS servers were re-instated and made operational. It was confirmed that although further testing would be carried out the electrical systems would only be isolated for short periods for the rest of the work package.
03/11	On completion of active flushing evolution carried out at the Strip & Decontamination Facility the test rig was monitored clear, Form 31M issued and then the rig was walked across site by hand rather than being returned via HPG as is the authorised method. This was outside HPG process in not using approved transport.	21 Jan 11	Personnel Related Event	D	1	This NSER received a Trend Investigation.  The rig was immediately returned to the SRC to place it back under health physics control. During the transfer process the rig was under positive control with both the inner and outer bags remaining intact. No contamination was issued from the rig during this process. Health physics were made aware of this event and the MESM staff informed their line management.



Dated 5 Mar 12

NSER	Description of Event	Event Date	Cause	Event Code A-D	Freq Code	Remarks
04/11	The Standard Nuclear Procedure [REDACTED] was issued to a submarine by the TXB PAG Chairman without the signature of a BNSO representative. BNSO is a full member of the TXB PAG as laid down in NRPA Nuclear Safety Management Arrangements (NRPA-3-6 Art 0308) and as such the NP was not duly authorised for use.	24 Jan 11	Personnel Related Event	D	1	This NSER received a Trend Investigation.  A full audit of issued Standard NPs was conducted by the TXB PAG Chairman and the SSN PAG and TXB PAG Authors have been re-briefed on the importance of the correct attendance at PAG meetings and thoroughly checking of NPs before issue has been carried out.
05/11	When base staff were carrying out the Nuclear Procedure for PCD removal (NP 98-073) it was observed that the crane had lifted a hose assembly consisting of 2 hose lengths. This is in contravention of Precaution D12 of the Nuclear Procedure which states that 'the hose should not be lifted with more than one hose length'.	3 Feb 11	Personnel Related Event	D	3	This NSER received a Trend Investigation.  The Hose concerned has been identified and has been subjected to further inspection. Hose assessed by DA as fit for continued service following removal of a short section from each end of the hose that would have been subject to most significant stress.
06/11	Event occurred on 9 Wharf 27 Jan 11, and was raised as an OEF (26419). A polythene catchment had split and there was <300ml of clear water contained within the catchment. Good actions were taken by the Duty Manger and Health Physics Staff to resolve the situation. However the SHP(FO) & NBRPA were not aware of this until 08 Feb 11 as the FP requirement to report iaw NBBP 19 was not adhered to.	8 Feb 11	Work Control Related Event	D	2	This NSER received a Trend Investigation.  The HPF dispatched a team to deal with the situation and make it safe. Upon gaining knowledge of the Event, SHP(FO) sent the bag of arisings to be processed through AWM and was subsequently proved clear of tritium by the RCL.
NSER	Description of Event	Event Date	Cause	Event Code A-D	Freq Code	Remarks

Dated 5 Mar 12

07/11	Failure to bring the Devonport Nuclear Accident Response Organisation (NARO) to the Alert State for the period of 12 hours when a submarine returned to Devonport from sea. The NARO was immediately brought to the Alert State on notification of this omission at 0900 on 11 Feb 11.	11 Feb 11	Personnel Related Event	D	2	This NSER received a Trend Investigation.  The improved system implemented in NSER 35-09 was amended to include a cross check with the endorsed berthing plan by the member who is carrying out the Submarine Daily State Chit update (morning ring round) to identify the required NARO ALERT state.
08/11	HMS [REDACTED] casing party were detailed to carryout greasing routine on the Fwd casing bollards. To allow access to the bollards the hawser was released. On completion of the activity and re-securing the hawser it was found that the submarine had settled in a position approximately 1 to 2 metres out from the pontoon. Further investigation revealed that some damage to the Forward brow and a casing stanchion had occurred.	9 Feb 11	Work Control Related Event & Personnel Related Event	D	3	This NSER received a Trend Investigation.  The Master Rigger was contacted by FSG to attend 8W North and take any corrective action necessary to ensure HMS [REDACTED] was correctly secured alongside. Riggers carried out an inspection of the brow to ensure it was safe for continued use. The damaged stanchion was replaced.
09/11	Sea King Helicopter sighted leaving the Weston Mill Landing site, turning and then overflying 9 Wharf at 0935 in contravention of EGR002. HMS [REDACTED] was occupying 9 Wharf at the time of this event.	14 Mar 11	Personnel Related Event	C	2	This NSER received a Trend Investigation.  Plymouth Military re-briefed aircrew on R002 avoids. The Air Traffic Controllers monitored radar displays to anticipate potential infringement and brief if necessary.  When possible Plymouth Military to monitor radar displays when non-regular helicopters are transiting to WML HLS, and inform pilots if infringement of EGR002 is likely to take place

Dated 5 Mar 12

NSER	Description of Event	Event Date	Cause	Event Code A-D	Freq Code	Remarks
10/11	One bag of processed solid Very Low Level Waste (VLLW) was prepared/assayed ready for disposal by HPG(W) waste section and placed into the VLLW skip. Form FR18-01-126(9)(3) was not fully completed i.a.w FP 18-01-126(9) requirements. Departmental checks identified the error and the bag of VLLW was removed from the skip prior to off site disposal.	22 Mar 11	Personnel Related Event	D	3	This NSER received a Trend Investigation.  This was an administrative error which was created by the waste section MA's errant assumption that paperwork was in place.
11/11	One Nuclear Safety Tugs' protective equipment has expired its inspection dates as of 14 April 11, even though SERCO have requested replacement on at least two occasions.	14 Apr 11	Work Control	D	4	This NSER received a Trend Investigation.  Full face respirators were not exchanged on this occasion due to a shortage of replacement parts for carrying out maintenance on the respirators at the Breathing Apparatus (BA) Workshop. Replacements have been procured.
12/11	HMS [REDACTED] entered Plymouth Sound, within the Dockyard Port of Plymouth, where she suffered [REDACTED] whilst at Delta bouy and for the subsequent transit up the Hamoaze to the TXB Facility.	17 Apr 11	Equipment Related Event	C	3	This NSER received a Trend Investigation.  On arrival at Delta Buoy a [REDACTED] Event raised for data capture only.
13/11	HMS [REDACTED] was forced to conduct a short notice entry into the Dockyard Port of Plymouth, whereupon it was discovered that the designated Standby Berth was unavailable.	17 Apr 11	Work Control Related Event & Personnel Related Event	C	3	This Event was subject to Root Cause Analysis.  It was identified that supplies were not available from transformer 3T30 that had previously been reported as being available.

Dated 5 Mar 12

NSER	Description of Event	Event Date	Cause	Event Code A-D	Freq Code	Remarks
14/11	Procedures laid down in Chart 2 of FP14-51-000 (Nuclear Powered Submarine Movement Planning at Devonport) were not followed for the short notice return of HMS [REDACTED] to Plymouth Sound and Chart 3 was not followed for her subsequent berthing.	17 Apr 11	Work Control	C	3	This Event was subject to Root Cause Analysis. Several process errors have been identified in documentation and in the cascade of information.
15/11	During the short notice return to port of HMS [REDACTED] the correct procedure for bringing the NARO to "Alert" was only partially completed by the Duty BNSO Member iaw the Desk Instruction contained within the Duty Pack	17 Apr 11	Personnel Related Event	D	3	This NSER received a Trend Investigation. Desk Instructions contained within BNSO Duty Pack were ambiguous, with both procedure for alerting the NARO via pager and instructions on how to raise a signal to alert the NARO contained on the same page. Desk instructions amended.
16/11	Southern Diving Unit were holding 6 Chemical Agent Monitors (CAMs) containing sealed radioactive sources, in excess of their locally allocated maximum holding of 5.	10 May 11	Work Control & Personnel Related Event	C	3	This Event was subject to Root Cause Analysis. NBRSD formulated specific "get well" programme advice which has been implemented by SDU. New notification of maximum holdings issued to SDU. Environment Agency contacted to inform them of potential failure of management systems.
17/11	During routine monthly maintenance checks of the gamma alarm units installed within the HPG Active Material Facility (AMF), the maintenance engineer reported that the unit on the North East wall (adjacent to the pressure test workshop) had been turned off at the mains supply. When the unit was switched on, it immediately entered into an alarm fault condition which was unable to be reset / remedied on site.	13/6/11	Equipment Related Event & Work Control & Personnel Related Event	D	1	This NSER received a Trend Investigation. The unit has ultimately been removed and sent to the Nuclear Calibration Facility at South yard for repair. A replacement Mini Alarm 710 has been fitted as a temporary replacement unit. It should be noted that the AMF contains 2 gamma alarm units, the second of which was confirmed to be operating correctly.

Dated 5 Mar 12

NSER	Description of Event	Event Date	Cause	Event Code A-D	Freq Code	Remarks
18/11	Whilst carrying out a task within the Active Material Facility (AMF), 9 in number, un-bagged, various type rig adaptors and caps were found to be inappropriately stored within MESM's local toolbox. On surveying the various components, 3 in number were found to be greater than the counting equipment limit of detection (LOD), the highest equating to 0.54Bq/cm <sup>2</sup> against a LOD value of 0.05Bq/cm <sup>2</sup> .	16/6/11	Personnel Related Event	D	1	This NSER received a Trend Investigation.  These items as detailed in FP18-01-126(9) should have been stored in an appropriate location and double polythene bagged.
19/11	On reviewing NP 98-072 Issue 37 ( [REDACTED] ) it became apparent that the NP does not specifically cover the process for [REDACTED] there was a requirement to deviate from the NP and made a comment accordingly in the Co-ordinators comment box.	15 Jun 11	Personnel Related Event	C	3	NRPA Event Report raised.  Event prompted the review and amendment of NP98-072.
20/11	Following a routine entry to the Active Waste Facility (AWF) a pool of water was discovered under the sinks caused by a tap left running into the sink. The AWF Active Drain Tank was inspected and found to be submerged in water, indicating that the tank had overflowed into the bunded area. The tank level indication was reading only 40%, indicating a malfunctioning level indication and alarm which should have alarmed at a tank level of 80%.	20 Jun 11	Equipment Related Event & Personnel Related Event	B	1	This Event was subject to Root Cause Analysis.  The immediate cause of this event was the inadvertent operation of a tap in the AWF, however several maintenance regime shortfalls were identified and subsequent mechanical failures.
NSER	Description of Event	Event Date	Cause	Event Code A-D	Freq Code	Remarks

Dated 5 Mar 12

21/11	A Naval Sea King helicopter overflew a nuclear submarine berthed at 9 Wharf at approximately 1248 on 21 Jun 11. This overfly was in contravention of EGR002 (Restricted Flying).	21 Jun 11	Personnel Related Event	C	1	This NSER received a Trend Investigation.  When possible Plymouth Military to monitor radar displays when non-regular helicopters are transiting to WML HLS, and inform pilots if infringement of EGR002 is likely to take place.
22/11	Diesel Generator Set located in Grenville Block (BO71), required as a backup electrical supply for Emergency Planning Arrangements, is beyond maximum tolerance date for its 3 monthly maintenance (Load run/readiness check). Due date 5 Jun 11, maximum tolerance date 20 Jun 11. Work Order No. 5441581.	20 Jun 11	Work Control	C	1	This Event was subject to Root Cause Analysis.  Planning requirements were postponed then overlooked
23/11	Energised DC shore supply cables were damaged due to movement of submarine and contact with scaffolding arrangement. Ship's Staff de-energised DC Shore Supply and replaced the cables iaw Normal and Emergency Actions for DC Shore Supply and Emergency Action for Battery Change Nuclear Procedure.	28 Jun 11	Equipment Related Event & Personnel Related Event	C	4	This Event was subject to Root Cause Analysis.  DC supplies were restored to full functionality within 6 hours of identifying defect.
24/11	A bag of Low Level Waste destined for transfer to NUB for sorting/disposal was noticed to contain at least two hypodermic needles and other medical type materials. This was fortunately noticed due to the vigilance of the inboard MA preparing the waste for transfer. The bag was received from [REDACTED] on the 10/01/11.	1 Jul 11	Personnel Related Event	D	3	This NSER received a Trend Investigation.  Re-briefing of onboard MAs required with additional education and training.

Dated 5 Mar 12

NSER	Description of Event	Event Date	Cause	Event Code A-D	Freq Code	Remarks
25/11	Incomplete test rig for Nuclear Procedure [REDACTED] requiring NP to be held whilst issues resolved.	15 May 11	Personnel Related Event	D	3	This Event was subject to Root Cause Analysis. Identified as an event during post completion review of NP by PAG members.
26/11	Incorrect labeling of test rig and associated equipment for transfer to HPG(W) from SRC Equipment Monitoring Point.	13 Jul 11	Personnel Related Event	D	2	This NSER received a Trend Investigation. Duty HP Foreman gave incorrect information to consignee. This was acknowledged by HP Operations Manager who has discussed the matter with the SRC Duty HP Foreman.
27/11	Discrepancy between survey results for waste being transferred to NUB.	29 Jul 11	Personnel Related Event	D	1	This NSER received a Trend Investigation. A review of instrumentation was carried out and as a result the "Minirad" is now used in HPG(W) for all waste and component radiation surveys.
28/11	[REDACTED]	18 Aug 11	Equipment Related Event	C	4	NRPA Event Report raised. Mechanical failure of a bearing on the [REDACTED]. Recorded for trending only.
NSER	Description of Event	Event Date	Cause	Event Code A-D	Freq Code	Remarks

Dated 5 Mar 12

29/11	PCD hose on 9 Wharf was observed trailing in sea by a Babcock Marine (BM) Health Physics Monitor (HPM). Duty HP Foreman arranged for recovery of the PCD hose from the sea. Note: no discharge was occurring during time which the PCD hose was observed submerged within the sea.	1 Sep 11	Work Control & Personnel Related Event	D	3	This NSER received a Trend Investigation. COMDEVFLOT Newsletter highlighted the importance of regular checks on umbilicals.
30/11	During monitoring of the Low Level Waste (LLW)bags by a NUB Operator a discrepancy was discovered between the maximum contact dose rate as recorded on the RMTL of one of the LLW waste bags and that of the maximum contact dose rate as measured by the NUB Operator. Maximum contact dose rate of 30uSv/hr made using a MiniRad1000, well above the 0.3 uSv/h written on the accompanying RMTL for the bag.	3 Oct 11	Personnel Related Event	D	3	This NSER received a Trend Investigation. This event is similar in nature to 27/11. A review of instrumentation was carried out and as a result the Minirad is now used in HPG(W) for all waste and component radiation surveys.
31/11	During inspection the RPA identified that the audible high level and pressure alarms on 5 of the 6 TXB Effluent Tanks had been taped over or showed evidence of being taped over, in an effort to mute the alarm function.	22 Sep 11	Personnel Related Event	C	3	This Event was subject to Root Cause Analysis. Equipment made good. Babcock further investigating the Safety Culture of personnel involved in this event.
32/11	HMS [REDACTED] over the allowance for OTTO Fuel Monitors (OFM)	14 Oct 11	Personnel Related Event	D	3	This NSER received a Trend Investigation. Ships Investigation conducted. Excess OFMs removed. Local refresher training undertaken.
33/11	HMS [REDACTED] adopted single TG owing to a defect at harbour stations prior to entering Plymouth Sound. The submarine informed FOMO, who informed COMDEVFLOT. BNSO and QHM were informed by COMDEVFLOT. As Facility Operator, QHM should have been informed first as detailed in FLOOs.	18 Oct 11	Work Control & Personnel Related Event	D	3	This NSER received a Trend Investigation. COMDEVFLOT identified ambiguity in FLAGO(SM). Submarine re-briefed by QHM. Change request to FLAGO(SM) raised.
<b>NSER</b>	<b>Description of Event</b>	<b>Event Date</b>	<b>Cause</b>	<b>Event Code A-D</b>	<b>Freq Code</b>	<b>Remarks</b>



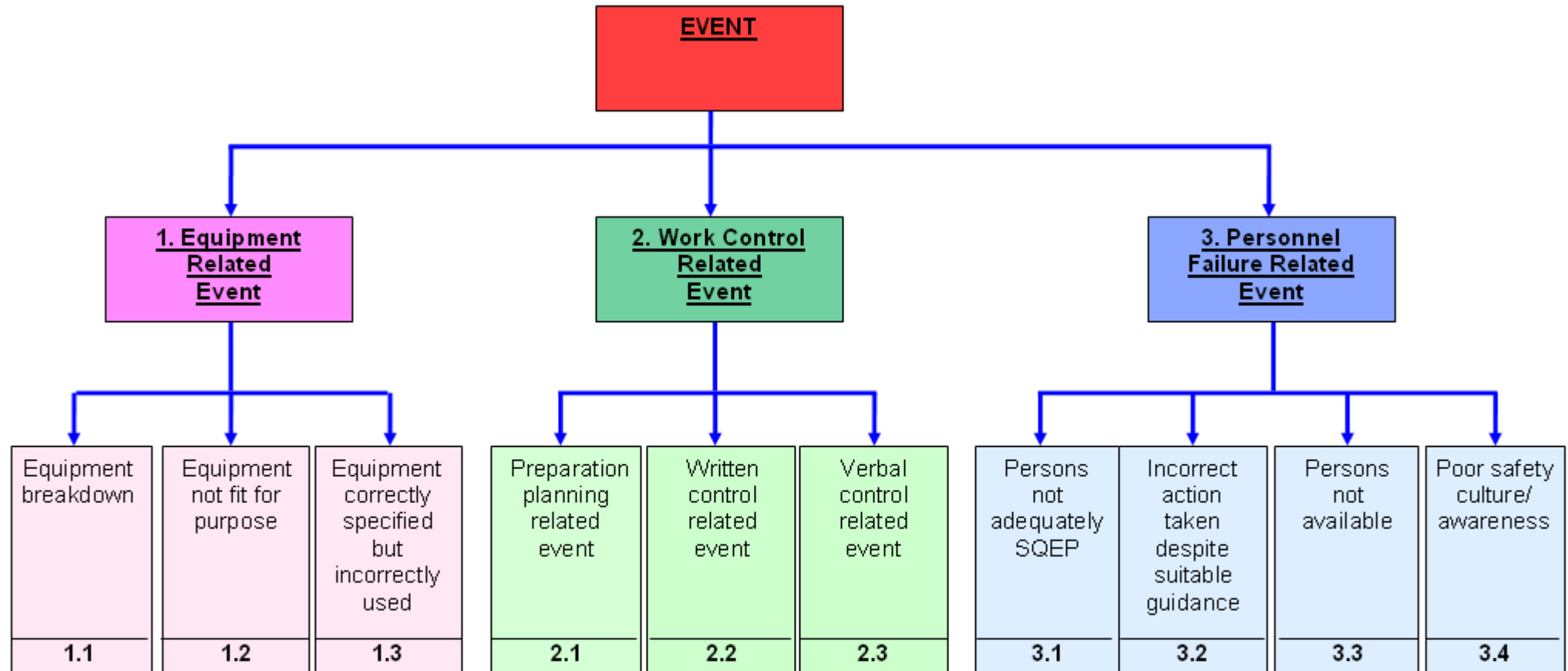
Dated 5 Mar 12

34/11	An open unmarked bag of potentially active material / waste was discovered within the controlled bund of the active jet vac at 9W. Associated jet vac hoses were incorrectly stowed - container lid could not be closed and contents were open to the environment.	20 Oct 11	Personnel Related Event	D	3	This NSER received a Trend Investigation. Personnel re-briefed with respect to their responsibilities for correct storage of active materials and waste.
35/11	During a visit to HMS [REDACTED] HP(FAC) found Active Hoover (AH) in RC Tunnel. The Hoover was not double bagged and had no RMTL attached to it. The Active Hoover was not fully visible due to other items of equipment being stacked onto it.	25 Oct 11	Personnel Related Event	D	2	This NSER received a Trend Investigation. Personnel re-briefed with respect to their responsibilities for the correct movement of active materials.
36/11	[REDACTED]	29 Sep 11	Equipment Related Event	C	2	NRPA Event Report raised. Most likely cause was a localised spill of water. [REDACTED]
37/11	The Riggers slipped HMS [REDACTED] to go to sea on Monday 31 <sup>st</sup> Oct 2011, without wearing dosimetry which is now required iaw Naval Base and Babcock procedures. DNSQ-RSD-QU-08-30-315-Riggers Memo dated 19 Sept 2011.	31 Oct 11	Work Control	D	3	This NSER received a Trend Investigation. New procedure had not been fully briefed to Riggers. PEPS training required by Riggers.
38/11	8W(N) Coping Edge PCD Bund was overflowing into the Hamoaze. There was no PCD connected and the bagging on both PCD valves within the bund was intact with no evidence of water within the bags. It had been raining heavily for some time.	26 Oct 11	Equipment Related Event	D	1	This NSER received a Trend Investigation. HPG took immediate action to prevent further liquid from the coping edge entering the Hamoaze and the SHP(FO) was informed immediately of the event. Subsequently identified as rainwater.
<b>NSER</b>	<b>Description of Event</b>	<b>Event Date</b>	<b>Cause</b>	<b>Event Code A-D</b>	<b>Freq Code</b>	<b>Remarks</b>

Dated 5 Mar 12

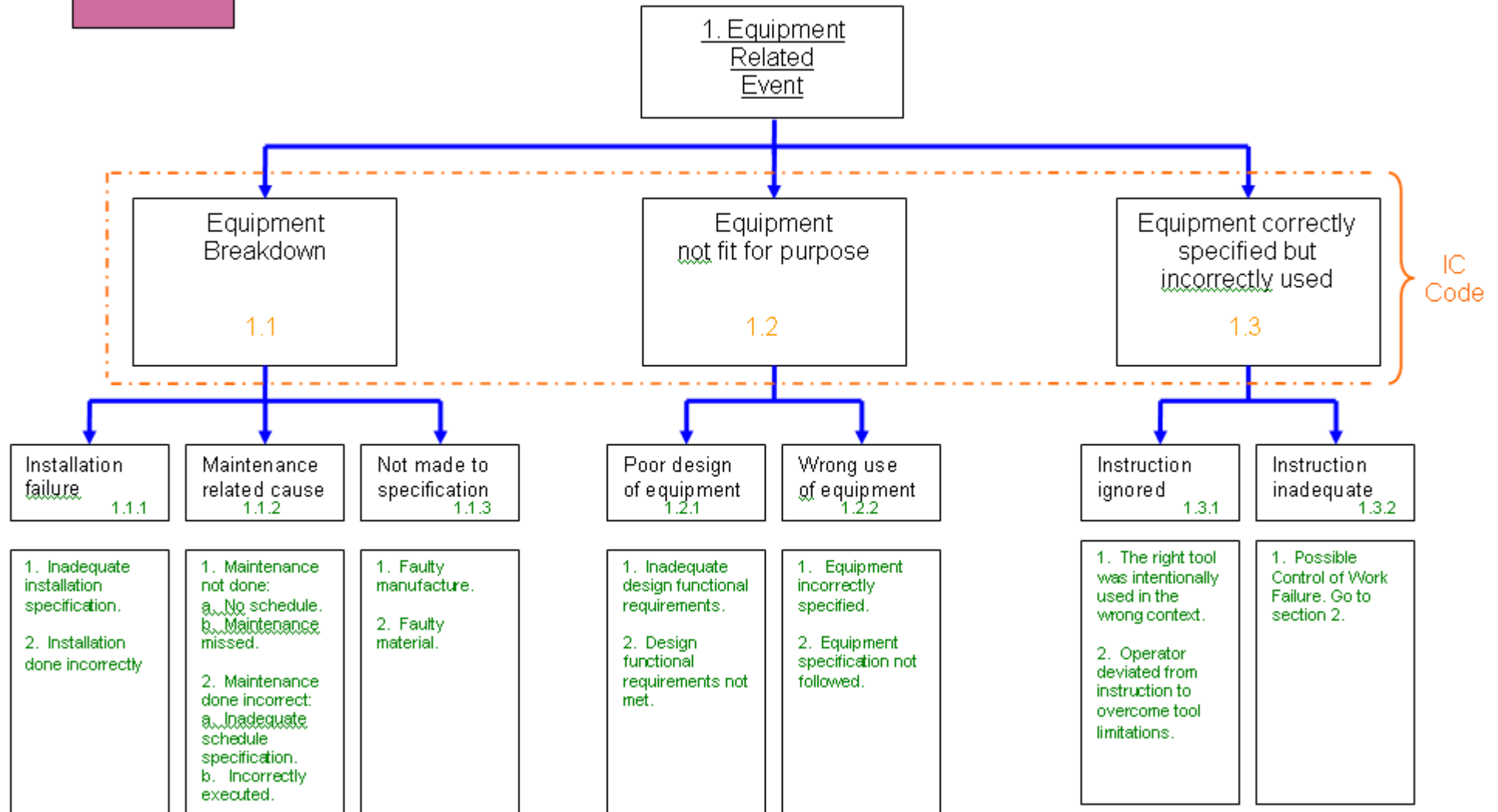
39/11	The Primary Effluent Tank Sump Level Float Indication was found to have come away from the wall and had been slung over electrical cables.	23 Sep 11	Personnel Related Event & Equipment Related Event	<b>D</b>	<b>1</b>	This NSER received a Trend Investigation.  Discovered during an audit investigation conducted in support of NSER 31-1. Bracket had been removed for painting but was not replaced.
40/11	Spare Gas Gain Detector Module for the IPM8 exit monitor found in a cupboard in the instrument maintainer's workshop within Defiance building. This detector module contains a small (500 Bq) <sup>137</sup> Cs radioactive source, unaccounted for on the HPG(W) source log. A similar unit installed in the IPM8 exit monitor in Defiance Building, is also not accounted for in HPG(W) records	20 Dec 11	Work Control & Personnel Related Event	<b>C</b>	<b>2</b>	This Event was subject to Root Cause Analysis.  Neither the detector itself nor the associated documentation identifies these items as containing sources. Items will be withdrawn from service in due course.

## EVENT CAUSE CLASSIFICATION CODE TREES



**Nuclear Site Event Reporting Immediate Cause (IC) Code Determination Diagram**

**Section 1**



**Section 2**

2. Work Control  
Related  
Event



IC Code

No Plan or Preparation  
2.1.1

Ineffective Plan or Preparation  
2.1.2

- 1. Failure to realise the requirement to plan.
- 2. Insufficient information available.
- 3. Insufficient time available.
- 4. Insufficient resource to formulate plan.  
(Consider Section 3)

- 1. Insufficient Management Competence.
- 2. Insufficient information available.
- 3. Insufficient time available.
- 4. Insufficient resource available for an effective plan.

No Written Control  
2.2.1

Ineffective Written Control  
2.2.2

- 1. Written instruction did not exist.
- 2. Manager unaware of existing written instruction.
- 3. Written instruction not available.
- 4. Written instruction considered unnecessary.
- 5. Written instruction not followed intentionally.

- 1. Information incomplete.
- 2. Information incorrect.
- 3. Incorrect issue/out of date.
- 4. Manager failed to deliver precise instruction.

Written Instruction Not Followed  
2.2.3

- 1. Not followed by accident.
- 2. Written instruction deliberately not followed.
- 3. Unaware of existing written instruction.
- 4. Misunderstood/ Misinterpretation.

Causes to Consider: Unclear instruction, Operator not competent, Operator believed knew better, Time pressure, unsuitable environment, not possible to follow instruction.

Verbal Instruction Not Followed  
2.3.1

- 1. Not followed by accident.
- 2. Verbal instruction deliberately not followed.
- 3. Misunderstood/ Misinterpretation.

Verbal Instruction Ineffective  
2.3.2

- 1. Information incomplete.
- 2. Information incorrect.
- 3. Manager failed to deliver precise instruction.

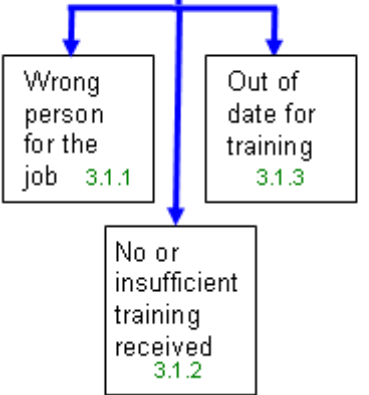
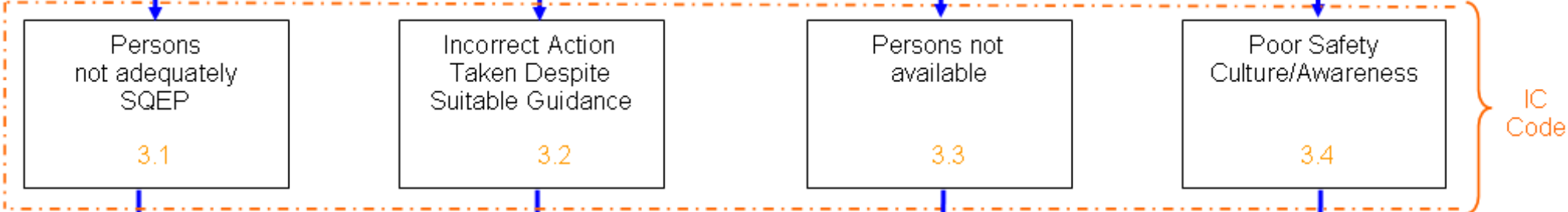
No Verbal Instruction  
2.3.3

- 1. Verbal instruction did not exist.
- 2. Manager considered verbal unnecessary.
- 3. Verbal message cascaded incorrectly.
- 4. Not sufficient time for verbal instruction.

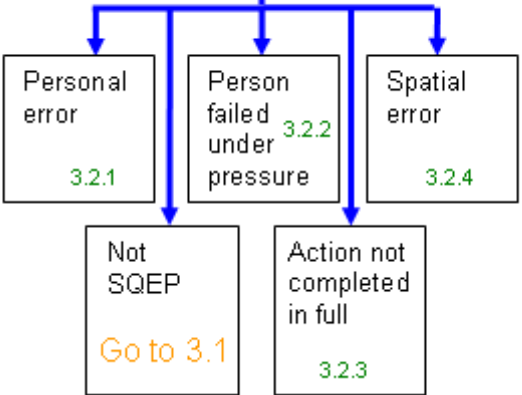
**Non Compliance**

**Section 3**

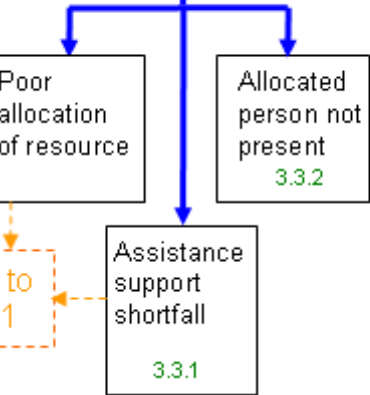
3. Personnel Failure  
Related Event



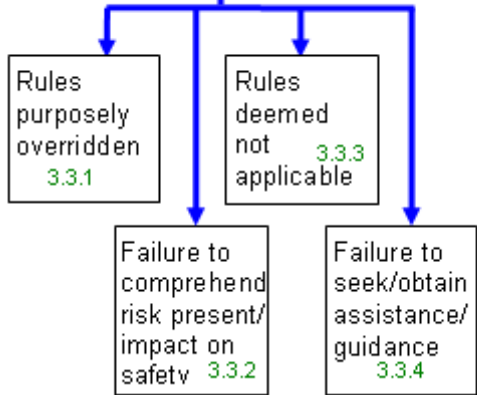
- 1. Requirements fro SQEP not properly identified.
- 2. No other persons available.
- 3. Training insufficient.
- 4. Training not available.



- 1. Excessive pressure due to: personal, programme, complexity of work (specify).
- 2. Action not completed as person:
  - a. Moved from the job
  - b. Lack of understanding
  - c. Oversight
  - d. Distracted
- 3. Spatial awareness of individual at fault.
- 4. Design layout failing for spatial error. Go to 1.2
- 5. Suitable guidance incorrectly used.



- 1. Not present on purpose.
- 2. Not present due to external factors.
- 3. Project/programme pressures restricted personnel availability.
- 4. Persons available but not efficiently utilised.



- 1. Operator deemed the rules restrictive or not applicable
- 2. Supervisor deemed the rules restrictive or not applicable.
- 3. Risk assessment inadequate / not conducted / out of date.
- 4. Safety culture training / awareness inadequate / incomplete / not conducted / out of date. (Consider if man is SQEP 3.1)
- 5. Rules / safety guidance provided are ambiguous.
- 6. Individual failed to interpret the risk.