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## EXERCISE ASTRAL BEND 2011 – ASSESSMENT

### References:

- A. JSP471: Defence Nuclear Accident Response
- B. JSP538: Regulation of the Nuclear Weapon Programme
- C. D/NM12/75 Exercise Di-Staff Instruction dated January 2011
- D. DNSR/18/10/1 Astral Bend 2010 Assessment dated 4 June 2010

1. This assessment is provided in accordance with the Ministry of Defence policy on nuclear accident response set out in Reference A and with DNSR regulatory requirements (Reference B).

2. The exercise was a demonstration of the arrangements for responding to an accident involving the air transport of defence nuclear materials, and was held at DTE Caerwent in Monmouthshire on 24 February 2011. The agreed objectives of the exercise are at Reference C.

3. DNSR assessed the MOD response during the exercise and provided a preliminary verbal assessment on completion. The exercise provided an appropriate vehicle for demonstrating the agreed aspects of the arrangements. The SNT response was generally effective in relation to the detailed technical drills but there were significant difficulties with a number of broader command and control issues which inhibited effective integration with the emergency services and the provision of specialist support to them. This repeats similar comments in the assessment of Exercise Astral Bend 10 (Reference D). In both cases allowance has been made for the shortcomings within the CES response.

4. It should be noted that these comments are aimed very much more widely than the SNT, and particular players on the day. The SNT structure, membership, procedures etc have remained essentially unchanged for many years while the response, awareness and capabilities of the CES whom they seek to support in this operation has evolved. There is clear evidence that this has made the SNT role more difficult rather than easier, with the current CES level of understanding demanding a much greater degree of genuine in-depth specialist technical knowledge from the SNT, in order effectively to provide support, than was the case when CES had very little CBRN awareness. SNT capability has not kept pace with this demand. Furthermore SNT Execs used to attend the 'Nuclear Accident Preparedness Course – Transport, (NAPC-T), also attended by CES

senior officers. This course gave ICs in particular experience of working with their CES opposite numbers, and insight into their 'world view'. This course was arbitrarily terminated a few years ago, with detrimental results. Accordingly, DNSR looks to SWPT to conduct a fundamental review of the role of the MOD immediate response force in light of current CES response arrangements, and to identify how this can most effectively be delivered. DNSR will be happy to provide additional background information but would wish to agree outline proposals for this work this summer.

5. Details of the assessment are at Annex A. A preliminary summary of the Findings is at Annex B. In accordance with Reference B, the final version of the Findings is for agreement with SWPT. Any issues requiring clarification should be referred to DNSR-IT at an early stage.

6. While the assessment is inevitably focussed on areas for improvement, a number of aspects of the response worked well. The wholehearted commitment, flexibility and enthusiasm of all participants were also clearly evident.

DNSR-IT

Annexes:

- A. Exercise Astral Bend 11 – Detailed Assessment.
- B. Exercise Astral Bend 11 - Assessment – Findings and Observations.

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## **EXERCISE ASTRAL BEND 2011 – DETAILED ASSESSMENT**

### **EXERCISE PLANNING AND MANAGEMENT**

1. The planning process was overseen by DNSR and was very effective in achieving full engagement of the civil emergency services (CES). All agencies demonstrated their commitment to the exercise by fielding a significant response on the day, which gave excellent opportunities for liaison and support by the SNT. It was pleasing to see a new exercise site used. The exercise provided an opportunity for an MOD NARO to exercise with the CES in S Wales, for the first time in many years.

2. Simulation of the accident site was effective with good use being made of the site infrastructure to support the scenario. Di-staff coverage together with the number and range of injects, coupled with the timed introduction of the MOD and civil response forces allowed a realistic response to be mounted. Exercise management on the day was good, being sufficiently flexible to allow for provision of additional monitoring information.

2. The exercise planners were unable to obtain a helo to support the exercise.

3. Given that the CES now deploy with radiation monitoring instruments this provided an opportunity to inject appropriate instrument readings to them. Such input would have provided a valuable illustration of the effectiveness and limitations of their equipment compared to the SNT's specialised equipment, which may in turn be useful in routinely updating SNT capabilities and procedures.

**Observation (TRO 099): Opportunities should be sought both within the framework of an exercise and otherwise to determine and demonstrate the extent of the civilian monitoring capability in detecting DNM.**

### **PLANS, ORDERS, AND TRAINING**

4. The SNT NAR plans and orders were generally satisfactory. Revised instrumentation for HEU detection was issued a few weeks before the exercise. Related operating procedures and the training syllabus need updating to reflect this, and to clear the extant SIN.

5. While recognising that an air accident presents a particularly severe test of the MOD NAR arrangements with no initial specialist MOD presence and the arrival of CES in advance of any military assets it remains incumbent on the MOD to ensure that their initial response provides the most effective specialist support to the emergency services that is practicable. The MOD response should take due account of developments in the capability and understanding of the CES. This developing capability heightens the need for SNT executives to demonstrate a good technical understanding of the issues, supported by background knowledge. As has been noted previously it is some time since the SNT's initial response arrangements have been significantly reviewed or revised, and it is now timely to review these arrangements and to consider how the MOD response can be brought more into line with the developing CES capabilities and awareness.

**Finding (TRF 171): The defined SNT role and capability has not kept pace with CES developments and requires wide-ranging review.**

## THE RESPONSE

### Initial deployment

6. The SNT were deployed by road rather than helicopter. Although their arrival time was advanced by the DiStaff they lost the benefit of an aerial overview of the scene before arrival. This is however an entirely credible scenario.

7. The CES arrived well ahead of the SNT, as would be expected. The fire service proceeded directly to the scene, for exercise not having received notification of the hazard. Police and ambulance service stood off. The SNT halted well short of the CES and initially located themselves upwind of the first debris sighted. Even though this was quickly monitored and found to be clean (it was in fact wreckage from the light aircraft), there was a lengthy delay before any further movement forward. Indeed key Bronze elements of the SNT, including the HCP, remained at this initial location throughout, well short of the CES Bronze and their facilities and largely isolated from them by a group of derelict buildings. The location selected was in itself satisfactory, but given a decision not to co-locate with the CES it would have been better to appoint a liaison officer to work full time with the CES ICs at their 'Bronze' site. It took over 25 minutes to find and start liaising with the CES commanders.

**Finding (TRF 172): Key elements of the SNT remained isolated from, and therefore were not able to integrate effectively with, the CES responders.**

8. The Medical Officer moved forward some 15 minutes after arrival, making contact with the Ambulance Officer at the 20 minute point. The IC followed, linking up with the police Silver which had been set up by that time some 25 minutes after arrival. In both cases a speedier deployment forward would be expected.

**Finding (TRF173): There were significant delays in SNT executives establishing initial face-to-face liaison with CES on arrival.**

### SNT in-cordon response

9. On arrival the in-cordon team (YM and recorder) proceeded directly towards the crash site from their vehicle and began to confirm the radiological cleanliness of the proposed set-up location which was directly upwind of the crash site. They then set up a temporary cordon and proceeded to monitor within the cordon, working towards the crash site, without apparent co-ordination with the forward deployed CES Bronze. The containers were located and instruments used appropriately monitored to determine which had been breached, and their contents with a release being confirmed within 20 minutes of arrival. Instrument responses and grid references (artificially provided by di-staff) were recorded and reported although this was somewhat delayed as the recorder kept leaving the YM to investigate other areas. Although there was no explosive present there was some concern over using radios within 10m of the containers.

[REDACTED]. The status of all 6 containers (4 ruptured) was determined within approximately 35 minutes.

The SNT made effective use of the modified IS 610 monitoring kit issued to them only a fortnight before the exercise.

10. Fire service personnel operating within the cordon without any respiratory protection were correctly challenged by SNT personnel and issued with MOD ori-nasal masks and 'instructions in writing' on the radiological hazards present. However, afterwards more CES entries were made subsequently without respiratory protection, again highlighting the lack of effective SNT command level liaison at the Bronze level. The lack of understanding of the hazard by the fire service was

not helped by the remote location of the SNT. Face masks were also provided to a group of personnel who had been corralled by the CES.

**Observation (TRO 100): Personal protection advice was given to CES responders in cordon but this was not effective in preventing further CES in-cordon entries without appropriate PPE.**

11. At 1135 a team of 4 fire service personnel in full protective suits entered the cordon to undertake monitoring. Co-operation between them and the SNT in cordon team could have avoided duplication of effort and led to an understanding of the capability (and limitations) of their instrumentation as it is possible that it would have detected the photon emissions from HEU. An alpha detection capability is understood to be in use but its effectiveness is not known for the materials in this scenario. No attempt was made to determine this information, or to compare readings.

**Observation (TRO 101): Both MOD and fire service teams carried out in-cordon monitoring but there was no attempt to avoid duplication of effort, or to understand each other's capabilities.**

12. The Fire Service began recovering casualties at around 1055 and this was effectively complete before the SNT in-cordon medic reached the accident site at 1059, although a number of bodies remained that slowed progress of the SNT in-cordon medic. SNT support to recovered casualties could have been enabled by close liaison with the fire service Bronze.

13. Once all containers had been located and monitored video and still photographs were taken. The in-cordon team arrived at the TCP at 1153. The cross-cordon brief to the COS was delayed until 1210 while he returned from his forward position near to the CES Bronze. The brief was concise (consisting largely of information already reported) and memory cards from the video and still cameras were handed over with good contamination control measures in evidence.

**Observation (TRO 102): Co-location of the TCP with the CES facility could reduce the delay in progressing the cross cordon brief.**

## Medical

14. The response in respect of the MOD assets (i.e. the SNT MO and team) was entirely adequate but was frustrated by the response and activities of the Fire service, with the SNT MO being unable to gain access to the casualties. The initially graded P1 and the two P2 casualties were deemed to have died of their (non-radiological) injuries. With prompt SNT MO intervention it is likely that their probability of survival would have been increased, although prompt transfer to a medical facility well within an hour would have been needed to achieve significant improvement.

15. The CES, notably the Fire & Rescue Service, rigidly applied the overall CBRN decontamination guidance from the Home Office<sup>1</sup> with no recognition of the needs of casualties with severe/life-threatening non-radiological injuries. On this occasion the NHS Ambulance service appeared not to support the view adopted by the Fire & Rescue service.

16. Specific reference to radiological and nuclear incidents is absent from the second edition of "Emergency Response and Recovery"<sup>2</sup> and guidance to apply life-saving treatments before dealing with radiological decontamination is no longer included.

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<sup>1</sup> The Decontamination of People exposed to Chemical, Biological, Radiological or Nuclear (CBRN) Substances or Material. Strategic National Guidance. Second Edition – May 2004. Home Office

<sup>2</sup> Emergency Response and Recovery. Non-statutory Guidance accompanying the Civil Contingencies Act 2004. Version 2 last updated 31/07/2009. H.M. Government.

17. The interpretation of the absolute necessity to decontaminate every casualty or person from within the determined "hot zone" did, and would in the event of such an incident, lead to avoidable deaths. The Fire & Rescue Service regard their control of the affected area as absolute and therefore chose to ignore the supposed primacy of the Ambulance Staff, HPA staff and medical professionals in determining the medical treatment needs of casualties. Given the longstanding issues relating to treatment of casualties by the CES it is DNSR's intention to raise this separately via MOD Centre as it is outside the direct control of MOD NER responders.

### **Monitoring and Temporary Control Post**

18. Downwind monitoring was carried out in accordance with protocols, and reported and recorded effectively. Monitoring personnel were familiar with their instrumentation and procedures. The cordon party set out to delineate the 2MBq plutonium contour but, due to lack of di-staff support, reported zero readings at all locations. This was completed within a little over 2h 30min of StartEx. A partial repeat of this operation was undertaken with a good understanding of the procedure being demonstrated. Readings for a 2MBq contour were passed to the SNT by di-staff.

19. The Temporary Control Post (TCP) was declared operational within a satisfactory time following arrival of the SNT Main Party. A number of MOD and civilian responders were then processed through, with all areas (reception, undressing, monitoring, recording etc) functioning effectively.

20. Recognising the SNT's specialist capability the Fire Service sought SNT monitoring support but were told that this would not be possible until all MOD personnel had been processed, after which personnel with instruments could be made available. At this time no personnel had been through the TCP and so this could have provided an opportunity to relocate the monitoring capability to the CES decontamination facility and direct the SNT cordon party there, so providing a single cordon exit point.

**Finding (TRF 0174): The possibility and benefits of relocating a personnel monitoring resource (separate from the TCP if necessary) with the CES in a separate facility was not considered. Rather, a robust declaration was made of the SNT intention to monitor MOD personnel out of the cordon before making instruments and manpower available to the CES.**

### **SNT command and control**

21. As described above, the first meaningful liaison between the IC and CES was significantly delayed. The public protection advice was then re-iterated and quickly implemented by the police.

22. The IC worked closely with police Silver and attended Silver executive meetings throughout. However, effectively no support was provided to the Bronze command group who were themselves holding regular co-ordination meetings but struggled throughout to gain a clear understanding of the technical issues. There were difficulties at Silver also, where for example the Fire Officer repeatedly stressed the very limited scope of any release/dispersion, ie to the immediate vicinity of the containers. This was never challenged even though the SNT had by that time positively detected contamination to 5 km downwind. Also there were particularly acute problems with casualty handling, where the treatment of severe injuries or transfer to hospital was extensively delayed pending decontamination. This was reported to the IC and raised by him but without the emphasis necessary to drive the issue to a conclusion.

23. The IC and PRO were focussed on the need to provide a media briefing and obtained police agreement for the IC to lead this. The pre-scripted statement was confidently presented but subsequent questions were not well handled, in particular substantially understating the scale of the hazards. It should be noted that the pre-scripted statements are specifically written as a

template for a police statement in the expectation that the police will take the lead as for any emergency impacting public safety. The SNT should endeavour to avoid leading for presentational reasons, and endeavour to avoid being drawn into excessive detail.

**Finding (TRF 0175): The broad SNT approach to command and control inhibited effective integration with the CES and the provision of specialist support to them.**

24. All information was channelled to the Chief of Staff who managed the team effectively and built up a comprehensive picture of the developing situation, logging this on state boards and keeping the IC informed as necessary. Regular reports were provided to the SSC. The state boards provided a basis for briefing the MCA on arrival. This was provided confidentially and in accordance with the proforma.

#### **TRAINING OF SNT ICs and Executives**

25. In an off-base crash scenario ICs face a particularly difficult challenge. They need to integrate their forces with the CES and convince the CES commanders, who are unused to working with them, of the skills and capabilities of their team. However they inevitably arrive at the crash site after the CES and so start at a disadvantage. ICs also lack the background knowledge of the hazards of radioactive materials possessed by those working full time in a nuclear programme. Whilst the drills required of most of the team can readily be practiced in internal RAF training it is more difficult for the IC himself/herself. Several recent exercises have illustrated the fact that the training received or undertaken by ICs since the abolition of the 'Nuclear Accident Preparedness Course – Transport, (NAPC-T) is inadequate. Either the IC or one of his senior staff need to have a better understanding of the nature of the hazards related to SNM than was displayed at the exercise, and hence the confidence to push harder for the desired MOD outcomes.

**Finding TRF 0179: The training provided to SNT ICs is not adequate.**

26. The possibility of providing ICs with better access to technical advice, for example by attaching the AWE Convoy Safety Officer from the SNM road convoy (which is typically already at BZN to deliver/receive the SNM when the SNT stands to) as adviser to the IC might be worth considering.

**EXERCISE ASTRAL BEND 2011 ASSESSMENT – FINDINGS**

Reference	Finding / Observation	Annex A para
TRF 0171	The defined SNT role and capability has not kept pace with CES developments and requires wide-ranging review.	5
TRF 0172	Key elements of the SNT remained isolated from, and therefore were not able to integrate effectively with, the CES responders.	7
TRF 0173	There were significant delays in SNT executives establishing initial face-to-face liaison with CES on arrival.	8
TRF 0174	The possibility and benefits of relocating a personnel monitoring resource (separate from the TCP if necessary) with the CES in a separate facility was not considered. Rather, a robust declaration was made of the SNT intention to monitor MOD personnel out of the cordon before making instruments and manpower available to the CES.	20
TRF 0175	The broad SNT approach to command and control inhibited effective integration with the CES and the provision of specialist support to them.	7, 8, 10, 22, 23, 25, 26
TRF 0179	The training provided to SNT ICs is not adequate.	25



**EXERCISE ASTRAL BEND 2011 ASSESSMENT – OBSERVATIONS**

<b>Reference</b>	<b>Observation</b>	<b>Annex A para</b>
TRO 0099	Opportunities should be sought both within the framework of an exercise and otherwise to determine and demonstrate the extent of the civilian monitoring capability in detecting DNM.	3
TRO 0100	Personal protection advice was given to CES responders in cordon but this was not effective in preventing further CES in-cordon entries without appropriate PPE.	10
TRO 0101	Both MOD and fire service teams carried out in-cordon monitoring but there was no attempt to avoid duplication of effort, or to understand each other's capabilities.	11
TRO 0102	Co-location of the TCP with the CES facility could reduce the delay in progressing the cross cordon brief.	13