PARTIALLY CLOSED
ND Division 1 Project Assessment Report No 84/2009

HEALTH AND SAFETY EXECUTIVE

HM NUCLEAR INSTALLATIONS INSPECTORATE

Project:	Investigation of the Gas Bypass Plant Contamination Incident that Occurred on16th July 2009 at Hinkley Point B
Site:	Hinkley Point B
Title:	Hinkley Point B Gas Bypass Plant – System of Work for Open Hole Working – Enforcement Management Model Evaluation
Site Licence No:	62A
Licence Condition:	LC26 (and IRR Regs 7, 8 & 14; LCs 10, 24 & 34)

Author ..... Date: 16th September 2009

[redacted]

Agreed by ..... Date: 16th September 2009

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SUMMARY

1. An incident occurred at Hinkley Point B Power Station on 16th July, when a slug of radioactive dust was released from the reactor gas circuit in to the gas bypass plant. As a direct result, 8 [redacted] became externally and internally contaminated. An analysis of the event has identified contraventions against LC24, LC26, LC34 and LC10 and also IRR Regulations 7, 8 and 14. Contravention of LC26 is considered to be the most significant shortfall, since safety was reliant on a safe system of work, which in the event was not properly controlled or supervised.

2. An evaluation against the NII/HSE EMM has identified that a letter is the appropriate regulatory response. It is noted that BE are introducing new fleet wide arrangements for the management of contractors. It is therefore proposed that a letter be sent to the appropriate BE CNO requiring that these new arrangements take full cognisance of the event at Hinkley Point B. In addition, an NII audit team should be assembled to ensure that the new BE arrangements for the control of contractors are suitable and will address the problems evident from this event.

3. It is further proposed that a letter be sent to Hinkley Point B containing full details of the NII investigation findings with a request for an action plan to provide a remedy. It is recommended that the Hinkley Point B Station Director be invited to Bootle to explain the event, the lessons learnt, the proposed corrective actions and to provide a personal commitment.

1. INTRODUCTION

4. An incident occurred at Hinkley Point B Power Station on 16th July, when a quantity of radioactive dust totalling some 20 MBq of activity was released from the reactor gas circuit in to the gas bypass plant. As a direct result 8 men became externally and internally contaminated. The spread of contamination in the gas bypass plant was such that it is unlikely that the area will ever be fully clean again.

5. This report provides a summary of the incident and subsequent investigation, plus an evaluation of the event undertaken in accordance with the HSE/NII Enforcement Management Model. The rationale for enforcement action is presented within Section 3 of this report. All the references and other relevant documents are recorded on Trim and held on file 4.7.2610.

2. BACKGROUND AND ASSESSMENT

Sequence of events

6. Weir Power and Industrial Services (Weirs) were tasked by the licensee with replacing a ball valve (B/G/1761) and pipe spool in the gas bypass plant, as part of the Reactor 3 outage programme of work. The initial work specification involved isolation of the gas bypass plant from the reactor vessel circuit; this work having been successfully completed on Reactor 4 the previous year. The original Radiological Work Permit (RWP 399) for this job was based on a standard risk assessment for isolations requiring C2 clothing. The work was planned to be done between 11th and 12th July 2009, but the duty Accredited Health Physicist became concerned that RWP 399 was inappropriate because of the higher levels of contamination present. As a result, RWP 3446 was produced requiring the work to be undertaken under C3

conditions (double cloth coverall, surgeons boots and powered air hood). RWP 3446 also stipulated that the reactor vessel be under negative pressure in case isolation valves were passing and that work be stopped if outflow of air from the valve was experienced. RWP 3446 also required the old valve to be surrounded with polythene sheeting to prevent the spread of contamination.

7. The change in RWP posed a problem for Weirs because only one of the original work team was classified and therefore able to work under C3 conditions. At this point the relevant BE Systems Health Engineer (Harrison) volunteered to act as the fitters mate. Radwise, a further contract organisation, was also involved and was required to supply the radiation monitor function. A briefing was given to the Weirs staff by their supervisor on the 13th July 2009 concerning fitting of the valve. The team (three from Weirs, two from Radwise and Harrison) then attended an ALARP brief against RWP 3446, provided by a BE Accredited Health Physicist and all (including non-classified persons) were required to sign as having attended. During the initial attempt to execute the work on 13th July 2009, CO_2 in excess of 0.5% was detected in the vicinity of B/G/1761. The source of the CO_2 was not known for certain, but was judged at the time to pose a risk to the work party and to preclude isolation of the gas bypass plant from the reactor vessel. An alternative system of work was therefore adopted which relied on creating sufficient negative pressure within the reactor vessel to provide suction on the gas bypass plant, in order to prevent CO_2 and contamination escaping from the reactor gas circuit. The practicality of this system of work involves operation of a control valve situated on the pilecap and adjustment of the gas circulator IGVs by the Reactor Desk Engineer. This aspect of the work was to be controlled by a SAP NR (Lennon).

8. The work team returned to the gas bypass plant to complete the job on 16th July 2009. No further pre-job or RWP ALARP briefings were given to the team, despite the change in the system of work and the associated risks. The work team was also reliant on instructions provided on the original work order card and RWP 3446 [redacted] joined the work team at the gas bypass plant not having attended any briefings with them.

9. The B/G/1761 ball valve and pipe spool exchange was undertaken at an elevated position (up two vertical ladders) within the gas bypass plant by a 3 [redacted] team dressed for C3 (one Weirs fitter, [redacted] acting a mate and a Radwise monitor). The second Radwise monitor was dressed in C2 and positioned at the mezzanine level on the clean side of the boot barrier, to act as undresser. The rest of the work party were on standby at the ground floor of the gas bypass plant and dressed in ordinary coveralls. The work order card required the team to remove the old valve, then fit the new valve on 4 bolts, close the valve (or fit a blank) then withdraw. Fitting of the remaining bolts in the pipe flange and the associated pipe spool was to be undertaken at a later stage in C2 conditions (i.e. once the gas circuit had been resealed). The work reached a point where the new ball valve had been fitted and partially bolted up. It is significant that the B/G/1761 ball valve was in the open position, as necessary to permit the valve to be fitted with the pipe opening under suction. The new valve operating handle was not fitted and was left at the ground floor level; also the old handle was attached to the old valve. It is also significant that a copy of the work order card containing the work instructions was not at the point of work, as required. [redacted] made the decision to continue with fitting the spool piece to complete the job. During this additional work [redacted] called up to ask if they were on 4 bolts and [redacted] replied that they were doing it all (the exact words used vary slightly between statements). Although not under any real time pressure at the time, [redacted] was no doubt aware that the Reactor conditions needed to be returned to normal promptly, to avoid exceeding humidity limits. Following the exchange with [redacted], [redacted] relayed instructions by telephone to the Reactor Desk Engineer that Reactor conditions could be changed. As a consequence a large amount of contaminated dust was

blown out of the open hole. The open hole could not be sealed because the valve handle was not fitted or immediately available.

10. The 3 [redacted] team undertaking the valve exchange was contaminated with dust over their coveralls. The fallout of dust also contaminated the rest of the work team at the mezzanine and ground floor levels and the whole of the gas bypass plant area. The nature of the dust cloud was such that members of the work team thought that there was a fire and took action to raise the alarm. This may explain why those [redacted] wearing air hoods took them off almost immediately. An eighth [redacted] subsequently arrived in the gas bypass plant area to help and also became contaminated.

11. A British Energy Event Recovery Team was established in the Emergency Control Centre to control and recover the situation, although a Site Incident was not declared. The contaminated [redacted] remained in the bypass plant area for some 50 minutes whilst contamination control barriers were established. The [redacted] were decontaminated and later sent to Harwell for whole body dose measurements and analysis of urine samples. The maximum whole body committed dose from internal exposure was estimated to be [redacted] microSv. Although all persons involved appear to have been exposed to a similar level. The maximum whole body dose including external EDP data was [redacted] microSv. The whole of the gas bypass plant was contaminated and a major clean-up programme was instigated before Reactor 3 was allowed to be returned to service. An NII Radiological Protection Specialist has visited the site and expressed the view that the spread of contamination in the gas bypass plant was such that is extremely unlikely that the area will ever be fully clean again.

ND Investigation

12. An initial investigation in to this event was conducted on 22 July 2009 (Reference 1). At this point four of the contractors directly involved were informally interviewed before they left site for other work. In addition, I held discussions with a number of licensee staff not directly involved, to obtain the company perspective. This included the leader of the BE internal (SACI) investigation and the SRD site inspector. At this point copies of key documents were obtained, including copies of the work order card and relevant RWPs (Trim 4.7.2610).

13. A further investigation was conducted on 18 August 2009, with the support of an NII Radiological Protection Specialist (Reference 2). Staff involved with preparation and ALARP briefing of RWP 3446 were informally interviewed and a visit was made to the site of the incident. A request was made to interview the remainder of the work team and the Weirs supervisor, but only [redacted] was available on site. Discussions were also held with a Shift Manager to obtain details of the system of work and with the Operations Manager concerning disciplinary action. Further information was obtained concerning relevant procedures, site contamination surveys, air monitoring records, risk assessments and EPD dose records (Trim 4.7.2610).

14. In addition to the above, some of the [redacted] involved have provided copies of their own written statements and notes pertaining to the event (Trim 4.7.2610). Additional information has also been requested by letter from the licensee (Reference 3 and 4).

Licensee's Internal Investigation and Disciplinary Action

15. The licensee has conducted an internal investigation into the event (Reference 5). This investigation has concluded the following:

- The Direct Cause was a failure to apply proper standards of communication between the Systems Health Engineer [redacted] and the SAP NR [redacted]
- Contributing Cause 1 was the lack of a pre-job brief, which was appropriate given the significance of the task and would have identified restoring the pressure boundary as a critical step.
- Contributing Cause 2 was the failure to take the work order card to the point of work and to follow it step by step.
- Contributing Cause 3 was the lack of clarity as to who was in charge of the task.
- The Root Cause of the event was the lack of control of "open hole" work.

16. The SACI has recommended a number of corrective actions:

- Produce a documented definition of "open hole" working.
- Proceduralise the process required for "open hole" working, ensuring the company decision making model is utilised effectively.
- Plant Manager to discuss lessons learnt and strategy for addressing "open hole" working with other Plant Managers and agree any course of action.

17. Disciplinary action has been taken by the company against [redacted] and [redacted] for misconduct.

- [redacted] has received a 12 month written warning on the basis that [redacted] failed to positively confirm [redacted]
- [redacted] received an 18 month written warning on the basis that [redacted] disregarded the company's safety requirements and expectations with regard to the execution of work, which consequently had an impact on the safety of himself and others.

18. NII have requested and have been provided with a full copy of the disciplinary investigation, interviews and supporting papers (Reference 6).

Application of Relevant Legislation

IRR Regulations 7(1) & 7(3)

19. The duty holder is required to undertake a risk assessment prior to undertaking any new activity involving work with ionising radiation. The assessment must be suitable and sufficient and should identify any measures needed to control exposure. The risk assessment underpinning RWP 3446 was produced before the decision was taken to adopt "open hole" working and there is no evidence to show that this RWP was reviewed in the light of the revised system of work. RWP 3446 did require that the Reactor 3 vessel to be at negative pressure and not undergoing significant pressure changes, but this was as a precaution against an isolation valve passing. Had a risk assessment of the work actually undertaken been carried out, the key step of restoring the pressure boundary could have been identified and highlighted in the documentation. Not withstanding this, NII specialist opinion is that RWP 3446 was suitable and sufficient, given that the incident was not a foreseeable radiation accident (Reference 2). The unforeseen element being the level of contamination that could occur, should things go wrong. There are therefore shortfalls against IRR Regulation 7.

IRR Regulations 8(2)(a) & 8(2)(b)

20. Where practicable, the duty holder is required to achieve restriction of exposure by engineered means in preference to safe systems of work and PPE. There is evidence to show that isolation of the gas bypass plant was the preferred option and that "open hole" working was adopted only when the presence of CO_2 evolution was identified as an additional hazard. The vigour with which solutions to the CO_2 evolution problem was pursued is questionable however and there is no record that the hierarchy of control measures was dealt with explicitly in the risk assessment. But, given that isolation was the first option considered, there are shortfalls but no clear cut breach of IRR Regulation 8(2).

LC24

21. The licensee is required to ensure that all operations which may affect safety are carried out in accordance with written instructions. Where the term operations includes maintenance (LC1). There were instructions on the work order card regarding the replacement of the valve, but they were flawed. The instructions assume that there is an isolation and a requirement to check it. Experience with Reactor 4 was that the valve operating handle had to be removed because of confined space working, which was not factored into the instructions. Finally, the instructions contain an option to fit a blank, which would have been impossible with the inflow of air created for "open hole" working. The work instructions were not taken to the point of work and were not followed. Instructions exists for pilecap open hole working and specific pilecap operations, but no specific instructions were available for the open hole operation carried out at the gas bypass plant. This shortfall has been acknowledged by the SACI investigation (Reference 5). Therefore the operating instructions provided for this work activity were inadequate and those that did exist were not followed. There is thus a clear breach of LC24 requirements.

IRR Regulations 8(4) and LC26

22. IRR Regulation 8(4) requires that where a safe system of work is provided, all reasonable steps should be taken to ensure that it is used. LC26 requires the licensee to ensure that no operations are carried out which may affect safety except under the control and supervision of a SQEP. NII guidance (Reference 7) makes it clear that this extends to include all operations as defined in LC1, including maintenance. These requirements are however of a general nature and do not provide a set of clear guidelines regarding appropriate arrangements for the control and supervision of work. The NII investigation found it difficult to establish who was in charge of the work party and the line of accountability. The job was allocated to Weirs, who provided a supervisor for the work. The Weirs supervisor appears only to have had any interaction with the Weirs employees however and certainly was not present in the gas bypass plant during the work. Moreover, there was no structured setting to work process followed and no overall leadership of the mixed BE/contractor team. Such a light supervisory touch would only be appropriate for routine work activities, supported by clear written work instructions. Whereas this task was non-routine and the work instructions were poor. The licensee's own investigation acknowledges that there was a lack of clarity of who was in charge of the task. Ensuring that necessary authorisations have been obtained, that adequate work instructions are available and followed; and that work activities are properly coordinated where necessary are key supervisory duties. Ultimate responsibility for ensuring effective supervision of work falls to the licensee. There is thus a clear cut breach of IRR Regulation 8(4) and LC26. This breach is significant because safety was reliant on following a safe system of work.

IRR Regulation 14 and LC10

23. IRR Regulation 14 requires training to be given to employees regarding the risks to health caused by ionising radiations and the precautions that should be taken. LC10 requires suitable training to be given. The response of the work team following the ejection of dust into the gas bypass plant area gives some cause for concern. The three people wearing powered air hoods appear to have removed them prematurely and the whole work party waited in the contaminated area for an extended period, rather than escaping to the corridor. There is therefore a potential shortfall against IRR Regulation 14 and LC10 concerning training of staff in the response to an airborne contamination event.

LC34

24. The licensee is required to ensure that radioactive material is at all times adequately controlled or contained. Given that a quantity of radioactive material was released in to the gas bypass plant and that in all likelihood the area will remain contaminated for the remaining life of the station, there has been a clear cut breach of LC34.

Other Relevant Legislation

25. There are a number of other regulations which are potentially applicable to this event.

26. Health and Safety at Work etc. Act Sections 2 and 3 are relevant because safety was reliant on following a safe system of work and contractor staff were involved. It is considered that there was a breach of these general duties, in that employers must provide the necessary supervision to ensure the health and safety of employees and others. However, these general requirements do not provide a set of clear guidelines regarding appropriate arrangements for the control and supervision of work. These breaches may therefore be considered in conjunction with the breach of LC26.

27. The Management of Health and Safety at Work Regulation 5 is relevant to the requirements for a prior risk assessment. It is considered to be equivalent to IRR Regulation 7.

28. IRR Regulation 12 has been considered with regard to the emergency response discussed above under LC10. Also, IRR Regulation 15 has been considered with respect to shortfalls in the control and supervision of the work, discussed under LC26, above. The view has been taken that these regulatory requirements are not the most directly relevant to this event.

3. REGULATORY CONSIDERATIONS

Evaluation against the EMM

29. It is considered that there were clear contraventions of LC24, IRR Regulation 8(4), LC26 and LC34 leading to the incident. It is argued at paragraph 35 below however, that the most significant shortfall was in the area of control and supervision. An evaluation of the regulatory response has therefore been completed based on a breach of LC26, in accordance with the guidance provided with in HSE/EMM and OC 130/11. Potential breaches of the general requirements of Health and Safety at Work etc. Act Sections 2 and 3 also fall out of this analysis.

30. This report summarises the main outcomes from the process and further details can be found at Appendix 1 and a copy of the completed EMM1 form can be found at Appendix 2. It should be noted that all contraventions of Regulations and Licence Conditions associated with this incident have been considered together in conducting this evaluation.

31. The HSE/EMM evaluation has been based on specialist advice (Reference 8) that the ALARP benchmark is 0 mSv; the likelihood of a serious health effect is remote; and the risk gap is substantial.

32. The requirements of LC26 (and HSWA S2 and S3) are general in nature and do not provide a specific set of requirements regarding appropriate arrangements for the control and supervision of work. The benchmark standard for compliance has therefore been treated as interpretive for the purposes of the EMM evaluation.

33. An evaluation against the HSE/EMM indicates that the appropriate level of enforcement action is a letter.

Proposed Enforcement Action

34. It is necessary to consider the proposed enforcement action plan, given the shortfalls against legislative requirements that have been identified.

35. The licensee's internal investigation findings and disciplinary action against the individuals involved suggest that shortfalls in the arrangements for control and supervision are unrecognised, or not accepted. These contraventions are important, because safety was reliant on a safe system of work, which in the event was not properly controlled or supervised. The following shortfalls were identified:

- It was not clear who was in charge of the work team.
- There was no clear line of accountability back into the licensee's organisation.
- The work team was not provided with adequate instructions.
- The work team was not properly briefed and set to work.
- Adequate steps were not taken to ensure procedural adherence.
- Coordination of work team members and their organisations was inadequate.
- The direct supervision necessary to provide leadership and enforce standards of work was absent.

36. An added complication is the fact that the licensee is introducing new fleet wide arrangements for the management of contactors.

37. Taking the above into consideration, the following enforcement strategy is proposed:

- A letter should be sent to Hinkley Point B containing full details of the NII investigation findings and a request for an action plan to provide a remedy. In addition, the HPB Station Director should be invited to Bootle to explain the event, the lessons learnt, the proposed corrective actions and to provide a personal commitment (Reference 9).
- A letter to the appropriate BE CNO should be sent requesting that new fleet wide arrangements being introduced concerning the management of contractors take full cognisance of this event (Reference 10).

- An NII audit team should be assembled to ensure that the new BE arrangements for the control of contractors are suitable and will address the problems evident from this event.

4. CONCLUSIONS

1. An analysis of the event at Hinkley Point B on the 16th July 2009 has identified contraventions against LC24, LC26, LC34 and LC10 and also IRR Regulations 7, 8 and 14.

2. An evaluation against the NII/HSE EMM has identified that a letter is the appropriate regulatory response.

5. RECOMMENDATION

1. It is recommended that the Head of Unit 1A agrees this PAR and the issue of letters at References 9 and 10.

6. REFERENCES

1. VR HPB 12/2009. [redacted]. 28 July 2009. Trim 2009/291790.
2. VR HPB 13/2009. [redacted]. 28 August 2009. Trim 2009/339406.
3. NII Letter HPB 71668R [redacted]. 13 August 2009. Trim 2009/313677.
4. BE Letter HPB 51100N. [redacted]. 26 August 2009. Trim 2009/337795.
5. Significant Adverse Investigation Report (SACI) AR 547641.
6. HPB Contamination Event. BE disciplinary information. Trim 2009/338092.
7. BMS T/INS/027 – Guidance: LC26: Control and Supervision of Operations.
8. Division 2 Assessment Report. Hinkley Point B Gas Bypass Contamination Event (16h July 2009) – Radiological Protection Advice. EA Thomas. Trim 2009/364625
9. NII Letter HPB71673R. [redacted]. 16 September 2009. Trim 2009/363316.
10. NII Letter GEN71275R. [redacted]. 16 September 2009. Trim 2009/363319.

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APPENDIX 1 – ENFORCEMENT MANAGEMENT MODEL EVALUATION SUMMARY

Enforcement Assessment Record (EMM1) – Hinkley Point B Gas Bypass Plant – Contamination Event on 16th July 2009

SUMMARY:

This document summarises the conclusions and the outcomes from an assessment against the EMM model in relation to the recent contamination event at Hinkley Point B in which 8 men were contaminated by a release of radioactive dust into the gas bypass plant where they were working.

The assessment has been made based on a failure to comply with LC26.

It is proposed to issue letters requiring BE to address shortfalls in compliance with LC26, plus LC10, LC24, LC34, IRR Regulations 7 and 8. This will be followed up by NII audit of new BE arrangements for the management of contractors and an invitation to the HPB Station Director to attend a meeting in Bootle.

Ref	Descriptor	Description	Comments	Recommendation
3	**-**	**Risk Gap**		
	EMM Prioirty EMM Effects Priority	Is this EMM considering the effects of Ionising Radiations i.e. OC130/11?		Yes
		If you are considering Ionising Radiations, is the priority Stochastic, Whole Body or Deterministic effects?		Stochastic
3.1	Actual Risk	Determine the risk gap is to assess the level(s) of actual risk arising from the dutyholder's activities. Inspectors should base this judgement on information about hazards and control measures informed by their training, experience, guidance and other relevant sources of information. Whilst the risk gap principle can be used for events that have already happened, e.g. during investigation of an accident or dangerous occurrence, it is the potential for harm that should inform the decision: not what actually happened. However, the occurrence of an accident or dangerous occurrence (DO) becomes relevant later when considering dutyholder factors.	There was internal and external contamination of eight [redacted] working in the gas bypass area. The maximum level of committed effective (internal whole body) dose was estimated to be [redacted] microSv. The maximum whole body dose including external EDP data was [redacted] microSv. The whole of the gas bypass plant was initially contaminated from the release of 20MBq of radioactive dust, to the extent that clean-up had to be undertaken in C3 conditions. The area has been cleaned to C2 conditions at a cost of some £200K - £300K. NII Radiation Protection Specialist advice suggests that the area will never be fully clean. Thus entry into this plant area by operators will henceforth need to be undertaken in C2 clothing, with the potential for further exposure to personnel. There is also a potential for this new operational constraint to lead to as yet unforeseen threats to nuclear safety due to the need to adapt working practices and the potential to impair emergency response. No release of activity to the environment was reported as a result of this event. OC 130/11 requires that the likelihood of harm for stochastic effects to be based on the potential exposure above the ALARP level. Assuming that the external whole body dose was unavoidable, the ALARP level may be considered to be zero internal dose. For stochastic effects of ionising radiation, any increase of exposure above the ALARP level could increase the likelihood of serous health effects. In this case, a reasonable level of potential exposure is considered to be between 1 and 10 times the actual exposure. This gives a potential dose of between 100microSv and 1mSv above the ALARP level. Corresponding to a remote likelihood of a serious health effect, from OC 130/11 Table 1.	Consequence = Serious health effect Likelihood = Remote

3.2	Benchmark	Benchmarks describe the level of risk remaining once the actions required of the dutyholder by the relevant standards, enforceable by law, are met. This level may be nil or negligible when legislation requires risks to be eliminated or tightly controlled, or may be higher where some residual risk is allowed. This permitted risk may be established by a number of relevant sources including specific legal requirements, ACoPs, British or European standards, or guidance (see Standards table[1]). Benchmarks are crucial in achieving a consistent approach to enforcement.	The benchmark standard is that risks from ionising radiations are reduced to as low as reasonably practicable (ALARP). Therefore the benchmark represents a negligible likelihood of serious health effects (OC 130/11 Table 1).	Consequence = Serious health effect Likelihood = Negligible.
3.3	Risk Gap (and table used)	Determined by comparing the actual risk (assessed by inspection or investigation) "where the duty holder is" and the Benchmark "where the duty holder should be".	OC 130/11 Table 2.2 - EMM table for multiple casualties amended for stochastic effects. A remote likelihood of serious health effects corresponds to a substantial risk gap.	Risk gap = Substantial

4	-	**Initial Enforcement Expectation**		
	Initial Enforcement Expectation Priority	Need to determine if the Enforcement Action relates to Health and Safety, Compliance & Admin, or Permissioning		

4.1	Benchmark Standard	Benchmarks are derived from health and safety standards which come from various sources. These standards have differing 'authorities', e.g. they could be specified in law, or may be a reasoned description of what the law seeks to achieve set down in guidance. This influences the decision about the proportionate level of enforcement. A higher level of enforcement is expected where a duty holder has failed to meet well known and established standards compared to situations where there is very little information or guidance available. **What is the authority of the appropriate standard?** DEFINED - Minimum standard specified by Acts, Regulations, Orders and ACoPs. For example, defined standards of edge protection, requirement to fit safe load indicators to cranes, prohibitions of certain work activities, requirement to have a licence for certain asbestos work, licence conditions. ESTABLISHED - Codes of Practice and other standards linked to legislation, eg CEN standards, providing specific standards of health, safety and welfare. Also published or commonly known standards of performance interpreted by Sectors, TD, SG or other specialists, industry or other organisations as levels of performance needed to meet a general or qualified duty under health and safety law. INTERPRETATIVE - Standards put forward by Sectors, TD and SG or other HSE specialists, which are not published or available generally, but are examples of the performance needed to meet a general or qualified duty. Also standards interpreted by inspectors from first principles.	***LC26*** LC26 requires the licensee to ensure that no operations are carried out which may affect safety except under the control and supervision of a SQEP. NII guidance (Reference 7) makes it clear that this extends to all operations as defined in LC1, including maintenance. The NII investigation found it difficult to establish who was in charge of the work party and the line of supervision. The job was allocated to Weirs, who provided a supervisor for the work. The Weirs supervisor appears only to have had any interaction with the Weirs employees however and certainly was not present in the gas bypass plant during the work. Moreover, there was no structured setting to work process followed and no overall leadership of the mixed BE/contractor team. Such a light supervisory touch would only be appropriate for routine work activities, supported by clear written work instructions. Whereas this task was non-routine and the work instructions were poor. The licensees own investigation acknowledges that there was a lack of clarity of who was in charge of the task. Ensuring that necessary authorisations have been obtained, that adequate work instructions are available and followed; and that work activities are properly coordinated where necessary are key supervisory duties. Ultimate responsibility for ensuring effective supervision of work falls to the licensee. Safety was reliant on following a safe system of work, hence the general requirements of HSWA Sections 2 and 3 are also relevant. The requirements of LC26 and HSWA S2 and S3 are very general in nature and do not provide a set of clear requirements regarding appropriate arrangements for the control and supervision of work. The standard should therefore be treated as interpretive for the purposes of this EMM evaluation.	Interpretive

4.2	Compliance/Admin Descriptor	When considering compliance and administrative arrangements, inspectors should use the Compliance and administrative arrangements table to assess the level of non-compliance. This table may also be used when considering the provision of certain information required by permissioning regimes. The level of non-compliance should then be combined with the authority of the benchmark standard to produce the initial enforcement expectation, using the Compliance and administrative arrangements initial enforcement expectation table. **How well are the standards for compliance or administrative arrangement complied with?** ABSENT - Total absence, appreciation or implementation of compliance or administrative arrangements. For example, safety case not submitted, assessment of risk not done, requirements of Working Time regulations not complied with, toilets not provided, or accidents not reported. Also the failure to provide information required by permissioning regimes. INADEQUATE - Only rudimentary observance with standards or inadequate compliance, where such failures are of a substantial or material nature. For example washing facilities not provided with hot water, only fatal or 'major injuries' reported. Also poor quality submissions required for permissioning. MINOR - Deficiencies or inadequacies are minor, have little material impact and can be remedied easily. Also minor defects in the information supplied for permissioning.	Compliance against administrative arrangements has not been considered as part of this evaluation.	N/A
4.3	Compliance with permissioning document	The enforcement action necessary to close the risk gap in permissioning regimes is usually achieved through the permissioning document. This may be through its modification, including re-issue, its revocation/refusal or use of a specific enforcement power permissioning may provide, e.g. a direction. The extent of deviation from the permissioning document is considered along with the risk gap it generates in order to identify an initial enforcement expectation: see the Permissioning initial enforcement expectation table.	Compliance against permissioning requirements has not been considered as part of this evaluation.	N/A

4.4	Initial Enforcement Expectation	The judgements about risk gap, compliance and administrative arrangements, and permissioning requirements are considered with the legal 'authority' of the standards which establish the benchmark to reach the initial enforcement expectation. This is the enforcement action solely reflecting, and proportionate to, the risk to health or safety, or the seriousness of any breach of the law.	Refer to OC 130/11 EMM Table 5.1 Substantial compliance gap against an interpretive standard	Letter
4.5	Permissioning Document Impact		N/A	N/A

5	-	**Duty holder Factors**

5.1	Record of Previous written enforcement action	**<u>Does the dutyholder have a history of relevant, written enforcement being taken against them?</u>** Yes - Enforcement action has been taken against the dutyholder on the same or similar issues, by notices, prosecutions or letter requiring action. OR No - No written enforcement action against the dutyholder on the same or similar issues.	There has been no previous enforcement action on the same or similar issues.	No
5.2	History of related Incidents, accidents, ill health	**<u>Is there a relevant incident history?</u>** YES - The dutyholder has a history of related incidents, or that there is evidence of related incidents, eg accidents, cases of ill health, dangerous occurrences. OR NO - No previous history or evidence of related accidents, ill health, or dangerous occurrences	The licensee has identified a number of similar incidents in Magnox and AGR plants and has noted the risks and difficulties associated with using negative pressure to provide adequate containment of loose particulate contamination. In particular, the licensee notes in the internal investigation report (SACI) that a similar event occurred at Hinkley Point B in 1996 when CO2 was released into the circulator hall. The Reactor 4 gas pressure circuit was effectively open to atmosphere with containment provided by suction from the extract pump. The pump tripped, but the operator failed to notice. The configuration was unusual and the risks were recognised. The lesson learnt was that such tasks should not be initiated until a Temporary Operating Instruction approved by the Shift Manager has been issued (e.g. potential breach of LC24). It is not considered that this event constitutes a track record of related incidents.	No

5.3	History of previous related verbal enforcement	**Does the dutyholder have a history of relevant verbal enforcement being given to them?** YES - Enforcement action has been taken against the dutyholder on the same or similar issues, by verbally telling them what they have to do in order to comply with the law. OR NO - The dutyholder has not been told previously what they have to do in order to comply with the law on the same or similar issues.	In February 2008 an unirradiated fuel stringer was placed into the reactor with the gag closed. This was a potentially very serious threat to nuclear safety arising from the action of an individual who was inadequately supervised. The licensee recognised at the time that improvements needed to be made to the level of control and supervision of fuel route operations. Verbal discussions were held with the licensee. Although significant, this matter is not considered sufficiently relevant to the issue under consideration.	No
5.4	Duty holder gain economic advantage from non-compliance	**What is the intention of the dutyholder in non-compliance?** YES - The dutyholder is deliberately avoiding minimum legal requirements for commercial gain. (For example failing to price for or provide scaffolding for high roof work) OR NO - Failure to comply is not commercially motivated.	It is not considered that the licensee deliberately avoided complying with minimum legal requirements for commercial gain.	No
5.5	Level of actual harm arising from matter under consideration	**What is the level of actual harm?** YES - A 'serious personal injury' or 'serious health effect' has occurred as a result of the matter under consideration OR NO - There has been no actual harm, or the harm has been no greater than a 'significant personal injury' or a 'significant health effect'	The actual level of exposure to ionising radiations has incurred an actual dose less than 100microSv greater than ALARP. The likelihood of serious health effects is therefore negligible (OC 130/11 Table 1).	Negligible
5.6	Standard of General conditions	**What is the standard of general conditions?** POOR - There is a general failure of compliance across a range of issues, including those matters related to the activity being considered through the EMM. For example, failure to address risks arising from hazardous substances, machinery, transport, vibration, noise etc, or inadequate welfare facilities. REASONABLE - The majority of issues are adequately addressed, with only minor omissions. GOOD GENERAL COMPLIANCE - Full compliance across the whole range of indicators with no notable omissions.	It is considered that the general condition is deemed as adequate, as there is not full compliance across the whole range of indicators, but that the majority of issues are adequately addressed.	Reasonable

5.7	Inspection history of duty holder	**What is the Inspection history of the dutyholder?** POOR - The dutyholder has an inspection history of significant problems, copious advice and poor inspection ratings. REASONABLE - The dutyholder has an inspection history of nominal or piecemeal problems, where non-compliance has been related to new or obscure duties and where the rating history is in the average range. GOOD - The dutyholder has an inspection history of good compliance, effective response to advice, consistently high standards and a low rating.	It is considered that this can be deemed to be reasonable.	Reasonable
5.8	Attitude of Duty holder to H&S issues	**What is the attitude of the dutyholder?** HOSTILE/INDIFFERENT - The dutyholder is actively antagonistic, or completely uninterested in health and safety issues. Impossible to establish an effective relationship. REASONABLE - The dutyholder is open to discussion and reasoned persuasion and effective communications can be established. POSITIVE - The dutyholder is enthusiastic and proactive towards health and safety issues, actively seeking advice and pursuing solutions.	It is considered that the licensee is active and enthusiastic towards health and safety issues and that there is concern and regret regarding this event. It is therefore considered that their attitude should be considered as positive.	Positive
5.9	Indicated Enforcement Action - Enforcement		The indicated enforcement action is a letter. It is noted that BE are introducing new fleet wide arrangements for the management of contractors. A corporate letter should therefore be sent to ensure that these new arrangements take full cognisance of the event at HPB. In addition, an NII audit team should be assembled to ensure that the new BE arrangements for the control of contractors are suitable and will address the problems evident from this event. A letter should be sent to HPB containing full details of the NII investigation findings and request an action plan to provide a remedy. It is further proposed that the HPB Station Director be invited to Bootle to explain the event, the lessons learnt, the proposed corrective actions and a personal commitment. It is considered that the above regulatory response will be sufficient to raise the issue of outage and contractor control to the highest level in BE.	Letter
5.10	Indicated Enforcement Action - Permissioning			N/A

6	-	Strategic Factors		
6.1	Action coincide with Public Interest?	**Does the action coincide with the Public Interest?** Yes - The action results in a net benefit to the wider community in terms of targeting resources on risk and meeting public expectations of HSE No - The action results in a net disadvantage to the wider community in terms of addressing risk, targeting resources on risk and failing to meet public expectations of HSE	The resultant action will reduce the likelihood of a similar event occurring in the future. Eight [redacted] have been unnecessarily contaminated at a nuclear power plant; some of whom were visiting workers. There is already a great deal of public interest and the pubic will expect a robust regulatory response.	Yes
6.2	Vulnerable Groups protected by action	**Are vulnerable groups protected?** YES - The action results in control of risks to vulnerable groups, eg children, members of the public, patients, etc NO - The action does not result in control of risks to vulnerable groups	The resultant action will reduce the likelihood of a similar event occurring in the future. Vulnerable groups remain protected.	Yes
6.3	Long term impact of Action	**What is the long-term impact of the action?** SUSTAINED COMPLIANCE - The action is sufficient to achieve sustained compliance across the range of risks associated with the dutyholder NO LONG TERM IMPACT - The action is insufficient to secure sustained improvements and that problems may be expected at subsequent visits	It is considered that the outcome of this investigation and associated action will result in improvements to the arrangements for control and supervision of work, particularly work undertaken by contractors during outages. This will address not only "open hole" working but other activities where there may be risks from ionising radiations associated with work of a novel or complex nature.	Sustained
6.4	Effect of action on other duty holders	**What is the effect of the action on other dutyholders?** POSITIVE - Other dutyholders within the same industry, geographical location or wider business community are deterred from committing similar offences or encouraged to adopt a more favourable view of health and safety requirements. In effect, the action taken broadcasts a positive message about HSE NEGATIVE - The course of action undermines both positive dutyholders' perceptions of HSE and the wider appreciation of the standards of health and safety required. For example, failure to prohibit construction work causing a danger to the public	Details of this incident will be circulated throughout British Energy, with the lessons learned. The action will highlight not only the need for adequate operational instructions but importantly the need for effective control and supervision to ensure that appropriate standards are met, particularly concerning the adherence to safe systems of work.	Positive
6.5	Initial effect of action on compliance with benchmark	**What is the initial effect of action?** BENCHMARK ACHIEVED - The action secures compliance with the relevant benchmark, eg COSHH assessment completed, access to dangerous parts of machinery prevented, etc INCOMPLETE BENCHMARK - The action does not secure full compliance with the benchmark.	The licensee's own internal investigation has identified that new procedures for "open hole" working need to be developed and that the company decision making processes need to be used. The disciplinary action taken also suggests that incorrect individual actions were a significant factor. The licensee has acknowledged that there was a lack of clarity as to who was in charge of the task. The licensee has failed to recognise the importance of adequate control and supervision in ensuring that adequate work instructions are available and followed; and that work activities are properly coordinated where necessary. This action will therefore secure the necessary compliance with LC26 (and HSWA).	Achieved

6.6	Functional impact of action	**What is the functional impact of the action?** ACCEPTABLE - There is a net benefit to the employees, and others who might be affected. Please note that risk is the overriding concern, and that the wider impact may be a qualifying issue, but is not definitive. To illustrate: where risk gap is nominal or moderate and the strict application of the law would result in closure of the workplace or unemployment, then all of the ramifications of the action should be taken into account. The net benefit of the enforcement action in this situation is for the inspector to judge. UNACCEPTABLE - There is a net disadvantage to employees and other who might be affected, from the action taken. Please note that risk is the overriding concern, and that the wider impact may be a qualifying issue, but is not definitive.	There will be demands on resourcing required to introduce adequate improvements in response to this action. But it is not envisaged that there will be any disbenefit to workers arising from the action.	Acceptable
6.7	Principles/expectation of Enforcement Policy met?	**Have the principles and expectations of the Enforcement Policy been met?** YES - The policy has been followed NO - The policy has not been followed	The HSE Enforcement Policy has been followed and met.	Yes

	Does the matter need to be Referred for Management Review			No

HSE

FULLY CLOSED

APPENDIX 2

Health and Safety Executive

Enforcement Management Model

Enforcement Assessment Record (EMM1)

(see FAQ for guidance on completing this form)

Section 1 **Directorate:** FOD ☐ HID ☐ ND ☒

Duty holder	Customer No	British Energy Hinkley Point B		
Site/Premises	Site No	4023753	Case No	416005

Brief description of circumstances and risks considered

Eight [redacted] contaminated in the gas bypass plant on 16th July 2009

Section 2 – Imminent risk of serious personal injury

Prohibition notice Yes ☐ No ☒ HSWA Section 25 powers Yes ☐ No ☒

Section 3 – Risk gap (From Table 1 and Tables 2.1 or 2.2)

Actual risk	Consequence		Serious ☒	Significant ☐	Minor ☐
	Likelihood	Probable/significant ☐	Possible ☐	Remote ☒	Nil / negligible ☐
Benchmark	Consequence		Serious ☒	Significant ☐	Minor ☒
	Likelihood	Probable/significant ☐	Possible ☐	Remote ☐	Nil / negligible ☒
Risk gap (and table used)	**Single/low casualties** (Table 2.1)	Extreme ☐	Substantial ☐	Moderate ☐	Nominal ☐
	Multiple casualties (Table 2.2)	Extreme ☐	Substantial ☒	Moderate ☐	Nominal ☐
					No breach of law OR no risk gap ☐

Section 4 – Initial Enforcement Expectation (Tables 5.1, 5.2 or 5.3)

Benchmark standard *(Table 3)*			Defined ☐	Established ☐	Interpretative ☒	
Compliance / admin descriptor (Table 4)			Absent ☐	Shortfall ☐	Minor ☐	
Compliance with permissioning document			Contravention ☐	Irregularities ☐	Compliance ☐	
Initial Enforcement Expectation	Prosecution / Crown Censure ☐	IN / Direction / Specification ☐	Letter ☒	Verbal warning ☐	No enforcement action ☐	
Permissioning document impact (table 5.3 only)	Revocation / Refusal / Direction ☐	Amendment / Refusal / Variation ☐	Amendment ☐	Letter ☐	Letter / verbal warning ☐	Nil ☐

Section 5 – Dutyholder factors *(all elements do not always apply)*

Is there a record of previous relevant written enforcement action, such as notices, prosecutions, directions or letters requiring action?	Yes ☐	No ☒	
Is there a history of related incidents, accidents, ill health, etc?	Yes ☐	No ☒	
Is there a history of previous relevant verbal enforcement?	Yes ☐	No ☒	

Did the dutyholder gain or deliberately seek economic advantage from non-compliance?	Yes ☐	No ☒	
Level of actual harm arising from the matter under consideration?	Serious personal injury or serious health effect ☐	No serious harm ☒	No harm ☐
What is the standard of general conditions?	Poor ☐	Reasonable or N/A ☒	Good ☐
What is the inspection history of the dutyholder?	Poor ☐	Reasonable or N/A ☒	Good ☐
What is the attitude of the dutyholder to H&S issues?	Hostile / indifferent ☐	Reasonable ☐	Positive ☒

Indicated enforcement action *(after considering dutyholder factors)*

Enforcement	Prosecution / Crown Censure ☐	IN / Direction / Specification ☐	Letter ☒	Verbal warning ☐	None ☐	
Permissioning	Revocation / Refusal / Direction ☐	Amendment / Refusal / Variation ☐	Amendment ☐	Letter ☐	Verbal warning ☐	Nil ☐

Section 6 - Strategic factors

Does action coincide with public interest? *(refer to additional guidance)*	Yes ☒	No ☐
Are vulnerable groups protected by the action?	Yes ☒	No ☐
What is the long-term impact of the action?	Sustained ☒	None ☐
What is the effect of the action on other dutyholders?	Positive ☒	Negative ☐
What is the initial effect of action on compliance with benchmark?	Achieved ☒	Incomplete ☐
What is the functional impact of the action?	Acceptable ☒	Unacceptable ☐
Have the principles and expectations of the Enforcement policy been met?	Yes ☒	No ☐

Outcome of management review *(To be completed when indicated enforcement action does not match planned action, where dutyholder or strategic factors are not fully addressed or otherwise where instructed)*

Not required.

Enforcement action plan *(Priorities for action, and timescales)*

It is noted that BE are introducing new fleet wide arrangements for the management of contractors. A corporate letter should therefore be sent to ensure that these new arrangements take full cognisance of the event at HPB. In addition, an NII audit team should be assembled to ensure that the new BE arrangements for the control of contractors are suitable and will address the problems evident from this event.

A letter should be sent to HPB containing full details of the NII investigation findings and request an action plan to provide a remedy. It is further proposed that the HPB Station Director be invited to Bootle to explain the event, the lessons learnt, the proposed corrective actions and a personal commitment.

Name of inspector	[redacted]	Date	16/9/09
Name of line manager	[redacted]	Date	16/9/09