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[redacted]
Health and Safety Executive
Nuclear Directorate
Redgrave Court
4S.1 Merton Road
BOOTLE
Merseyside
L20 7HS

Our Ref: NC/GH/BW
Your ref: HPB 71668 R
Unique No: HPB 51100 N

26 August 2009

Dear [redacted]

BRITISH ENERGY GENERATION LIMITED
HINKLEY POINT B POWER STATION – NUCLEAR SITE LICENCE No 62A
EVENT ON 16 JULY 2009 INVOLVING THE CONTAMINATION OF A WORKING PARTY WITHIN THE GAS BYPASS PLANT

I am replying to your letter HPB71668R dated 13 August 2009 in which you asked for further information relating to the release of radioactive material in the gas bypass plant on 16 July 2009. This continues our ongoing dialogue in which you have been regularly provided with information relating to the event.

a. Electronic personal dosemeter (EPD) radiation dose information for the eight affected individuals from the 16 July 2009 is detailed in attachment 1. The EPD records gamma and x-ray doses and also beta doses. For completeness extremity thermo luminescent dosemeter (TLD) information for the three members of the immediate working party has also been included with the whole body EPD dose data.

   On 6 August 2009 you were sent a summary of the committed effective doses and skin doses (arising from the skin contamination) and the final Harwell internal dosimetry investigation reports.

b. You requested a realistic estimate of the potential worst case exposure to a hypothetical individual. In order to provide you with a response the most credible worse case has to be based upon persons within the immediate work area not wearing respiratory protective equipment (RPE) stated in the Radiological Work Permit (RWP), or the risk assessment being inadequate and therefore RPE not stated in the RWP.

   The assigned protection factor for the Protector/Sabre Tornado T25 powered hooded respirator recommended by HSG53 is 40. Therefore the estimated exposure for a person not wearing RPE would be 40 times the maximum committed effective dose actually received by an individual involved in the event. The hooded respirator provides particulate protection only and no reduction for any tritium concentration has been assumed. The maximum committed effective dose resulting from the

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event was 0.059 mSv and so the revised committed effective dose would be 2.36 mSv.

It is judged that with the speed of the dust being ejected the exposure would not have been greater if the faces of the work party had been closer to the release site. However, if it is assumed that the work party at the valve was not wearing RPE and was half the distance from the valve than was actually the case then applying the inverse square law would give a revised committed effective dose of 9.44 mSv.

There has been no radiological survey evidence of any 'hot particles' within the release site and surrounding area.

The activity was fairly evenly distributed as a fine particulate dust that is from the gas bypass plant internal circuit and does not have the same beta/gamma fingerprint ratio as fuel route type activity. The activity has been established as predominantly chlorine-36 and was not released directly from the pressure vessel. Therefore the activity would not have been greater if the event had occurred earlier in the programme immediately after the reactor had been purged to air.

Finally, an assumption is made that the dust released was not visible and the immediate work party continued to bolt up the spool piece so that they were exposed for an extended period, whilst not wearing RPE and half the distance from the valve than was actually the case. Under this assumption the exposure time would be greater. However, as the dust would not have been seen the dust burden would have been lower, and as the dust would not have been felt by the work party it would have been ejected less vigorously and so would have been subject to dilution as it dispersed. Consequently, the extended period of exposure would have been balanced by the decreased activity burden in the release.

Case	Factor Applied	Revised CED Estimate (mSv)
Initial event	n/a	[redacted]
No RPE	40	[redacted]
Closer proximity	4	[redacted]
Earlier in the programme	1	[redacted]
Extended period of release	1	[redacted]

c. In accordance with station procedures a radiological contamination survey of the corridor and operating area of the gas bypass plant was undertaken on 20 July 2009 using individual microfibre wipes and a BP19 large area beta probe contamination instrument. Until the survey was complete no access was made by personnel, the gas bypass plant being contained behind the hot gas release containment doors. A maximum reading of 7000 counts per second on the corridor walkway was identified. A further radiological survey of the B/G/1761 valve and spool piece location was undertaken on 22 July 2009 using individual microfibre wipes and an EP15 type pancake geiger contamination instrument. Maximum readings found were 4000 cps on the B/G/1761 valve and 5000 cps on the floor under the wall between the valve and pipe joint. Copies of these survey forms were provided to the NII on 21 August 2009.

d. Representative 541 type swabs were taken from the corridor and main operating area within the gas bypass plant on 22 July 2009 for radiochemical and chemical analysis. The radiochemical findings are given in attachment 2 and the chemical analysis findings are given in attachment 3. Radiological analysis of these swabs was undertaken at

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the Hinkley Point B Combwich District Survey Laboratory and active swab samples were additionally sent to the National Nuclear Laboratory, Preston for detailed radiochemical analysis.

e. The powered particulate hoods are the Protector/Sabre Tornado T25 type with PF251 particulate filters. The assigned protection factor is assumed to be 40 as stated in HSG53 and Appendix E, Table E1 of BEG/SPEC/SHE/CRSI/010 Company Radiological Safety Instruction 10, Entry to and Work in Supervised and Controlled Areas. I understand that a copy of Appendix E of BEG/SPEC/SHE/CRSI/010 was given to you in the week beginning 17 August 2009.

f. Arrangements for complying with Regulation 7 of the Ionising Radiations Regulations 1999 are detailed in section 4 of BEG/SPEC/SHE/CRSI/006 Company Radiological Safety Instruction 6, Risk Assessments and the Application of the ALARP Principle. The company work management process incorporates a radiological risk assessment to be undertaken for all tasks requiring a RWP. The risk assessment will be produced by an Accredited Health Physicist as a precursor to producing a RWP. The RWP shall take account of the outcome of the risk assessment and contain suitable precautions to ensure adequate radiological safety. RWPs are prepared in accordance with BEG/SPEC/SHE/CRSI/007 Company Radiological Safety Instruction 7, Radiological Documentation. I understand that a copy of each of these documents was given to you in the week beginning 17 August 2009.

g. Reactor open hole working only occurs during outages when the reactor is in air and purged of carbon dioxide gas. Therefore no further open hole working has taken place since the event. An OPEX brief has been distributed across the station and the company. Open hole working will only recommence when the process for this work has been proceduralised and the other recommendations of the SACI report implemented. In future open hole working will be subject to ODM and IPTE and a formal pre job brief. The SACI corrective actions to reinforce open hole working are as follows:
    - For a company wide definition of open hole work to be documented
    - To proceduralise across the company the process required for open hole working ensuring that the company decision making model is utilised effectively
    - For Plant Managers to initiate a company wide discussion on lessons learnt and the strategy for open hole working.

h. You were provided with a copy of the interim report of the SACI on 24 July 2009. The final report will be provided to you shortly.

If you would like further information please contact [redacted]

Yours sincerely

[redacted]

Enc:

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Internal copy circulation list

SRD number file
[redacted]

Peer checked by: [redacted] 26/8/09 (date)

Independently verified by [redacted] 26/8/09 (date)

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Attachment 1

EPD Whole Body Doses

Issue Period 16th July 2009

Name Skin Dose	EPD Number	Whole Body Dose (Hp – Gamma + X-Ray) mSv	Whole Body (Hs – Beta) mSv
[redacted]	[redacted]	[redacted]	[redacted]

EXTRAD TLD (Extremity Dosemeter) Results

Issue Period July 2009

Name	Body Position	TLD number	Dose (mSv)
[redacted]	Eyes / Head Right Arm Left Arm	01028825 01023959 01029468	[redacted]
	Eyes / Head Right Arm Left Arm	01023980 01030184 01029217	
	Eyes / Head	01019511 01020986 01020513	

[redacted]

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Attachment 2

Radiological Analysis of Swab Samples from Gas Bypass Plant

National Nuclear Laboratory data

Radionuclide	Activity ± 2 Sigma (Bq/g of the swab)		
Sulphur-35	44.1	±	1.6
Chlorine-36	5400	±	12
Chromium-51	13.4	±	3.6
Manganese-54	31.0	±	2.3
Cobalt-58	5.89	±	0.91
Cobalt-60	391	±	10
Zinc-65	9.01	±	2.3
Silver-110m	3.73	±	0.73
Antimony-124	6.76	±	0.78
Caesium-137	2.54	±	0.78
Americium-241	<2.8		
Gross total beta/gamma activity assessment	6320	±	950

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Attachment 3

Chemical Analysis of Swab Samples from Gas Bypass Plant

A sample from the gas bypass plant was sent to an external company NNL for chemical analysis. This was achieved by use of Environmental Scanning Electron Microscopy (ESEM). It is likely, however that this sample contained other pre-existing non-active dust and debris from the general gas bypass plant area in addition to the debris emitted during the event. This therefore makes interpretation of the results difficult.

Elements positively identified are carbon, oxygen, fluorine, sodium, magnesium, aluminium, silicon, phosphorus, sulphur, chlorine, potassium, calcium, titanium, and iron. Silicon and calcium were the dominant element on a few of the particles.

Likely constituents of the debris associated with the actual event and associated hazard are

(i) carbon dust – hazard associated with dust inhalation
(ii) desiccant – an amorphous aluminosilica gel, hazard associated with dust inhalation
(iii) traces of oil – hazard associated with oil mist

The likely constituents listed above would account for the observation of carbon, oxygen, aluminium and silicon. Sulphur would also potentially be present in all three.

Significant levels of calcium are most easily accounted for as cement based dust that pre-existed the event. This pre-existing dust may also account for the other elements identified.

In conclusion, it has not proved possible to categorically confirm the chemical composition of the debris emitted during the gas bypass plant event. However it is considered to have been predominantly a mixture of carbon dust, desiccant and oil. The hazard associated with these components is generally one of irritation of the respiratory tract.

[redacted]

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