

Hinkley Point B Overview of gaseous discharges exceeding quarterly notification

Feb 2020



Advanced Gas-Cooled Reactor (AGR) Operations

- Heat generated within the reactor core is transferred using Carbon Dioxide (CO₂)
- It is essential that the chemistry of the CO₂ is maintained within strictly controlled parameters
- To achieve this the CO₂ is conditioned through the Gas Bypass Plant (GBP)
- Part of the GBP function is to remove moisture using drying towers



What Happened?

- To allow essential maintenance activities to occur the GBP was isolated from the reactor gas circuit (November 2019)
- Following successful completion of the maintenance the GBP was de-isolated (November) but moisture readings were higher than expected, indicating that the dryer towers were not functioning.
- A team of experienced engineers were tasked with identifying the source of the issue and to return the GBP back to service.



Why did it happen?

- The team quickly identified that a blockage had formed within the pipework, stopping the normal route for the water to be drained from the gas dryers
- A small quantity of this water backed up into the GBP system leading to increases in moisture levels when the GBP was reconnected
- Unblocking the pipework was a relatively simple task, but locating the water and returning the GBP to full-service required CO₂ to be discharged from the primary circuit



How was the liquid removed?

- Initially, the issue was thought to be in the dryer towers and hot CO₂ was passed through the filtered system to purge the moisture
 - To minimise environmental consequences only a small amount (4Te) CO₂ was used initially. However, it was not enough to remove the moisture from the dryers.
 - Subsequently a larger amount (120Te) of CO₂ was put through to heat the dryer towers to required temperature and successfully remove the moisture.
 - However, further moisture readings identified presence of liquid within other parts of the GBP.



How was the liquid removed?

- Further liquid was located in lower sections of the pipework using innovative radiography techniques (x-rays). This liquid was drained.
- To return the gas conditions to the required chemistry controls a further purge required 120Te of CO₂ to be discharge through the filtered route
- Prior to authorising any of the discharges the team assessed the available options. Minimising the impact to the environment was a prime consideration of this team.
- Once authorised the discharges were limited to a maximum quantity and carefully controlled to ensure they were minimised



What were the environmental consequences (1)

- These additional discharges were above the Quarterly Notification Level for Carbon-14 (C-14) – as set by the site's discharge permit
- The QNL is set at a level that may, from time to time, be exceeded. It is not a legal limit.
- HPB submitted a report to the EA outlining why the QNL had been exceeded and the efforts taken to minimise the discharges.
- Overall dose impact has been reviewed and is negligible at 0.4 micro Sv (a 5g brazil nut equates to 0.5 micro Sv)



Organisational Learning

- The need to undertake additional discharges have been taken very seriously
- Following return to normal operations a team was set up to investigate the causes of the event.
- This investigation has initiated a suite of improvement actions to prevent a reoccurrence which will be tracked to completion
- The learning from the event has been shared across the company to ensure fleet wide learning is captured

