Permitting decisions

Radioactive Substances Regulation (nuclear sites)

We have decided to grant the permit variation for Sizewell B Power Station operated by EDF Energy Nuclear Generation Ltd. The decision is effective from 1.9.2021.

The permit number is EPR/XB3539DH.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

These considerations are set out in:

Government RSR Guidance;
RGN RSR1 *Radioactive Substances Regulation - Environmental Principles*;
RGN RSR2 *The regulation of radioactive substances activities on nuclear licensed sites*
and the guidance referenced from within those documents.

Purpose of this document

This decision document provides a record of our decision making process. It summarises the decision making process to show how we have taken all relevant factors into account in reaching our decision.

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Read the permitting decisions in conjunction with the environmental permit and supporting Compilation of Environment Agency Requirements (CEAR) document. The introductory note summarises what the permit covers.

Key issues of the decision

The applicant is EDF Energy Nuclear Generation Limited.

The application is for a variation to permit number EPR/XB3539DH for Sizewell B Power Station, Near Leiston, Suffolk IP16 4UR which is a bespoke permit for the disposal of radioactive waste from the premises.
The application was duly made on 31.7.2020.
We requested further information from the applicant on 19.10.20; the responses were received by the Environment Agency on 29.1.21 (protectively marked version) and 26.2.21 (redacted version for public register).

The application requested an increase to the annual limit on carbon-14 discharges to air from 500 GBq to 600 GBq in any twelve-month period, with a corresponding increase in the quarterly notification level. No other changes to the permit were requested. We have updated some conditions in the permit to incorporate changes in the latest nuclear permit template (version 7). The changes are described in the Variation Notice (VN). The permit and VN has been peer reviewed and checked with the applicant. We will take the opportunity to update the CEAR.

When station operations commenced in 1995, the annual limit on carbon-14 discharges to air was set at 600 GBq per year, based on modelling of carbon-14 production carried out during power station design. Subsequently, in a review of the Radioactive Substances Act 1993 (RSA93) Authorisation in 2007 that limit was reduced to 500 GBq per year based on historical discharge information submitted by British Energy (the Operator at that time). The limit was reduced because the review of historical discharge data showed that a lower limit was appropriate at that time.

In setting limits, we must be satisfied that operators can comply with the proposed limits without unduly affecting their ability to operate. Therefore, we must set limits which provide sufficient headroom for normal operation, provided that the operator applies best available techniques (BAT) to minimise the activity of radioactive waste discharged.

Operational experience in recent fuel cycles has been that the rate of carbon-14 production has increased as station operations normalised to long periods of steady state, full power operation. Power station systems, such as the Gaseous Radioactive Waste System, are operating more reliably so that more of the carbon-14 produced is being preferentially discharged to air (as the power station design intended).

The future discharge profile of carbon-14 to air has been predicted and it is possible that the annual limit of 500 GBq could be exceeded at the current rate of carbon-14 production. The applicant has predicted that raising the annual limit for carbon-14 to the previous value of 600 GBq will cater for these fluctuations in discharges.

We have scrutinised the applicant's radiological assessment of the impact on members of the public and on wildlife. The estimated radiation dose to the representative person[1] due to discharges from Sizewell B at the limits in the permit is 10.8 micro Sv per year which is within the dose constraint of 300 micro Sv per year. The representative person would receive a dose of 16.6 micro Sv per year from the combined future Sizewell A and B discharges if the discharges were made at the permit limits for each site. Sizewell A ceased generation in 2006 and the site is now in stage 2 decommissioning.

We have not considered the proposed discharges from the proposed power station at Sizewell C in determining this application as there is no extant permit in force for that site. We will, however, take in to account the combined site discharges in coming to our decision on the Sizewell C application.

The assessment of the radiation dose to wildlife has shown that grasses and herbs will receive the highest dose rate for discharges to air at the RAMSAR and SSSI[2] sites, the

[1] The representative person for this site is an adult member of a fisherman's family who is exposed via the food chain and direct radiation.

[2] The Sizewell Marshes Site of Special Scientific Interest and the Minsmere/Walberswick Heaths and Marshes RAMSAR site.

highest being 0.005 micro Gy/h at the SSSI. The highest dose rate to wildlife overall is from discharge to sea, the maximum being 0.19 micro Gy/h to polychaete worms.

These values are well below the threshold dose rate at which significant effects on organisms would occur (40 micro Gy/h). We have assessed the potential impact on the most exposed Natura 2000 conservation site which is the Sandlings Special Protection Area (SPA). The estimated dose rate at this SPA is well below the threshold dose rate at which significant effects on organisms would occur (40 micro Gy/h).

We have considered the information supplied in the application and the responses to our request for further information. In determining this application we have applied our limit setting guidance, Government policy and our statutory obligations.

We have decided to grant the application subject to the conditions and limitations of the bespoke permit.

Confidential Information

A claim for commercial or industrial confidentiality has not been made.

Consultation

The consultation requirements were identified in accordance with the Environmental Permitting Regulations and our statement on public participation, "Environmental Permits: When and how we consult".

The application was publicised on the GOV.UK website.

We formally consulted the following organisations:

Office for Nuclear Regulation;
Food Standards Agency;
Public Health England.

Although the site is not a site of high public interest we decided to publicise the application wider than required by our procedure because we were also consulting on an application for a new bespoke permit for the proposed Sizewell C power station on adjacent premises. The application was advertised on the Environment Agency consultation hub between 19 August 2020 and 1 October 2020.

The comments and our responses are summarised in Annex 1.

Part 1: Variation to a permit for the disposal of radioactive waste

Introduction

The application requested an increase to the annual limit on carbon-14 discharges to air from 500 GBq to 600 GBq in any twelve-month period, with a corresponding increase in the quarterly Notification Level.

When station operations commenced in 1995, the annual limit on carbon-14 discharges to air was set at 600 GBq per year, based on modelling of carbon-14 production carried out during power station design. Subsequently, in a routine review of the RSA93 Authorisation in 2007 that limit was reduced to 500 GBq per year based on historical discharge information submitted by British Energy Generation Limited (the Operator at that time).

Carbon-14 arises in the pressurised water reactor (PWR) predominantly as a result of neutron activation of oxygen-17 impurities in the water coolant/moderator by thermal neutrons in the reactor core. There is a small contribution from activation of nitrogen-14 in dissolved air in the feed water. The inventory of carbon-14 and production rate is dependent on reactor power and there are no available techniques to remove carbon-14 from the gases discharged from light water reactors. The production of carbon-14 via activation of the primary circuit water is controlled by a surveillance programme to ensure that air ingress is minimised and that BAT is applied. Dissolved oxygen levels in reactor make-up water are controlled so that carbon-14 production due to activation is minimised.

The design estimate for the production rate of carbon-14 at continuous full power operation is between 300 - 600 GBq per year.

Carbon-14 is discharged to atmosphere via the gaseous radioactive waste system mainly in the form of methane.

Operational experience in recent fuel cycles has been that the rate of carbon-14 production has increased as station operations normalised to long periods of steady state, full power operation. Power station systems, such as the Gaseous Radioactive Waste System, are operating more reliably so that more of the carbon-14 produced is being preferentially discharged to air (as the power station design intended).

In addition, there is evidence that carbon-14 labelled methane is adsorbed and retained within the activated charcoal in the carbon bed delay system and then released later in the operating cycle of the plant.

The future discharge profile of carbon-14 to air has been predicted and it is possible that the annual limit of 500 GBq could be exceeded at the current rate of carbon-14 production. The applicant has predicted that raising the annual limit for carbon-14 to the previous value of 600 GBq will cater for these fluctuations in discharges.

Justification (RSR-A, Q11)

The practice is justified as *The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, light water moderated thermal reactor*.

The Chief Inspector of Her Majesty's Inspectorate of Pollution and the Minister of Agriculture, Fisheries and Food decided in November 1994 that operation of the Sizewell B PWR power station was Justified. This means that the Government has decided that the individual or societal benefit resulting from the class or type of practice outweighs the health detriment that it may cause.

Euratom Article 37 (RSR-C3, Q2c)

An Article 37 submission is not required for this application.

The requirements of Article 37 of the Euratom Treaty and the European Commission (EC) Recommendation (2010/635/Euratom) have now been superseded by The Transboundary Radioactive Contamination (England) Direction 2020.

This Direction is made for the purpose of ensuring that the Environment Agency considers whether plans to dispose of radioactive waste are liable to result in the radioactive contamination, significant from the point of view of health, of water, soil or airspace of notifiable countries.

The General Data that was submitted to the EC for Sizewell B by the UK Government on 13 May 1992 and the evaluation of transfer to man was based on a continuous discharge of carbon-14 to atmosphere of 600 GBq per year. We have satisfied the requirements of the Direction through our consultation process.

Operator and Operator Competence (RSR-A, Q12)

We have assessed the applicant's competence against our guidance on the definition of legal operator for environmental permits and against our guidance on management arrangements for nuclear site operators. We have focussed extensively on environmental leadership and management during inspections between 2018 and 2020 and carried out a national themed inspection in this area in 2018.

We are satisfied that the applicant is the person who will have control over the operation of the facility after the grant of the permit.

We have not identified any reasons indicating that the operator is unable to operate in accordance with the permit.

Disposal of Radioactive Waste (RSR-C3, Q2d)

The Sizewell B Power Station design is a light water, 4-loop Westinghouse Standardised Nuclear Unit Power Plant System (SNUPPS). Full power operation is typically with a reactor thermal power of 3445 MWth and gross electrical output of 1.26 GWe. The power station operates in eighteen-month fuel cycles, comprising about 17 months of full power operation followed by a refuelling outage, during which the power station is shut down for refuelling and essential maintenance.

Carbon-14 in the form of methane evolves from coolant in to the gas space at the top of the volume control tank (VCT) as hydrogen is injected in to the coolant as part of controlling the water chemistry. The methane is extracted by the gaseous radioactive waste system (GRWS). The GRWS comprises two parallel trains of processing plant, each

containing a cooler/condenser to dry the gas; oxygen and moisture monitoring; a guard bed containing 90 kg of charcoal; a main adsorber bed containing 8.17 tonnes of charcoal; and a HEPA filter. After the HEPA filter, the trains come together into a single line that feeds into the radwaste building ventilation stack, where all of the potentially contaminated ventilation air in the building is also directed for monitoring, sampling and final discharge.

The applicant has assumed that, for the purposes of modelling the discharge, 90% of the carbon-14 is discharged as methane and 10% as carbon dioxide. In further information the applicant has described the basis for this assumption, which is based upon design information and international research. In the absence of free oxygen and under reducing conditions, the formation of inorganic forms of carbon-14 is inhibited; the power station continuously purges the VCT with hydrogen and maintains the carbon bed delay system (CBDS) in a hydrogen atmosphere during operation. The Operator is currently carrying out a study to determine the actual composition of the gas that is discharged. We have included an Improvement and Information Requirement in the permit to carry out chemical analysis of the gas released from the gaseous radioactive waste system to determine the relative amounts of methane and carbon dioxide that is discharged and report the results.

The CBDS is designed to delay the release of short to medium-lived radioactive noble gases (such as isotopes of xenon and krypton) during normal operations and when there is failed fuel in the reactor. There is evidence of trapping some carbon-14 within the activated carbon beds which is then released at a later date. The plant was not designed to offer any abatement for carbon-14. The accumulation of carbon-14 in power plant systems during the fuel cycle means that not all of it is discharged within twelve months of being produced, leading to an increasing discharge trend over the course of the operating cycle.

The applicant has carried out a significant amount of work to understand the behaviour of carbon-14 within the GRWS, in particular the dynamics of carbon-14 retention within the CBDS and its subsequent release. The applicant has supplied information about how carbon-14 partitions in to the GRWS during plant operations and accumulates on the carbon beds during periods when the plant is not running. The applicant has carried out laboratory testing of charcoal samples which investigated the behaviour and properties of the activated charcoal. It is expert opinion that there is isotopic exchange occurring between carbon-12 in the matrix of the charcoal and carbon-14 in the methane and that at some point all the active sites within the matrix become saturated.

We asked the applicant for further information regarding the predicted discharge profile of carbon-14 via the GRWS, both during normal operations and foreseeable deviations from planned operation, including the mechanisms for short-term releases.

The conditions that would be likely to cause retained carbon-14 to be desorbed from the carbon beds are described in the further information received. These are:

1. heating of the gas entering the carbon beds due to failure of the cooler condenser;
2. increased flow rate of gas through the CBDS.

In both cases intervention to stop the fault would take place within four hours and the release is assumed to stop after four hours. The carbon-14 activity released to air during the four hour period before intervention is estimated to be 20 GBq.

Disposal Routes and Limits (RSR-C3, Q2d)

Setting of limits and Notification Levels

We set site limits on the discharge of radioactive waste in environmental permits in order to:

- ensure that the radiation exposure of members of the public is less than the statutory dose limits and constraints and is as low as reasonably achievable;
- ensure the environment is protected; and
- provide a reference for the indication of operational discharge performance and the application of the best available techniques to minimise discharges**.**

In 2007 we reviewed the radioactive waste discharge authorisations for power stations operated by EDF (then British Energy Generation Limited). The review looked at historical discharges and considered information submitted by the operator of the day in revising some of the discharge limits. For Sizewell B the annual limit for disposal of carbon-14 to air was reduced from 600 GBq to 500 GBq, with a corresponding change to the Notification Level. The limit was reduced because the review of historical discharge data showed that a lower limit was appropriate at that time.

In setting limits, we must be satisfied that operators can comply with the proposed limits without unduly affecting their ability to operate. Therefore, we must set limits which provide sufficient headroom for normal operation, provided that the operator applies BAT to minimise the activity of radioactive waste discharged.

We have applied the *Criteria for setting limits on the discharge of radioactive waste from nuclear sites*[3] in coming to a decision on the limits to set in the permit.

Information has been presented in the application explaining that discharges during the period considered during the 2007 Authorisation review, represented by the first eight fuel cycles, were much more erratic and generally lower than the subsequent fuel cycles. The load factor of the power station was lower pre-2006 and it did not operate at full power for such long periods for various reasons that are explained in the application. With the power station operating at full power for longer periods the gaseous discharges will be higher than during the earlier operating cycles.

The discharges of carbon-14 to air exceeded the quarterly Notification Level (QNL) specified in the permit in the periods November 2019 to March 2020 and November 2020 to May 2021. In the period 27th October 2020 to 26th January 2021 the amount of carbon-14 discharged to atmosphere was 115 GBq compared with the QNL of 110 GBq. The

[3] Environment Agency 2012 395_12 Environmental Permitting Regulations (England and Wales) 2010: Criteria for setting limits on the discharge of radioactive waste from nuclear sites (publishing.service.gov.uk)

rolling quarterly total continued to exceed the QNL until May 2021 after which it started to decline following shut down of the power station for routine maintenance.

Exceeding a QNL is not a breach of the permit conditions but it does require the permit holder to report and examine the techniques used to minimise the production, disposal and impact of radioactive discharges. It reflects the general trend of carbon-14 discharges increasing and following the increase in load factor as the power station and GRWS operates for longer periods.

It is estimated that up to 625 GBq of carbon-14 could be produced for disposal via the GRWS in one 18-month fuel cycle. Not all will be discharged promptly but may circulate in the reactor coolant system (RCS) and the sum of prompt and delayed releases may exceed the annual discharge limit of 500 GBq. The application shows the general upward trend of gaseous carbon-14 discharges during the course of a fuel cycle and the peak monthly discharges occur soon after the GRWS is returned to service after maintenance outages as the system is purged and the carbon-14 in the RCS is vented through the GRWS route.

The further information supplied by the applicant estimates the inventory of carbon-14 retained on the CBDS to be 1.6 TBq. Under reasonably foreseeable fault conditions it is estimated that some of this could be released from the plant over a four hour period before intervention by the operator. The estimated release over the four hour period is 20 GBq.

With the information presented in the application and further information we have decided to set a limit for carbon-14 discharges to air of 600 GBq.

The associated quarterly notification level (QNL) will be set at 150 GBq on the basis that:

The main source of carbon-14 is oxygen-17 in water molecules;

Discharges of 150 GBq per quarter have already occurred. There is a balance in setting the QNL such that it is not exceeded routinely during normal operations.

Discharges above 150 GBq may be taken to indicate an unexpected source of carbon-14 that requires further investigation. For example, an additional discharge per quarter of 20 GBq of carbon-14 is equivalent to approximately 10-ppm nitrogen-14 in coolant. Increases of this magnitude may also indicate that the GRWS is not functioning correctly.

Monitoring (RSR-C3, 2d)

We have reviewed the applicant's sampling and measurement techniques for disposals of gaseous radioactive waste made from the GRWS. The techniques are described in the operator's Technical Standards. It describes the methods for measuring carbon-14 in methane. We commissioned an expert opinion from our contract laboratory on whether the analytical methods use appropriate techniques for the measurement of carbon-14 in gaseous effluent. The report confirms that the operator uses an appropriate method for preparation of traceable standards for determining the counting efficiency of the measuring instruments.

The Operator is currently carrying out a study to determine the actual composition of the gas that is discharged.

Radiological Assessment (RSR-C3, 2d)

Below we present the results of our assessment of the radiological impact on people and wildlife from the discharges from Sizewell B PS. We have assessed the radiation dose to members of the public from discharges at the limits set out in the permit and have compared them with the criteria specified in Schedule 23 Part 4 Section 1 of EPR 16. The current criteria are:

- a source constraint of 300 microsieverts per year (µSv/y)
- a site dose constraint of 500 µSv/y
- a public dose limit of 1000 µSv/y

Site dose

To assess the Sizewell site dose for comparison with the 500 µSv/y site dose constraint, doses from future discharges from any other sources on the site and other sites with adjoining boundaries are included. At Sizewell there are two sources, Sizewell A and Sizewell B which have adjoining boundaries. Doses from Sizewell A and Sizewell B discharges should therefore be summed for the comparison with the site constraint.

The assessments carried out also take account of the dose from direct radiation from the site and from the adjacent Sizewell A site. We have not included potential discharges from the proposed Sizewell C power station because a permit is not in force for that site. The impact of discharges from the combined site including Sizewell C will be reviewed as part of determining that application and work is currently underway to do this.

Source dose

Our assessment of doses uses realistic assumptions about the behaviour and dietary patterns of representative members of the exposed public, as required by EPR 16.

The applicant has carried out radiological assessments at the discharge limits requested in the application. We have carried out assessments at the discharge limits we have set in the permit in order to verify that the assessment of the impact of discharges of radioactive waste is reasonable.

We have also carried out an assessment of the impact of short duration discharges to atmosphere which may occur under certain plant conditions that might cause an increase in carbon-14 discharges for a period of up to four hours.

Radiological assessments of the radiation dose to the public from future discharges are based on the behaviour and concentrations of radionuclides once they are in the environment. It is assumed that discharges are made at 100% of the current or proposed discharge limits for the operational lifetime of the power station.

Our assessment used our screening model (Initial Radiological Assessment Tool (IRAT2)) together with general information on people's habits. The IRAT2 tool contains some very conservative assumptions about the dispersion and transport of radionuclides in the environment and their incorporation in to the food chain. Results from the screening model will therefore be greater than from using more refined models.

In accordance with the current International Commission on Radiological Protection (ICRP) recommendations, we calculate the dose to the *representative person*. This is an individual receiving a dose that is representative of those members of the public who are estimated to receive the highest dose overall (from gaseous and aqueous discharges and direct radiation). The dose to the representative person is then compared with the dose constraint and dose limit. (The term *representative person* replaces, *average member of the critical group* as used in previous ICRP Recommendations). Where doses are separately assessed for different types of discharges, the term *group most exposed to* is used for each discharge. The dose to the representative person may be less than the total of all the doses to the *groups most exposed*, as the representative person may not be fully exposed to all the discharges and direct radiation.

Radiological Assessment – impact on people

The applicant has carried out dose assessments to members of the public in support of its application to increase the numerical limit on discharge of carbon-14 to air. The dose assessments include impacts of discharges to air and sea (at the proposed numerical limits) as well as impact due to direct radiation. The applicant has compared the results of the dose assessments to the criteria specified in Schedule 23 Part 4 Section 1 of the Environmental Permitting (England and Wales) Regulations 2016 (EPR 16), *viz*.:

- a source dose constraint of 300 micro Sieverts per year (µSv/y)
- a site dose constraint of 500µSv/y

To compare against the constraint of 300µSv/y, the applicant has assessed public dose due to discharges from Sizewell B (single source). Then, for comparison against the 500µSv/y constraint, the applicant has assessed public dose due to discharges from Sizewell A and Sizewell B (contiguous sites).

The applicant has used PC-CREAM08 for calculating dose to the representative person and identified the following representative persons:

- staff at the adjacent Sizewell A site;
- people living at the nearest residence - adult, child, infant and foetus;
- commercial fishermen maintaining boats and fishing equipment on the shore to the south of the station and their families - adult, child, infant and foetus.

The applicant has used 10-year averaged meteorological data from RAF Wattisham, which is the nearest weather station that supplies open data. We have compared it with surface wind data from the weather station at RAF Honington over a typical year (using data from The CEDA Archive - https://archive.ceda.ac.uk). We accept that surface wind data from RAF Wattisham is representative of the general pattern of weather in the Suffolk coastal area.

The composition of “other radionuclides” discharged to sea was based on 10 years of results from the analyses of the annual bulked samples of liquid effluent for Sizewell B and for the years 2000-2004 for Sizewell A (decay corrected).

We note that the assessment does not include exposure via consumption of local milk or milk products because there are currently no known farms within 25km producing local milk and the 2015 habits survey confirmed that. We have, however, made an assessment of the exposure via this route using generic data in case dairy farming is reintroduced in the future.

The representative person due to discharges from Sizewell B, including direct radiation, is an adult member of a fisherman's family who receives a dose of 10.8 µSv/y, representing 4% of the constraint of 300 µSv/y. Similarly, the representative person for the combined Sizewell A/Sizewell B discharges at the proposed limits is an adult member of the fisherman's family who receives a dose of 16.6 µSv/y which represents 3% of the constraint of 500 µSv/y. We note that the highest contributing radionuclide is caesium-137 discharged to sea from Sizewell A (if discharges were made at the permit limits). We note that carbon-14 accounts for around only 1% of the total dose.

Table 1 summarises the dose to the representative person from the different exposure routes.

The direct radiation dose assessment assumes that the dry fuel store is the primary radiation source which is independent of reactor power. We note that dose rates measured on-site for the assessment are not statistically distinguishable from the local background and therefore the assessment uses an upper bounding value for estimating exposure of the public/Magnox worker.

Table 1 Dose to the Representative Person from Discharges from Sizewell A and B at the respective permit limits

Source of exposure	Dose/μSv per year							
	Local Resident				Local Fisherman's family			
	Adult	Child	Infant	Foetus	Adult	Child	Infant	Foetus
Discharges to Air								
Sizewell B								
C-14 discharged to air	7.3E-01	2.9E-01	2.8E-01	5.3E-01	2.7E-02			
Co-60 discharged to air	1.7E-03	1.2E-03	1.8E-03	1.2E-03	1.8E-03			
H-3 discharged to air	3.0E-02	1.3E-02	1.2E-02	1.9E-02	3.6E-03			
I-131 discharged to air	4.5E-03	4.6E-03	1.1E-02	3.0E-03	2.2E-04			
Kr-88 discharged to air	2.4E-01	1.7E-01	2.4E-01	1.7E-01	2.2E-01			
Sizewell A								
C-14 discharged to air	1.4E-01	4.5E-02	5.5E-02	8.9E-02	7.5E-03			
Co-60 discharged to air	1.4E-02	9.7E-03	1.5E-02	1.0E-02	1.3E-02			
H-3 discharged to air	3.5E-02	1.0E-02	1.4E-02	2.3E-02	3.6E-03			
Discharges to Sea								
Sizewell B								
H-3 discharged to sea					2.9E-03	1.1E-03	1.1E-03	2.9E-03
Cs-137 discharged to sea					2.8E-01	1.2E-01	1.7E-02	2.2E-02
Other activity discharged to sea					1.8E+00	7.4E-01	1.6E-01	1.7E-01
Sizewell A								
H-3 discharged to sea					1.8E-04	7.2E-05	6.8E-05	1.8E-04
Cs-137 discharged to sea					1.4E+01	5.8E+00	8.3E-01	2.2E+00
Other activity discharged to sea					2.0E-01	8.7E-02	2.2E-02	3.6E-02
Totals	**1.2**	**0.5**	**0.9**	**0.9**	**16.6**	**6.7**	**1.0**	**2.4**

Radiological Assessment – impact on wildlife

The applicant has identified two conservation areas in the vicinity of Sizewell B. These are a RAMSAR site to the north of the site, and a SSSI to the west of the site. The applicant has used the ERICA dose assessment tool to assess impact on wildlife at these sites for depositing radionuclides (particulates). To assess the impact of gaseous radionuclides on wildlife the applicant has used the Terrestrial Ecosystem SCK CEN tool, which is a development of the Environment Agency tool in R&D Report 128. This allows simple addition of the results from both tools to derive an overall dose for each reference animal and plant.

The European research project, "Framework for assessment of environmental impact" (FASSET) sets out the criteria for comparison by concluding that the threshold for statistically significant effects on organisms is about 100 microgray per hour (μGy/h). Allowing for the dose rate from natural background, which is at most about 60 μGy/h, we have adopted a value of 40 μGy/h as the level below which we consider there will be no adverse effect on non-human species. This dose criterion applies to all radiological discharges affecting a protected site.

The results for the applicant's assessments show that grasses/herbs will receive the highest dose rate for discharges to air at the RAMSAR and SSSI sites. The highest dose rate received is predicted to be 0.005 μGy/h at the SSSI.

The highest dose rate to wildlife overall is from discharges to sea, the maximum being 0.19 μGy/h to polychaete worms. The main contribution to dose for polychaete worms is manganese-54 (included within the "other activity" radionuclide grouping), which accounts for over 40% of the total dose; carbon-14 accounts for less than 0.1%. The marine organism most affected by dose from carbon-14 is zooplankton, which receives around 30% of its total dose from this radionuclide.

These results are well below the threshold dose rate of 40 μGy/h.

Consideration of Applicant's Radiological Assessments

We have examined the applicant's assessment of radiation doses and impacts set out in the application report ERO/REP/0245/SZB. Direct radiation is the dominant exposure pathway, followed by discharges to sea and discharges to air. Discharges to air are estimated to account for about only 2% of the dose.

We consider that the models and input data used are appropriate and the results are consistent with our own assessments.

We have estimated the dose to the public and wildlife at the proposed limits for Sizewell B discharges and Sizewell A/Sizewell B combined discharges, using our Initial Radiological Assessment Tool (IRAT2). We also carried out a Habitats Assessment using our Habitats Assessment Tool to identify the most affected Natura 2000 (Conservation) sites.

The results showed that discharges to air and sea from Sizewell B resulted in an estimated dose to the representative person of less than approximately 35 μSv/y if discharges were made at the permit limits. The main contributors to this are discharges of

cobalt-60 and caesium-134/caesium-137 to sea and from discharges of carbon-14 and noble gases to air.

The estimated dose to the representative person from the combined Sizewell A and Sizewell B discharges is less than approximately 85 µSv/y if discharges were made at the permit limits. The main contributors to this are discharges of cobalt-60 and caesium-137 to sea and carbon-14 to air.

As described above these values are an over-estimate because of the conservative assumptions used in the screening model, but the results are of the same order of magnitude as the applicant's assessment.

The impact on three Natura 2000 sites were considered in the vicinity of Sizewell B: the Sizewell Marshes Site of Special Scientific Interest, the Minsmere/Walberswick Heaths and Marshes RAMSAR site and the Sandlings Special Protection Area (SPA).

When making an initial assessment of the dose rates to individual organisms from a single site we use simplified assumptions and a dose rate screening criterion of 1 µGy/h. Below this level we would not expect wildlife or their habitats to suffer adverse impact from discharges of radioactive waste.

Results for the wildlife assessments for discharges to air from Sizewell B showed that the dose rate received by the most affected non-human species is approximately 6% of the screening criterion of 1 µGy/h. Similarly, dose rate received by the most affected wildlife due to discharges to sea from Sizewell B is approximately 6% of the screening criterion of 1 µGy/h.

Results from our habitats assessment show that the peak dose rate to the most affected site, which is the Sandlings SPA, is 17 µGy/h. Approximately 14.5 µGy/h is the contribution from combined Sizewell A and B discharges. The dose rate criterion we apply to radiological discharges affecting a protected site is 40 µGy/h. We are confident there is no significant impact on the Sandlings SPA.

Despite the very conservative assumptions within IRAT, the estimated dose rate to wildlife is consistent with the results of the applicant's assessments.

FSA assessment

The Food Standards Agency has provided an opinion on the risk to the public by exposure through the food chain. It has concluded that increasing the limit for C-14 to air to 600 GBq per year from the current 500 GBq per year would not make a significant difference to the dose to the representative person [via the food chain].

Impact of short duration discharges to air

The dose to the representative person which is assessed for releases at the annual or 12-month rolling discharge permit limits, assumes that the activity is discharged continuously and uniformly throughout the year. However, if a significant proportion of the 12-month permit limit (e.g. ≥2% of 12-monthly actual or expected discharges) was released operationally in a short time period (e.g. ≤1 day), this could lead to a higher annual dose to

the representative person than that assessed for a uniform release rate over the year, depending on the season and which receptors in the food chain are actively growing or being harvested.

We asked the applicant to consider the potential radiological impact of short-duration releases of radioactive waste to air, particularly of carbon-14, in line with principle 11 in *Principles for the Assessment of Prospective Public Doses arising from Authorised Discharges of Radioactive Waste to the Environment*.

Although releases to air lasting less than one day are not normal during plant operations, it has been estimated that a release of 20 GBq of carbon-14 to air could occur over a four hour period under certain plant conditions as described in the previous section. The applicant has modelled this potential release using NRPB-W54 *A methodology for Assessing Doses from Short-Term Planned Discharges to Atmosphere* and EPIC (which is an air dispersion model for predicting air concentrations from short-term releases of pollutants to air). It is assumed that the release takes place during spring or summer, to reflect higher consumption rates for freshly picked food.

We note that the assessment does not include exposure via consumption of local milk or milk products because there are currently no known farms within 25km producing local milk and the 2015 habits survey confirmed that. We have, however, made an assessment of the exposure via this route using generic data in case dairy farming is reintroduced in the future.

The incremental dose to the representative persons from a release of this nature has been calculated and presented in the further information. The maximum dose from this release would be 0.005 µSv/y to an adult local resident.

Collective Dose

Collective dose is a measure of the total dose received by a population as a consequence of each year that discharge are made. The quantity is integrated over time to allow for exposure in the future (up to 500 years) and to take account of the build-up of radioactivity in the environment. There are many uncertainties associated with the calculation of collective dose and it is often used to compare the relative impact of different disposal options.

Collective dose to the UK, European and world populations is presented in the application. It has been assumed that discharges continue at the permit limits for 35 years.

The majority of the atmospheric collective dose from Sizewell B arises from discharges of carbon-14. We have calculated the per capita doses from data supplied in the application as follows:

UK - 33 nSv per year

EU - 21 nSv per year

World - 29 nSv per year.

This satisfies the requirement of principle 12 in *Principles for the Assessment of Prospective Public Doses arising from Authorised Discharges of Radioactive Waste to the Environment*.

As the average annual dose for a population group is in the nano Sievert range then the collective dose does not need to be considered further in the decision making process.

Conclusions

We are satisfied that:

- the doses from discharges at the proposed limits from the Sizewell B site will be below the dose criteria specified in Schedule 23 part 4 section 1 of EPR 16;
- the dose rates to wildlife from the future permitted discharges from the Sizewell B site will be below the threshold at which the Environment Agency and Natural England have agreed there would be no adverse effect to the integrity of a Natura 2000 site;

Receipt of waste (RSR-C3, 2d)

The permit conditions include the derogations from certain other conditions for waste received from the National Arrangements for Incidents Involving Radioactivity (NAIR) and Radsafe schemes.

Other statutory considerations

Environment Act 1995, Section 4: Principal aim of the Environment Agency (Sustainable Development)

We are required to contribute towards achieving sustainable development, as considered appropriate by the Ministers and set out in guidance issued to us. *The Environment Agency's Objectives and Contribution to Sustainable Development: Statutory Guidance* (Defra, 2002) provides guidance to us on such matters as the formulation of approaches that we should take to our work, decisions about our priorities and our allocation of resources. It is not directly applicable to individual regulatory decisions.

The statutory guidance states that our main contribution to sustainable development will be to deliver our various objectives in a way that takes account (subject to and in accordance with the Environment Act 1995 (EA95) and any other enactment) of economic and social considerations. In respect of radioactive substances regulation, the guidance refers to the objective of regulating aerial and liquid radioactive discharges and solid radioactive waste disposal in accordance with statutory duties, statutory guidance and UK government policy.

We consider that the overall approach described in this document, in particular the application of BAT, which takes into consideration social and economic factors, and the assessment of the impact of the discharges on members of the public and environment, contribute appropriately to the aim of achieving sustainable development, having regard to the statutory guidance.

EA 95, Section 5: Pollution control powers

Section 5 of EA 95 sets out the purpose for which our pollution control powers, including our powers under EPR 16, must be used, namely *preventing or minimising, or remedying or mitigating the effects of, pollution of the environment*. We consider that we have properly used our pollution control powers for that purpose, in that:

- we have set limits and conditions based on BAT, as specified in the statutory guidance, and having regard to government policy;
- the impact of the permitted discharges on members of the public is as low as reasonably achievable;
- the environment is protected.

EA 95, Section 7(1)(c)(iii): Well-being of local communities

Under section 7(1)(c)(iii) of EA 95, we must have regard to the effect our proposals may have on the economic and social well-being of local communities in rural areas.

We have had regard, as appropriate, to the potential effect on the economic and social wellbeing of the local community as part of:

- our assessment of EDF Energy proposals in relation to the use of BAT, which involves consideration of costs and benefits;
- our considerations in relation to the principal aim of the Environment Agency (sustainable development);
- our assessment of the impact of disposals.

We do not consider that any additional or different limitations or conditions are required, in relation to this duty.

Public participation and duty to involve

Regulation 60 of EPR 16 requires us to prepare and publish a statement of our policies for complying with our public participation duties. We have published such a document, 'Working together: your role in our environmental permitting' (Environment Agency, 2010) and we have consulted interested parties on this application. This satisfies the requirements of the Public Participation Directive.

Section 23 of the Local Democracy, Economic Development and Construction Act 2009 (UK Parliament, 2009) requires us, where we consider it appropriate, to take such steps as we consider appropriate to secure the involvement of interested persons in the exercise of our functions by providing them with information, consulting them or involving them in any other way.

We have described our consultation in relation to this application in this Decision Document. We have described the way in which we have taken account of representations we have received in Appendix 1.

Growth Duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit.

Paragraph 1.3 of the guidance says:

> *The primary role of regulators in delivering regulation is to achieve the regulatory outcomes for which they are responsible. For a number of regulators these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation*.

We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the Decision Document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

We consider that the requirements and standards we have set in this permit are reasonable and necessary in order to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

Other matters

Non-radiological properties of the radioactive waste

Some environmental legislation that normally applies to waste or emissions does not apply when the waste is radioactive waste. We have, therefore, included a standard condition in our permits (condition 2.3.7) requiring the operator to minimise the risk of pollution from the non-radiological properties of the radioactive waste and from any non-radioactive substances associated with the disposal of the radioactive waste, to the extent that this is not addressed by other environmental permits.

For this case, there are no activities taking place that would require an environmental permit if the waste were not radioactive waste and there is no requirement to carry out an assessment of the non-radiological impact of the discharges. We can control any minor impacts through the standard condition mentioned above.

Disposal of aqueous radioactive waste and transfers to other premises

The applicant has not requested any change to the limits for the disposal of aqueous radioactive waste to controlled waters.

Changes initiated by the Regulator

In addition to the changes made as a result of the permit variation application we have made some minor changes to the permit and CEAR to bring the conditions in to line with the current version of our permit template. These changes are detailed in the accompanying Variation Notice.

Decision

We conclude that that the operator can operate in accordance with the permit conditions to meet statutory requirements and the requirements of Government policy. We therefore grant the application, subject to the conditions and limitations of the permit.

Annex 1: Consultation and advertising responses

The following summarises the responses to consultation with other organisations, our notice on GOV.UK for the public, newspaper advertising, and the way in which we have considered these in the determination process.

Responses from organisations listed in the consultation section

Response received from
Food Standards Agency
Brief summary of issues raised
FSA has advised that that increasing the limit for C-14 to air to 600 GBq per year from the current 500 GBq per year would not make a significant difference to the dose to the representative person [via the food chain].

Representations from local MP, councillors and parish/town community councils

Response received from
Melton Parish Council
Brief summary of issues raised
The respondent was concerned that the emission limit for carbon-14 to air was reduced in 2007 for reasons of public safety and considered that the limit should not be raised for future discharges.
Summary of actions taken or show how this has been covered
The prospective dose assessment shows that the dose to those potentially exposed from radioactive discharges at the permit limits is below the public dose limit and the source and site dose constraints. The limits were not reduced in 2007 for reasons of public safety or because the impact of discharges on the environment was unacceptable but following a routine review of what had been discharged historically since the original Authorisation was granted in 1996. In setting limits, we must be satisfied that operators can comply with the proposed limits without unduly affecting their ability to operate. Therefore, we must set limits which provide sufficient headroom for normal operation, provided that the operator applies BAT to minimise the activity of radioactive waste discharged.

Representations from community and other organisations

Response received from
Sizewell Site Stakeholder Group
Brief summary of issues raised
The respondent questioned why the regulator sets a limit based on the performance of the reactor rather than what is considered to be a safe limit. The respondent asked why the emission limit for carbon-14 to air was reduced in 2007. The respondent asked about the relative impacts of discharging carbon-14 wastes to air and sea. The respondent asked whether the Environment Agency has powers to impose sanctions and fines for breaching limits in environmental permits. The respondent asked whether the regulator considers the increase in emission limit to be harmless and what the health impacts of discharges might be. The respondent asked for information on the equivalent volume of 600 GBq of [^{14}C]methane gas that is discharged over a 12 month period.

The respondent asked about the accumulation of carbon-14 in living organisms.

Summary of actions taken or show how this has been covered

The prospective dose assessment shows that the dose to those potentially exposed from radioactive discharges at the permit limits is below the public dose limit and the source and site dose constraints.

In setting limits, we must be satisfied that operators can comply with the proposed limits without unduly affecting their ability to operate. Therefore, we must set limits which provide sufficient headroom for normal operation, provided that the operator applies BAT to minimise the activity of radioactive waste discharged.

When station operations commenced in 1995, the annual limit on carbon-14 discharges to air was set at 600 GBq per year, based on modelling of carbon-14 production carried out during power station design. Subsequently, in a review of the RSA93 Authorisation in 2007 that limit was reduced to 500 GBq per year based on historical discharge information submitted by British Energy Generation Limited (the Operator at that time). As stated in the Decision Document the limits were not reduced in 2007 for reasons of public safety or because the impact of discharges on the environment was unacceptable but following a routine review of what had been discharged historically since the original Authorisation was granted in 1996.

The dose per Becquerel of carbon-14 activity that is discharged to sea is approximately ten times that for discharges to air. This is because of the differences in the behaviour of radionuclides in the environment and the pathways through which the public can be exposed.

The Environment Agency is responsible for enforcing laws that protect the environment. We aim to use our enforcement powers efficiently and effectively to secure compliance. We will normally consider other options before considering criminal proceedings. Generally, prosecution is our last resort.

Our Enforcement and Sanctions Policy for regulated sites in England is set out in the policy paper: https://www.gov.uk/government/publications/environment-agency-enforcement-and-sanctions-policy/environment-agency-enforcement-and-sanctions-policy

In making enforcement decisions we will: act proportionately; have regard to the growth duty; be consistent; be transparent; target enforcement action towards those whose activities cause or could cause the greatest risk of serious environmental damage or where the risks are least well controlled; and be accountable. We must follow the requirements of the Regulators' Code; it is a framework for how regulators should engage with those they regulate.

In understanding our decision regarding the application in the light of issues raised, it is helpful to consider the concept of risk and the system of radiation protection. This system is based on the evaluation of the risks to which members of the public are exposed and which society normally accepts in its day to day activities.

All human activities including those which society accepts every day involve some element of risk, i.e. involve some chance of suffering injury, illness or death. Examples of risk, in terms of the average annual risk of death, are:

solo rock climbing (5 hours a week)	=	1	in	100
smoking 10 cigarettes a day	=	1	in	200
natural causes for someone aged 40	=	1	in	700
coal mining	=	1	in	7,000
accidents in the home	=	1	in	10,000
road accidents	=	1	in	10,000
accidents at work	=	1	in	50,000
alcohol consumption (light drinker)	=	1	in	50,000

Some risks, although they may be high, are associated with activities people choose to pursue, such as smoking and certain sports, whilst others are an inherent feature of employment and everyday life. Risks associated with being at work are explicitly recognised and are treated differently from risks to which the general public is exposed. The behaviour of people at work can be managed to assure their protection whereas the general public may choose to adopt broader patterns of behaviour.

Any industrial activity inevitably involves risks for both workers and the public. Through its regulatory activities, the Agency aims to ensure that any risks to members of the public arising from authorised releases of radioactivity from these activities are acceptably low.

There have been many studies to establish levels of risk which society considers to be trivial, acceptable, tolerable or unacceptable. In particular, a report by a study group of the Royal Society published in 1983 concluded that a risk as low as one in a million per year for members of the public was commonly regarded as trivial. There was also a widely held view that few people would commit their own resources to reduce an annual risk of death which is already as low as one in a hundred thousand. The HSE in establishing what would be an unacceptable level of risk has stated that a risk of one in ten thousand per year to any member of the public is the maximum that should be tolerated from any large industrial plant in any industry. For new nuclear power stations the Office for Nuclear Regulation (previously HSE) has proposed adopting a lower risk of one in a hundred thousand per year as a benchmark. This figure has also been taken into account by Public Health England (PHE) in its advice on radiation protection standards for any single nuclear plant.

Exposure to radiation can cause cancers and hereditary defects. The higher the radiation dose the greater the likelihood or risk that a cancer or a hereditary defect will result. But, apart from very high levels of radiation dose, there is no certainty that an individual exposed to radiation will suffer a health effect. The dose/risk relationships have been determined by studies undertaken on various groups that have been exposed to radiation, predominantly survivors of the atomic bombs in Japan and certain medical patients.

There is little direct evidence that very low doses of radiation cause harm. However, the approach taken in radiation protection errs on the side of caution by assuming that there is no dose so low that it cannot potentially cause harm and there is no absolutely safe threshold of radiation dose below which the risk may approach zero. In the present state of knowledge, it is appropriate to assume an increasing risk with increasing dose. This approach is accepted by international bodies such as the ICRP and by national advisory bodies such as PHE in the UK.

It is possible to use studies of acceptable levels of risk and of dose/risk relationships to set dose limits and targets for members of the public. For example, it is estimated that a radiation dose of 1 millisievert (mSv), results in a one in twenty thousand risk of contracting a fatal cancer; and that the dose from one microsievert (μSv), results in a one in twenty million risk.

For comparison, the dose to an average member of the UK population is 2.2 mSv/year arising from natural background radiation and 0.4 mSv/year from medical exposure. There is a large variation in the natural background radiation that members of the public receive depending primarily on where they live. Any doses that people receive from practices involving the use of radioactive substances are in addition to the dose from natural background radiation.

International bodies such as ICRP and UNSCEAR regularly review the risks arising from exposure to radiation. UNSCEAR, the United Nations Scientific Committee on the Effects of Atomic Radiation, is an international body composed of expert scientific delegates from a range of nuclear and non-nuclear countries and is constituted entirely separately from ICRP.

Current UK dose limits and dose constraints are based on the recommendations of ICRP and have been accepted by the Government following advice from PHE.

The Government has stated that it has confidence in the radiological protection advice provided by PHE.

Further information about radiation risks and effects can be found at the UNSCEAR Answers to Frequently Asked Questions: https://www.unscear.org/unscear/en/faq.html

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Carbon-14 discharges to air are predominantly discharged from the power station in the form of methane. It has been estimated that the volume of methane discharged at the new limit is less than 2600 litres per year. For comparison, ruminant livestock can produce 250 to 500 litres of methane per animal per day.

Carbon-14 in radioactive waste can be taken up by receptors in the environment once it has been discharged. This can be, for example, incorporation in to the molecules of compounds in plants or crops. We consult the Food Standards Agency on proposed changes to limits in permits for the disposal of radioactive waste in order that the impact on the food chain can be properly assessed.

We carry out a programme of regular monitoring of radioactivity in food and the environment, known as the RIFE programme, in conjunction with our partners the Food Standards Agency and other environmental regulators in the UK.

The results of the monitoring programme indicate whether there is significant accumulation of radioactivity within environmental receptors or media and is used to assess the exposure of people through food consumption and other exposure routes.

The results are reported in the annual report *Radioactivity in Food and the Environment, 2019 25th ed.* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932885/Radioactivity_in_food_and_the_environment_2019_RIFE_25.pdf

The main aim of the RIFE programme is to monitor the environment and the diet of people who live or work near nuclear and other sites. From this monitoring we can estimate the amount of radioactivity the general public is exposed to, and particularly to those small groups of people who are most exposed because of their age, diet, location or way of life.

Response received from
Committee on Medical Aspects of Radiation in the Environment (COMARE)
Brief summary of issues raised
COMARE noted that the assessments of dose to the Representative Person and collective dose to the population suggest low impacts and that it does not provide cause for concern. COMARE has identified some research articles from *Journal of Environmental Radioactivity* and the BIOPROTA international collaborative forum that compare models for carbon-14 release to atmosphere. COMARE noted that the chemical form of the gas released is important in modelling the impact of discharges on the food chain and the inhalation dose.
Summary of actions taken or show how this has been covered
We note the references given. For simplicity, uptake of carbon-14 in to the food chain was modelled assuming the discharge to be 100% CO_2. This overestimates the public dose via consumption of crops, perhaps by up to a factor of 2. There is no milk farming in the vicinity. The inhalation dose was modelled on the assumption of a gas composition of 90% methane/10% carbon dioxide. The operator is currently conducting a study to establish the actual composition of the gas that is discharged. The preliminary indications are that the discharged gas is composed of around 90-95% methane. We have included an Improvement and Information Requirement in the permit to carry out chemical analysis of the gas released from the gaseous radioactive waste system to determine the relative amounts of methane and carbon dioxide that is discharged and report the results. We note that the dose via the inhalation route is approximately half that via consumption of crops and, although the doses are well below the dose constraints, we undertake to carry out a sensitivity analysis once the study of gaseous discharges is complete. We are aware that the ICRP is in the process of updating dose coefficients to align with the updated system of radiological protection, ICRP publication 103, and that updated methodology and dose coefficients for occupational intakes of C-14 have been published. Whilst we await the publication of updated dose coefficients for use in public dose assessments we consider that the use of dose coefficients taken from ICRP publication 119 is appropriate. We note that the inhalation dose contributes approximately 0.1 µSv/year to the adult dose of 1.0 µSv/year from aerial discharges.

Representations from individual members of the public

Common responses have been considered and summarised together

Brief summary of issues raised
Production of radioactive waste during the period of operating the power station at reduced power in summer 2020.
Summary of actions taken or show how this has been covered
As the period of operating the reactor at reduced power was short compared to the overall fuel cycle there was no any significant change to the rate of production of solid radioactive waste. In the absence of any failed fuel in the reactor, there was no change in iodine-131 or noble gas releases. The production of some radionuclide groups is dependent on reactor power and the rate of production of tritium, carbon-14 and other activation products was slightly reduced. Plant operations required the displacement of reactor coolant which was eventually discharged to sea in accordance with the environmental permit; the activity contribution was around 1.6 TBq of tritium and less than 30 MBq of other radionuclides. The permit allows 80 TBq of tritium and 130 GBq of other radionuclides to be discharged to sea in a 12 month period.

Brief summary of issues raised
Monitoring equipment standards and reporting procedures and notifications.
Summary of actions taken or show how this has been covered
The environmental permit requires the operator to use the best available techniques to take samples and conduct measurements and analyses to determine the activity of radioactive waste disposals. This also includes instrument calibration and performance verification. We do not approve particular models of monitoring equipment but take a view on whether it is appropriate for the pollutant being measured and represents BAT. For some types of measurement we apply the Monitoring Certification Scheme (MCERTS) standard. Generally, we would not expect a prototype instrument to meet the standards until it had undergone appropriate type testing. Establishing appropriate alarm settings is a matter for the plant operator. The laboratories will be operated according to ISO 17025:2017 with appropriate quality assurance and oversight arrangements and staffed by suitably qualified and experienced staff. The permit requires the operator to keep records and there is a schedule of reporting and a requirement to notify certain occurrences to the regulator without delay.

Brief summary of issues raised
A respondent commented that we should not allow any further pollution [in to the environment] from operation of the power station.
Summary of actions taken or show how this has been covered
As stated in the Decision Document operation of the Sizewell B Power Station is considered to be a Justified practice involving exposure to ionising radiation. This means that the Government has decided that the individual or societal benefit resulting from the class or type of practice outweighs the health detriment that it may cause.

The UK is a signatory to the Convention for the Protection of the Marine Environment of the North East Atlantic (the 'OSPAR Convention'). The OSPAR Convention identifies threats to the marine environment and organises programmes and measures designed to ensure effective national action to combat them. One of the key work areas of OSPAR is on radioactive substances.

The 2009 Radioactive Discharges Strategy alongside the OSPAR Radioactive Substances Strategy, aims to prevent pollution of the OSPAR maritime area (the North East Atlantic) from radiation through progressive and substantial reductions of discharges, emissions and losses of radioactive substances.

The *UK Strategy for Radioactive Discharges* (GB Parliament, 2009) set out the following objectives:

- to implement the UK's obligations, rigorously and transparently, in respect of the OSPAR Radioactive Substances Strategy (OSPAR, 2010) intermediate objective for 2020;
- to provide a clear statement of government policy and a strategic framework for discharge reductions, sector by sector, to inform decision making by industry and regulators

with the expected outcomes by 2020 of:

- progressive and substantial reductions in radioactive discharges (to the extent described in the strategy);
- progressive reductions in concentrations of radionuclides in the marine environment resulting from radioactive discharges, such that by 2020 they add close to zero to historic levels;
- progressive reductions in human exposures to ionising radiation resulting from radioactive discharges, as a result of planned reductions in discharges.

In 2016, government and the devolved administrations commenced a review of the strategy, producing the *UK Discharge Strategy Review* which was published in 2018. The review document sits alongside the strategy, reviewing discharges since 2009 and updating operator forecasts out to 2030. The review also updated the policy framework with changes made since 2009.

The 2018 Review shows that the UK is making good progress towards achieving the outcomes in the 2009 strategy, and that the UK is contributing towards meeting the objectives of the OSPAR strategy.

OSPAR is currently in the process of reviewing its new radioactive substances strategy for 2020 – 2030. The UK Government continues to apply the principles in the UK discharge strategy, including the application of BAT to ensure discharges are minimised, and which we expect will be consistent with OSPARs future strategy.

In the *Statutory guidance to the Environment Agency concerning the regulation of radioactive discharges into the environment* (GB Parliament, 2009), the government provides guidance on how we should pursue these objectives, namely through applying the environmental principles in the UK strategy. The statutory guidance also requires us to take account of other government objectives, such as the safe and timely decommissioning of redundant facilities, clean-up of the historic legacy of radioactive wastes, security of energy supply, and maintaining defence nuclear capabilities.

The following comments have not been considered in this decision:

Comment regarding the nuclear safety of the advanced gas cooled reactors;

Comments on energy policy and investment in green power generation technologies;

Comments about the proposed Sizewell C power station.