REGULATION OF RADIOACTIVE WASTE DISCHARGES FROM NUCLEAR POWER PLANTS IN ENGLAND & WALES

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ABSTRACT

Her Majesty's Inspectorate of Pollution (HMIP) has responsibility for authorizing radioactive waste discharges from nuclear power plants in England and Wales, under the Radioactive Substances Act 1993. Regulatory control is achieved by attaching limits and conditions to discharge authorizations. These are set in accordance with general radiological protection principles, but also take into account site-specific factors. Authorizations are regularly reviewed. When such a review leads to a requirement to revise an authorization, the process of revision entails a stage of public consultation.

UK LEGISLATION & REGULATORY APPROACH

There are twelve nuclear power plants currently operating in England and Wales (with a further two being decommissioned), each of which disposes of radioactive waste in the form of gases and aerosols, as liquid effluent and as solid waste. These disposals are controlled by means of authorizations under the Radioactive Substances Act 1993 (RSA93) - see Fig. 1 (1). The authorizations are subject to limitations and conditions on the nature, activity and means of disposal of the waste. Further conditions specify requirements for sampling of waste, activity measurement and record keeping.

RADIOACTIVE SUBSTANCES ACT 1993

Protects the public and the environment from exposure to ionizing radiations arising from radioactive substances, by:-

- Regulating Keeping and Use
- Regulating Mobile Sources
- Regulating Waste Disposal
- Regulating Waste Accumulation

The 1993 Act consolidated changes made to the 1960 Radioactive Substances Act by the Environmental Protection Act of 1990.

Fig. 1. Functions of the Radioactive Substances Act.

Different official bodies are responsible for regulating disposals of radioactive waste from nuclear power stations in each of the three countries of Great Britain, namely England, Wales and Scotland. In Scotland, responsibility rests solely with Her Majesty's Industrial Pollution Inspectorate. In England, where most of the nuclear stations are located, regulation of disposals is carried out jointly by HMIP (see Fig. 2) and the Ministry of Agriculture, Fisheries & Food (MAFF). In Wales, the legal position is that regulation is carried out jointly by HMIP and the Welsh Office; in practice, MAFF inspectors provide the technical expertise to enable the Welsh Office to carry out their role. The joint regulatory agencies (HMIP and MAFF) will be referred to as the "authorizing Departments" (ADs) because they are responsible for issuing authorizations for disposal under RSA93.

Authorizations were first issued when the stations began operating, mainly from the 1960s through to the early 1980s. Initial discharge limits were set at relatively high levels, reflecting the expected performance of the plant at the time and the radiological protection criteria then current. As operational experience developed, progressive improvements were made to waste management practices; radioactive discharges became more closely controlled and have now been reduced to levels generally far below the original authorized limits.

"HMIP Protects the Environment by Enforcing Regulations to Prevent Pollution."

With regard to radioactive substances in England and Wales, HMIP regulates:-

- Keeping and use of sealed sources, open radioactive material and mobile sources, also accumulation and disposal of waste, by all small users (such as hospitals, colleges, industrial users);
- Disposal of waste from Licensed Nuclear Sites (with MAFF/Welsh Office).

HMIP is currently part of the UK Department of the Environment (DOE), and is therefore additionally responsible to the Secretary of State for ensuring compliance with Government policy on radioactive waste management.

Fig. 2. Role of HMIP.

UK Government policy (2) is for nuclear power station discharge authorizations to be reviewed regularly; the ADs aim to carry out such reviews every 4 years. Such a review in the 1980s led to the present approach of setting limits at levels more closely reflecting actual discharges, so as to encourage improved control. This paper describes the current approach which has been successfully applied in reviewing and revising the authorizations.

REACTOR TYPES

All twelve of the nuclear power plants currently operating in England and Wales (and also the two which are being decommissioned) are based on two generic types of carbon dioxide cooled, graphite moderated, thermal reactor (see Fig. 3). A pressurized water reactor power station is now undergoing commissioning trials and is expected to begin power operation during 1994.

The older generic type of carbon dioxide cooled reactor uses natural uranium metal fuel clad in a magnesium alloy (Magnox) and for this reason is known as a Magnox reactor. All the Magnox reactors have steel pressure vessels except at the last two power stations of the series, where the reactor pressure vessels are made of prestressed concrete. The

Station	Owner/ Operator	No. of Reactors	Reactor Type	Output MW(e)	First Power	Status Now
Calder Hall	BNFL	4	Magnox	200	1956	Op
Berkeley	NE	2	Magnox	Nil	1962	Decom
Bradwell	NE	2	Magnox	246	1962	Op
Hinkley Point A	NE	2	Magnox	470	1965	Op
Trawsfynydd	NE	2	Magnox	Nil	1965	Decom
Dungeness A	NE	2	Magnox	440	1965	Op
Sizewell A	NE	2	Magnox	420	1966	Op
Oldbury	NE	2	Magnox	434	1967	Op
Wylfa	NE	2	Magnox	950	1971	Op
Hinkley Point B	NE	2	AGR	1170	1976	Op
Dungeness B	NE	2	AGR	1040	1983	Op
Hartlepool	NE	2	AGR	1150	1983	Op
Heysham 1	NE	2	AGR	1100	1983	Op
Heysham 2	NE	2	AGR	1230	1987	Op
Sizewell B	NE	1	PWR	1300	1994^{P}	Com

BNFL = British Nuclear Fuels plc, NE = Nuclear Electric plc, Op = Operational, Com = Commissioning, Decom = Decommissioning, P = Prospective

Fig. 3. Nuclear Stations, England & Wales.

concrete biological shields of the steel pressure vessel reactors are cooled by a flow of air between the pressure vessel and the biological shield (shield cooling air), which is filtered before discharge to atmosphere.

The newer type of carbon dioxide cooled reactor is known as the Advanced Gas-cooled Reactor (AGR). The fuel is enriched uranium dioxide clad in stainless steel. All these reactors have prestressed concrete pressure vessels.

Although the gas-cooled reactor power stations share many common features, there are significant differences in design, even between stations of the same type. Coupled with differences of siting and local environment, this results in appreciable differences in the authorizations between one power station and another.

WASTE ARISINGS & DISPOSAL ROUTES

General

The type of reactor, i.e. Magnox or AGR, has a marked bearing on the nature and activity of radioactive waste to be disposed of. It is convenient to consider liquid, gaseous and solid waste separately, while bearing in mind the links between these sources of arisings, e.g. treatment of gaseous effluent can produce liquid or solid waste.

Liquid Effluent

At most Magnox stations, the dominant source of activity in liquid effluent is the plant used to treat spent fuel pond water. Spent Magnox fuel is cooled for at least 90 days in on-site ponds before being despatched to the Sellafield fuel reprocessing plant. In the reactors, priority is given to detection, early discharge and separate bottling of any leaking fuel. In the ponds, the water chemistry is controlled carefully to minimize corrosion of the cladding of the spent fuel. Nevertheless, during storage in the ponds the fuel cladding may be subject to some corrosion and leakage, releasing activation and fission products into the water.

The most significant radionuclide in pond water is caesium-137, but other radionuclides, such as strontium-90, may also have a significant presence. The water is in general treated by ion exchange, causing most of the relevant radionuclides to be transferred to the ion exchange medium, usually an organic resin. Backwash arisings are transferred to delay tanks for sampling, analysis and discharge into the station's (non-active) cooling water outlet, affording maximum dilution before entering the sea. Optimum waste management in this area entails successful control of pond water chemistry to minimize fuel cladding corrosion, while limiting the activity in aqueous effluent without generating excessive quantities of spent ion exchange resin for storage as intermediate level waste.

A further liquid effluent stream arises from reactor coolant gas driers. These are used to maintain carbon dioxide coolant moisture levels within set limits, and the resulting small volumes of effluent from drier liquors contain tritium and sulphur-35.

The stainless steel cladding of AGR fuel is much less prone than Magnox cladding to corrosion in the cooling pond water. In the reactors, similar priority is given to detection, early discharge and separate bottling of any leaking fuel. Fission product discharges are consequently much less. Activity in drier liquors is considerably greater, however, with numerically larger discharge levels of tritium and sulphur-35.

At both types of station there are minor sources of activity in liquid effluent, including laundries, change rooms and on-site sewage treatment.

Gaseous Effluent

A major source of gaseous effluent at both Magnox and AGR power stations is the controlled discharge of carbon dioxide to atmosphere in order to reduce reactor coolant pressure, e.g. at shutdown. Such a "blowdown" can discharge many tons of carbon dioxide to atmosphere through particulate filters. Iodine adsorption units are also provided for treating the gaseous discharge. The usual radionuclides present in the discharges are tritium, carbon-14 and sulphur-35. The gas is also liable to contain the short-lived isotope argon-41 (1.83 hrs half-life), formed by neutron activation of impurities.

The filtered shield cooling air discharged from steel pressure vessel Magnox stations contains significant quantities of argon-41, also as a result of activation. The rate of argon-41 discharge is proportional to reactor power.

Lesser quantities of gaseous activity are discharged with the ventilation air from pile cap areas and active waste buildings, and from laundry tumble driers. Some sites operate low level waste incinerators, which may also be a minor source of gaseous activity.

Solid Waste (see Fig. 4)

Low level solid waste arises operationally in the form of contaminated clothing, paper, miscellaneous wipes, filters, redundant items of contaminated plant, etc. Waste which is combustible and only lightly contaminated, such as change room waste and discarded protective clothing, is normally incinerated. The non-combustible waste, including ash from the incinerators, is drummed and compacted. Its activity is assessed and it is consigned for disposal at the Drigg facility of British Nuclear Fuels.

There are also operational arisings of intermediate level solid waste, three of the principal forms being (i) contaminated or activated Magnox, stainless steel or graphite material discarded in the process of preparing irradiated fuel for underwater storage and subsequent trans-shipment, (ii) discarded filters and (iii) spent resins from ion exchange beds.

HIGH LEVEL WASTES (HLW)

Wastes from the reprocessing of irradiated nuclear fuel which are intensely radioactive. The wastes are of relatively small volume, but have a high heat output due to the energy from radioactive decay. This heat has to be taken into account in the design of storage or disposal facilities. High level wastes contain over 95% of all the radioactivity in wastes from the nuclear fuel cycle.

INTERMEDIATE LEVEL WASTES (ILW)

Wastes with a radioactivity content which exceeds either of the upper limits for low level wastes, but of a lower radioactivity and heat output than high level wastes. Intermediate level wastes encompass a large range of different forms including the metal cladding of nuclear reactor fuel, reactor components, chemical process residues and filters.

LOW LEVEL WASTES (LLW)

Wastes with a radioactivity content which does not exceed $4x10^9$ Bq/t of alpha radioactivity or $1.2x10^{10}$ Bq/t of beta and gamma radioactivity. Low level wastes include concrete, rubble and soil from the demolition or refurbishment of buildings and general rubbish such as discarded protective clothing, used wrapping materials and worn out or damaged plant and equipment. Unlike high level and intermediate level wastes, low level wastes do not normally require shielding against their radiation emissions during handling and transport.

Fig. 4. UK definitions of solid waste types.

The intermediate level waste is currently being stored on site pending the availability of a national facility for its permanent disposal.

MAIN PRINCIPLES FOR DETERMINING DISCHARGE AUTHORIZATIONS

Dose Limits & Targets

In accordance with ICRP recommendations and on the advice of the UK National Radiological Protection Board (NRPB), the principal dose limit in the UK for members of the public from all manmade sources of radioactivity (other than medical applications) is 1 mSv/y. This compares with an average radiation dose to members of the UK population of 2.2 mSv/y from natural background radiation and an average of 0.3 mSv/y from medical applications.

Since members of the public may be exposed to radiation from more than one source of radiation, the UK has also adopted a radiation dose target of 0.5 mSv/y from the operation of **any single** nuclear site. Going one step further, and following the 1990 recommendations of ICRP, NRPB has recently recommended that no more than 0.3 mSv/y should result from the operation of a single **new source**. (A complete nuclear power plant would be regarded as a single source.) Where there are multiple sources and pre-existing levels of radioactivity in the environment, these must be taken into account in setting an authorization for discharge from each source.

In addition NRPB has stated the belief that, in general, it should be possible for **existing** plant to be operated so that the dose to individual members of the public does not exceed 0.3 mSv/y. However, in some cases a realistic assessment of doses may suggest that an existing facility cannot be operated within this figure. Particular examples of nuclear power plants where there may be difficulty in meeting the 0.3 mSv/y constraint are some of the UK's steel pressure vessel Magnox reactors, where there is a significant contribution to off-site dose as a result of direct radiation from the gas ducts. In such cases, NRPB considers that the operator must demonstrate that the doses resulting from continued operation of the plant are as low as reasonably achievable and within the range of tolerable risk.

Best Practicable Environmental Option & Best Practicable Means

It is UK Government policy that discharges of radioactivity shall be as low as reasonably practicable, so that radiation exposures are as low as reasonably achievable (ALARA), social and economic factors being taken into account. This is consistent with the ICRP principle of optimization.

In ensuring that exposures are ALARA, the ADs regard it as appropriate for the applicant to demonstrate that the best practicable environmental option (BPEO) has been selected. The BPEO may be regarded as that management option from the available alternatives that achieves a high standard of protection of the public and environment but which represents the best overall option taking account of other factors such as waste accumulation on site, worker exposure, amenity and cost. In other words, the BPEO entails selecting the optimum from the possible range of options for managing the waste.

Given that choice of the BPEO has been demonstrated, the applicant is required to show that he will utilize the best practicable means (BPM) to reduce discharges of radioactivity so that exposures are ALARA. Within a particular waste management option, the BPM may be regarded as that level of management and engineering control that reduces to a minimum, as far as practicable, the radiological impact of the option while taking account of a wider range of factors, including technological status, other environmental and safety impacts, and the costs. In other words, BPM entails optimizing the particular option selected for managing the waste.

Justification of Radioactive Waste Discharges

Whenever an authorization is sought or reviewed, an opportunity is created for the ADs to require the operator of the nuclear site to produce or update a justification document. This document should justify the operator's radioactive waste discharges in the context of his waste management strategy and practices. Among other things, it should demonstrate that: (i) sources of radioactive waste creation and discharge have been identified and quantified; (ii) best practicable means are being used to reduce or eliminate discharges; (iii) dose limits and targets are not exceeded for members of the public at proposed discharge limits; (iv) adequate means of limiting and controlling discharges are provided; (v) adequate means of monitoring and assessing discharges are provided; (vi) adequate quality assurance arrangements are in place, including an appropriate management structure, defined responsibilities, documented procedures, staff training and record keeping.

AUTHORIZATION LIMITS & CONDITIONS

Special Factors

In determining the limitations and conditions of an authorization, the ADs take into account special local factors, such as the site-specific characteristics of the medium into which the discharge takes place (e.g. tidal effects for discharges to sea) and the consequent effect on doses to members of the public. They also consider the possible need for short term, as well as longer term, limits where there is the potential for unacceptable exposure from short term releases.

Enforceability of Authorization Conditions

A breach of a condition in an authorization is a criminal offence under RSA93. All conditions of authorization need therefore to be enforceable.

Discharge Limits

Numerical discharge limits are applied in the authorization to radionuclides in the following three categories:

a. Those of significance in terms of radiological impact (e.g. argon-41, cobalt-60 and caesium-137)

b. Those of significance in terms of the quantity of radioactivity discharged, irrespective of radiological impact (e.g. tritium)

c. Those which have particularly long half-lives and which are liable to persist in the environment (e.g. carbon-14)

The limits may be applied either to radionuclides individually or grouped appropriately.

Discharge limits provide the means of ensuring that dose limits and targets are not exceeded for members of the public. They also provide part of the means of ensuring that the radiation exposure of individual members of the public and the collective dose to the population as a whole are reduced to ALARA levels. The other contribution to ALARA is the requirement placed on the operator, expressed as a standard condition of authorization, to employ BPM to reduce radioactive discharges below authorized limits.

Annual discharge limits provide the key control to ensure that dose limits and targets are not exceeded. They are normally set on a rolling year basis so as to encourage the even spread of discharges.

Because there may be short pathways to the receipt of doses by members of the public, it may be important to apply additional short term limits for atmospheric discharges where the doses may be sensitive to the particular phase or manner of plant operation. By contrast, it is usually less important to set short term limits for liquid discharges. Short term limits therefore constrain the effect of pathways which might otherwise deliver significant short term doses. They also limit dose peaks which may be undesirable within the long term limits. An example of where it might well be appropriate to set a short term limit is on a gas-cooled reactor to cater for controlled discharge of carbon dioxide gas to atmosphere (gas circuit blowdown), this being a planned operation.

Weekly limits are normally set for atmospheric discharges of certain radionuclides, as well as annual limits. Where short term limits relate to a timescale of a week or less, they are set on the basis of worst weather conditions. Short term limits are often set by reference to contamination of foodstuffs at levels which would exceed those permitted by European Community legislation.

For incineration of combustible wastes, limits are normally set in relation to a calendar month, this being regarded as pragmatically suitable for accounting purposes in controlling the rate of waste incineration.

In determining the levels at which discharge limits should be set, the requirement to comply with dose limits and targets provides a general upper bound, while the requirement to set limits below which the site operator can run his plant without unreasonable difficulty provides a general lower bound. For existing plant, a convenient rule of thumb to provide a starting point for setting an annual discharge limit is to take $1.5 \times$ the mean actual discharge level of the plant for five representative years of operation. For new plant, the equivalent rule of thumb is to take twice the projected discharge level.

While such a rule of thumb is useful for ensuring that the discharge limit is to some extent related to experience or expectation, it provides only a starting point for setting the limit. Consideration also needs to be given to aspects such as the following: (i) the causes of discharge and whether BPM have been properly applied; (ii) experience and expectation of fluctuations about the mean; (iii) the possible need to learn lessons from inadequate past practice; (iv) the changing performance of aging reactors; and (v) the introduction of altered dose limits and targets.

There may be unplanned, but foreseeable and unavoidable, events which cause or necessitate an increase in discharge levels if they occur. An example might be the requirement for controlled discharge to atmosphere of the carbon dioxide coolant from a gas-cooled reactor in the event of a minor boiler tube failure. Providing the environmental consequences are acceptable, the authorizations will normally take these into account (see example given below for Oldbury Power Station).

Notification Levels

For key radionuclides, levels of discharge are set such that, if the levels are exceeded, there is a formal requirement for the site operator to notify the ADs and justify the discharge. These radionuclides are chosen for their radiological significance and/or their sensitivity as an indicator of the operational performance of the process and abatement techniques. Notification levels are set somewhat below discharge limits. The need for them is associated with the requirement for assurance that the operator is applying BPM to reduce discharges and is not operating close to his discharge limits when it is reasonably practicable for him to do otherwise.

Notification levels are normally set above the anticipated level of discharge for planned events but may be set below the anticipated levels for unplanned but foreseeable events, such as small boiler tube leaks. They are chosen so as to ensure that the ADs are informed about the occurrence of certain types of unplanned event which may cause an increase in the level of discharges. Notification levels normally relate to the total discharge during a fixed calendar quarter. A convenient rule of thumb is to set the notification level at 1.5 × the best estimate discharge for the calendar quarter.

If a notification level is exceeded, the operator will generally be required to provide the ADs with a retrospective justification that BPM were applied to reduce radioactive discharges to a minimum in the circumstances of the event.

Monitoring Discharges & the Environment

The requirements placed on the site operator include monitoring radioactive discharges and monitoring the local terrestrial and aqueous environments into which the discharges are made. As part of their regulatory functions, the ADs undertake their own environmental monitoring programs to act both as a check on the operator's returns and to provide independent data on the exposure of the public. MAFF carries out its own independent monitoring programs of terrestrial and marine foodstuffs and intertidal areas. HMIP undertakes analysis of check samples of the effluents, and independent monitoring of potable and surface waters and sediments. The site operators publish annual reports of their discharges and environmental monitoring. MAFF and HMIP also issue annual reports of their environmental monitoring programs (3).

REVIEW, REVISION & VARIATION OF AUTHORIZATIONS

Reasons for Review

As stated earlier, it is UK Government policy for discharge authorizations to be reviewed regularly. The review needs to be undertaken and authorizations, including the limits applied, varied or revised as appropriate, in the light of: changes in legislation and Government policy; changes in ICRP recommendations and advice; perceptions of tolerability and acceptability of risk; experience on the plant and comparable other plant; developments in technology and techniques; and the broader context of progress in reducing environmental damage through pollution control. The authorization also needs to be reviewed if new plant is to be brought on stream or existing operational plant is to be shut down. The outcome of a review may range from a variation with a small number of changes to a complete revision.

Determining a New or Revised Authorization

The following eight broad stages may be identified in the process of determining a new or revised authorization:

a. Notification of intent to review or require a new application
b. Pre-application discussions/correspondence
c. Submission of application
d. Public access to application
e. ADs appraise application & liaise with operator
f. ADs consult other Government Departments, etc.
g. ADs undertake public consultation on the application & draft authorization with statutory & non-statutory bodies & others
h. Authorization is determined and, if appropriate, issued

The total process may take indicatively 18 months, with the first 6 months of this time devoted to the activities which precede the formal application.

A particular development in recent years has been the growing significance of public consultation in the process of determining authorizations, reinforced by changes to the legislation. It provides a means for individuals and organizations other than the regulatory agencies to be aware of and influence radioactive discharges. UK policy is to continue to involve the public in decisions on the level of discharges permitted from nuclear establishments (4).

Varying a Discharge Authorization

The ADs may vary an authorization at any time by revoking or varying any of the limitations or conditions of the authorization, or by attaching further limitations or conditions. In practice, such powers of variation are not generally used except for minor changes to an authorization, usually in the direction of imposing more restrictive limitations or conditions, or to correct errors.

Public Access to Discharge Authorizations

Whenever a new discharge authorization is issued or an authorization is varied, copies of the certificate of authorization are made available for public inspection at the relevant local council offices and HMIP regional office.

AUTHORIZATIONS FOR OLDBURY NUCLEAR POWER STATION

Limitations & Conditions

The revised limits for Oldbury Power Station, *near* Bristol, are shown in Table I as an example of the range of radionuclides limited and the levels of permitted discharge.

For the liquid authorization, annual limits have been placed on: i) caesium-137, the nuclide of greatest radiological significance in the discharges, and one which is characteristic of the activity in spent fuel pond water; ii) tritium, which could be present in numerically large, but radiologically insignificant, amounts; and iii) all other radionuclides, taken together.

For the gaseous authorization, annual limits have been placed on carbon-14, sulphur-35, tritium, and beta-emitting radionuclides associated with particulate matter. In addition, short term (weekly) limits have been set for carbon-14 and sulphur-35 to control the potentially large discharges of these

TABLE I
Authorized Limits for Oldbury Power Station

Liquid Waste	Annual Limit	
Tritium	25 TBq	
Caesium-137	700 GBq	
All other radionuclides, in total	1300 GBq	
Gaseous Waste	**Annual Limit**	**Weekly Limit**
Tritium	5 TBq	
Argon-41	500 TBq	
Sulphur-35	750 GBq	75 GBq
Carbon-14	6 TBq	350 GBq
Beta emitting radionuclides associated with particulate matter	1 GBq	
Combustible Waste	**Monthly Limit**	
Sulphur-35 plus tritium	800 MBq	
All other radionuclides, in total	800 MBq	

radionuclides during reactor blowdowns. These weekly limits allow for complete blowdown of both reactors at the station after a period of normal operation.

The combustible waste authorization limits the total activity of sulphur-35 and tritium in the waste burnt in the station incinerators and oil burner units to 800 MBq/month, and the activity of other radionuclides also to 800 MBq/month. The ash from these incinerators, together with other solid waste, is sent for disposal to the Drigg facility of British Nuclear Fuels under a separate authorization.

As stated earlier, the authorizations require that nuclear power stations not only must comply with the limits but also must use best practicable means to reduce discharges further. They also require that records of discharges are kept and retained for examination by inspectors appointed by the ADs, as must be samples of waste, which are subject to independent analysis.

Public Radiation Exposure

The assessed radiation exposure of members of the public living or consuming foodstuffs near Oldbury Power Station is shown in Table II. The total dose to an individual would be less than 0.25 mSv/y, i.e. well within the 0.5 mSv/y dose target.

TABLE II
Radiation Exposure of the Public From Oldbury Authorised Discharges

	Dose Equivalent, mSv/y
Liquid	0.006
Gaseous & Combustible	0.231
Total	0.237

It would also be within the 0.3 mSv/y dose constraint recently recommended by the UK NRPB (see Section above on Dose Limits & Targets).

CONCLUSIONS

This paper has described the main principles in accordance with which discharge authorizations for nuclear power stations are determined and the factors taken into account including, in particular, the manner in which discharge limits and notification levels are set. It has also outlined the stages in the process of reviewing and revising an authorization. The approach described has been successful, and it is intended to use it in the next round of reviews of nuclear power station authorizations.

An important development in recent years has been the increasing significance of public access to information and wider consultation in the process of determining discharge authorizations, reinforced by changes to the legislation. It reflects a growing public desire to be aware of and to influence levels of radioactive discharge to the environment. UK policy is to continue to involve the public in decisions on the level of discharges permitted from nuclear establishments.

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