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General Nuclear System Ltd.

UK HPR1000 GDA Project

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Pre-Construction Environmental Report

Chapter 2

Generic Site Description

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2.1 List of Abbreviations and Acronyms

ADMS5	Atmospheric Dispersion Modelling System 5
EA	Environment Agency (UK)
ERICA	Environmental Risk from Ionising Contaminants: Assessment and Management
FAP	Forward Action Plan
GDA	Generic Design Assessment
IRA	Initial Radiological Assessment
IRAT	Initial Radiological Assessment Tool
NHB	Non-Human Biota
P&ID	Process and Information Document for Generic Assessment of Candidate Nuclear Power Plant Designs
PC-CREAM	Personal Computer version of Consequences of Radiological Emissions Assessment Methodology
PCER	Pre-Construction Environmental Report
UK HPR1000	UK version of the Hua-long Pressurised Reactor

2.2 Introduction

One fundamental objective of the UK HPR1000 Generic Design Assessment (GDA) project is that the generic UK HPR1000 could be constructed, operated and decommissioned in the UK, on a site bounded by the generic site envelope, in a way that is safe, secure and protects the environment, Reference [2].

Radiological and non-radiological environmental impact assessments provide important information to demonstrate this fundamental objective is achieved. Indeed, they provide the information on the off-site radiological dose and non-radiological effects from the radioactive and non-radioactive material released from the facility and/or present in the facility that are then to be shown to be within relevant constraints and limits and to be minimised As Low As Reasonably Achievable notably through the use of Best Available Techniques.

This aligns with the requirements set out in the *Process and Information Document for Generic Assessment of Candidate Nuclear Power Plant Designs* (P&ID), Reference [1], published by the Environment Agency (EA), there is a need, during GDA, to assess the radiological and non-radiological impact to members of the public and the environment at a generic site.

This chapter provides the generic site characteristics (terrestrial and aquatic) and the definitions of the human and non-human receptors that could be exposed to radiological and non-radiological material discharged from and present in the UK version of the Hua-long Pressurised Reactor (UK HPR1000). This information is used in the assessments of radiological dose and emissions to air and water that are presented in PCER Chapter 07 and PCER Chapter 08 respectively.

It therefore aims to support the Level 2 Claim 1.2: *The characteristics adopted in the environmental assessment reflect those of the Generic Site*.

The assessment methods used to estimate the potential radiological impact of the UK HPR1000 on the environment together with the results of the assessment are provided in PCER Chapter 7. The conventional environmental impact assessment method and results can be found in PCER Chapter 8.

This chapter has interfaces with the following chapters:

T-2.2-1 Interface with Other Chapters

Chapter	Interface Relationship
PCER Chapter 7 Radiological Assessment	This chapter provides generic site data which are used in the radiological impact assessment detailed in PCER Chapter 7.
PCER Chapter 8 Conventional Impact Assessment	This chapter provides generic site data which are used in the conventional environmental impact assessment detailed in PCER Chapter 8.

2.3 Regulatory Context

The EA regulates nuclear licensed sites, primarily under *The Environmental Permitting (England and Wales) Regulations 2016 (as amended 2018),* Reference [3]. The information which is needed to be included in a GDA submission is specified in the P&ID, Reference [1].

The P&ID sets the following requirement with respect to the *Generic Site Description*, Reference [1]:

> ***General information relating to the requesting party and the design.***
>
> *Include:*
>
> - *Description and characteristics of the generic site (or sites) that the requesting party will use to provide its dose assessment (see Chapter 7). A range of generic sites might be chosen with coastal, estuarine and inland characteristics.*

The approach to the generic site also considers the following relevant Regulation Environmental Principles, Reference [4]:

Principle SEDP1 – General Principle for Siting of New Facilities

When evaluating sites for a new facility, account should be taken of the factors that might affect the protection of people and the environment from radiological hazards and the generation of radioactive waste.

Principle SEDP2 –Migration of Radioactive Material in the Environment

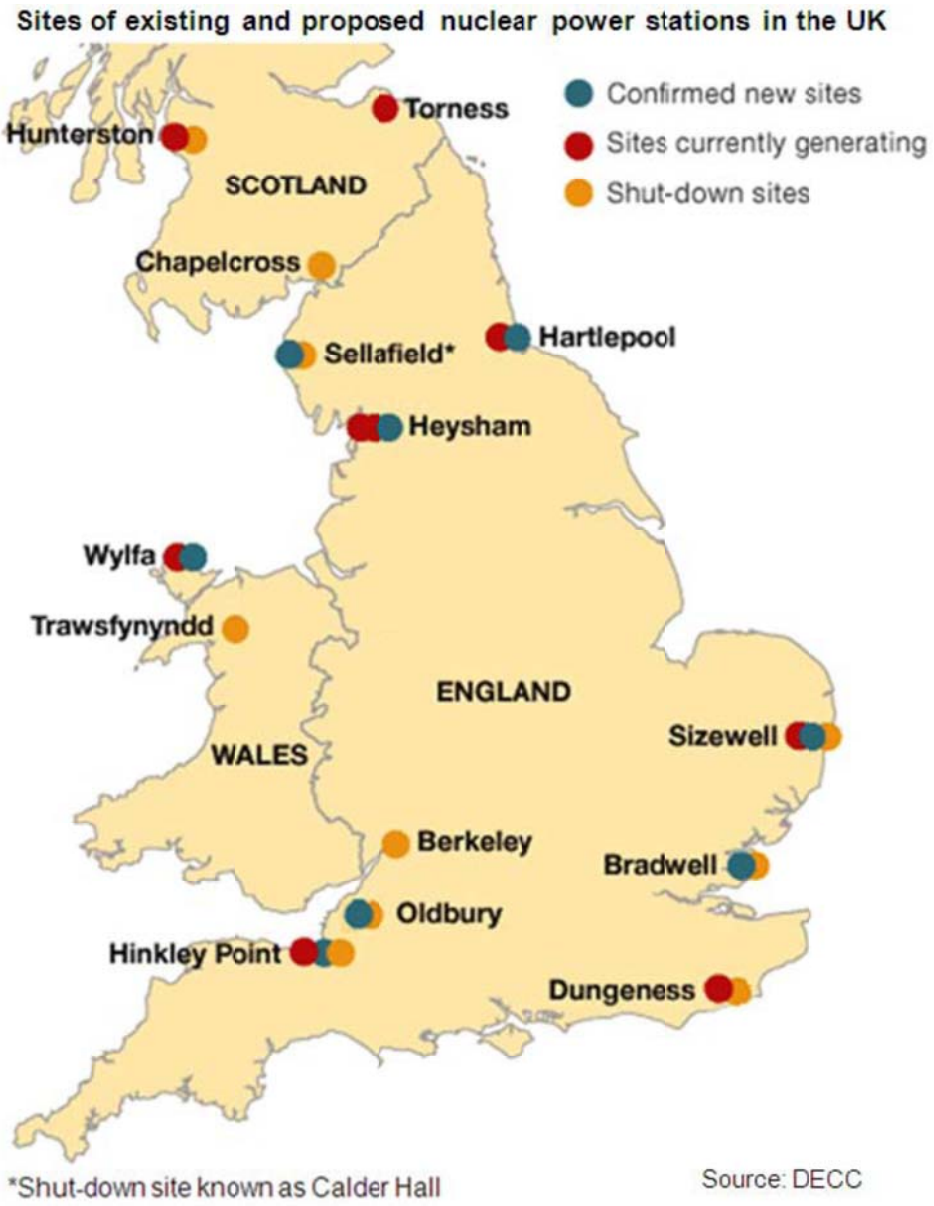
Data should be provided to allow the assessment of rates and patterns of migration of radioactive materials in the air and the aquatic and terrestrial environments around sites.

2.4 Characteristics of the Generic Site

2.4.1 Overview of Generic Site

The UK requires new nuclear power stations to provide reliable electricity supplies and a secure and diverse energy mix as the UK makes the transition to a low carbon economy. In the UK Government's *National Policy Statement for Nuclear Power Generation (EN-6)*, Reference [5], eight potential sites have been identified which are located on the coast or on large estuaries. The parameters used in this chapter are based primarily on the EA's recommended publications and guidelines, which are generic site data and are suitable for potential sites identified in EN-6, Reference [5].

The eight potential sites identified in EN-6, Reference [5] are shown as blue dots in F-2.4-1. The red dots in F-2.4-1 are the current operating nuclear power stations, and the orange dots are the nuclear power stations undergoing decommissioning (shut-down sites).



F-2.4-1 Sites of Existing and Proposed Nuclear Power Stations in the UK, Reference [7]

2.4.2 Justification for Selected Site Parameters

The generic site characteristics/parameters outlined in this report are limited to those used in the radiological dose assessment and conventional impact assessment at the GDA stage.

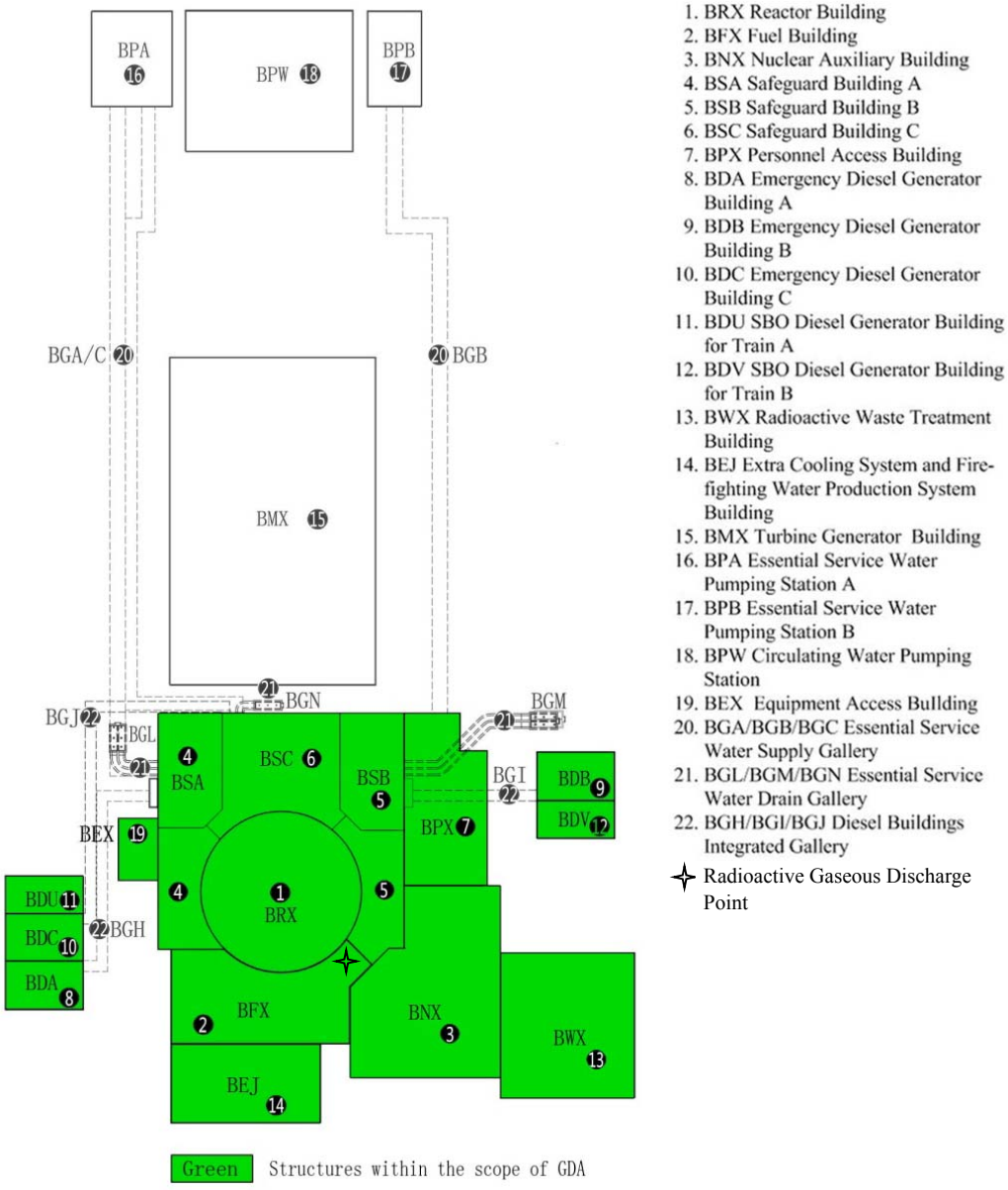
The parameters and datasets in common publications or guidance constitute the main features of the generic site. Specific site information such as site survey data from Bradwell site are used as compensation to ensure the data used falls within the ranges seen at the identified potential sites. To some extent, they would be the same for any of the potential UK nuclear new build sites identified in the *National Policy Statement*

for Nuclear Power Generation (EN-6) [5]. The specific instances, justification and impacts of using additional data are described in this PCER Chapter 2.

The UK HPR1000 generic site described in this document can represent the potential sites in England and Wales for the deployment of new nuclear power stations by the end of 2025. Considering the sources of the generic site and the requirements on environmental impact modelling, the future operator will need to undertake detailed environmental modelling by considering the site-specific data for its site-specific environment permit application.

The UK HPR1000 adopts a single-unit layout with no planned discharges to groundwater. The final layout of the UK HPR1000 is site specific, as it is impacted by the topography, geology, meteorology, transport conditions and other factors of the future site. UK HPR1000 will be designed to have an as low impact to the environment as reasonably practicable, to be safe, economical to build and operate, and as straightforward as possible to construct, operate, maintain and decommission.

F-2.4-2 shows the general layout of main buildings of the UK HPR1000 including the Nuclear Island, Conventional Island and balance of plant buildings within the GDA scope, Reference [6]. By considering the needs of facilities, a generic site including the site boundary is designed in GDA stage and the nearest distance between the stack and the site boundary is conservatively assumed to be 100m to ensure the dose assessment is not underestimated at GDA stage.



F-2.4-2 General Layout of the UK HPR1000

The main assumptions about the generic site are:

a) The site is in a coastal or estuarine location and the topography of the site is flat;

b) There is no water extraction from aquifers and no standing water at the site;

c) There are no freshwater bodies on or adjacent to the site;

d) The nearest human receptors are assumed to be a fisherman family and local resident family;

e) Discharge routes are assumed to be gaseous/airborne discharges to the atmosphere and liquid discharges to the marine/estuarine environment adjacent to the site;

f) All receptors are in the local compartment;

g) Human receptors are the local resident family and fisherman family;

h) There are no adjacent sites for general site of UK HPR1000 in GDA stage;

i) No incinerator is planned to be built on site.

2.4.3 Methodology for the Dose Assessment

Multiple assessment tools have been selected to ensure all of the dose assessments are carried out, notably to provide information required in the P&ID.

Information on these tools is summarised below. Details are provided in PCER Chapter 7.

2.4.3.1 Initial Radiological Assessment Tool (IRAT)

The IRAT methodology, Reference [8] and [9], is a staged approach developed by the EA to assess doses to the public, based on conservative assumptions.

This initial radiological assessment methodology is applied in the following three main stages:

a) Stage 1 – Initial radiological assessment using default data. If the assessed dose is > 20 μSv/y, then proceed to Stage 2;

b) Stage 2 – Initial radiological assessment using refined data. If the assessed dose is > 20 μSv/y, then proceed to Stage 3;

c) Stage 3 – Determine the need for separate site-specific assessment.

The Stages 1 and 2 are carried out in PCER Chapter 7 Radiological Assessment using default data in Reference [8] and [9]. The Stage 3 assessment is undertaken using more realistic site condition information, and is presented in PCER Chapter 7. The parameters presented in Reference [6] are relatively conservative for all of the potential sites and are also appropriate for carrying out the Stage 3 assessments.

2.4.3.2 Personal Computer version of Consequences of Radiological Emissions Assessment Methodology (PC-CREAM) 08

PC-CREAM08, Reference [10], is a well-developed and established dose modelling tool within the UK for the assessment of the potential dose to people.

2.4.3.3 Atmospheric Dispersion Modelling System (ADMS5)

ADMS5 is a practical, short-range air dispersion model that simulates a wide range of buoyant and passive releases to atmosphere. It is used to support short-term assessments, and is also capable of calculating the cloud gamma dose rate. The simulated atmospheric diffusion module in ADMS is consistent with Reference [11].

2.4.3.4 Environmental Risk from Ionising Contaminants: Assessment and Management (ERICA)

ERICA, Reference [12], is used within the UK for conducting dose assessments to Non-Human Biota (NHB). It has a tiered approach to assessing the radiological risk to terrestrial, freshwater and marine biota.

2.4.3.5 Ar-Kr-Xe Tool

The ERICA does not contain data for noble gases, therefore the Ar-Kr-Xe tool, Reference [13], is used to supplement the data from the ERICA assessment for calculating the dose from noble gases to NHB.

This tool is a variant to the R&D 128 tool developed by the EA. It includes the ability to calculate doses for all the environmentally relevant Ar, Kr and Xe isotopes and covers the original R&D 128 organisms and the International Commission on Radiological Protection reference animals and plants that the ERICA assessment considers.

2.4.4 Human Population

The EA's initial radiological assessment methodology, Reference [8] and [9], is based on exposure pathways and groups which are likely to be the most adversely affected for a particular discharge route. The receptors for humans have been taken from the EA's *Initial Radiological Assessment Methodology* (IRA), Reference [8]. For the IRA, it is assumed that the most exposed groups include:

a) Local resident family;

b) Fisherman family.

The local population distribution is not required for radiological dose assessment at this stage (site-specific data will be used to inform a dose assessment once a suitable site has been selected). It is necessary to have some information on the region of the UK and larger range, to be able to calculate population (collective) doses. The UK, EU and world populations are used for collective dose assessment in PC-CREAM 08, Reference [10]. EU12 and EU25 are defined including twelve countries and twenty-five countries of EU respectively.

T-2.4-1 Population Data Used in Collective Dose Assessment

Country/Region	Population
UK	5.96×10^{7}
EU12	3.60×10^{8}
EU25	4.56×10^{8}
World	1.00×10^{10}

2.4.5 Terrestrial Ecosystem

The environment around the generic site is described in following sub-chapters. At the GDA stage, the parameters used to describe the generic site are taken mainly from UK publications or guidance relevant to the potential sites identified in EN-6, Reference [5] (shown in F-2.4-1).

2.4.5.1 Meteorological Parameters

Meteorological data is used in the gaseous (and airborne) pathway impact assessment and the conventional air emission assessment. Different meteorological data are used for the annual release and the short term release.

The meteorological parameters which are used during the GDA stage to define the site characteristics are presented in T-2.4-2 below. Local meteorological data is not required for any of the assessments carried out at GDA. Therefore the meteorological data are taken from recommended publications and guidelines. Further information on basis for the selection of the parameters presented in T-2.4-2 is presented below.

For the annual assessment, data is taken from NRPB-R91, Reference [14]. This shows the typical annual average frequency of each Pasquill stability category, ranging from 50% D to 80% D. It also presents the expected ground level concentrations resulting from a continuous release, as a function of distance and effective stack height, at 50% D, 55% D, 60% D, 65% D, 70% D, 75% D and 80% D meteorological conditions (cf. Figure 34 to Figure 40 of Reference [14]). The data presented shows that an increase in the stability category D will reduce the ground level concentrations, for example, the concentration at the 50% D condition is about a factor of 2 higher than that at the 80% D condition.

The 65% D condition has been selected, for the assessments undertaken at the GDA stage, as the stability parameter that is representative of the coastal location occupied by the generic UK HPR1000. This value encompasses the conditions of all the potential sites and is considered to be a relatively conservative value.

The other parameters used for the annual impact assessment are a wind speed of 5 m/s, a boundary layer height of 800 m and a continuous rainfall rate of 1 mm/h (T-2.4-2).

For the short-term release assessment, the realistically conservative meteorological conditions presented in Reference [11] are used, which are reasonably conservative as Reference [11] states that *adoption of these meteorological conditions is shown to result in representative group doses at 1 km downwind of the release point, being in the upper part of the overall distribution, generally around the 70th percentile*.

The meteorological conditions used for the short-term release assessment are atmospheric stability category D, a wind speed of 3 m/s, a boundary layer height of 800 m and a continuous rainfall rate of 0.1 mm/h. These values are considered to be penalising and therefore provide a more conservative assessment, Reference [11].

T-2.4-2 Atmospheric Conditions Used for Gaseous Pathway Assessments in Reference [6]

Parameter	Proposed Value for Annual (Stage 1&2) and Collective Doses	Proposed Value for Annual (Stage 3) Doses	Proposed Value for Short-term Release Assessment
Pasquill Stability	50%D*	65%D∞	D∞∞
Wind Speed at 10 m height (m/s)	5	5	3
Wind Rose	Uniform	Uniform	Wind blows towards critical group and food crop
Rainfall Rate (mm/h)	1	1	0.1
Boundary layer depth (m)	800	800	800

* Data taken from Reference [9], the range of values for Pasquill category and wind speed is the same as in Reference [14].

∞ Data taken from Reference [14], the range of values for Pasquill category and wind speed is the same as Reference [14].

∞∞ Data taken from Reference [11].

2.4.5.2 Type of Land Use

It is assumed that an agricultural area is present around the UK HPR1000 generic site, which is typical of the 8 potential sites identified in EN-6, Reference [5]. The surface roughness value used for defining agricultural areas is 0.3 and the soil type is generic wet, Reference [6].

2.4.5.3 Habit Data for Gaseous Discharges

Habit data of local resident family exposure group are used to estimate the dose from intakes of radionuclides and the external radiation from gaseous discharges. The habit data relates to the exposure pathways from releases to air of the local resident family exposure group. These habits can vary widely from one individual to another and also in the same individual from one time to another.

Relevant exposure pathways are identified as:

a) Inhalation of radionuclides in the effluent plume;

b) External irradiation from radionuclides in the effluent plume and deposited to the ground; and,

c) Consumption of terrestrial food incorporating radionuclides deposited to the ground.

2.4.5.3.1 Distances from Gaseous Release Point to Receptors

The distances from gaseous release point to receptors are not known in GDA stage, as it is site specific information. For first two stages of assessment, the IRAT is used,

which has fixed distances of 100 m to human receptors from the gaseous discharge point and 500 m to food production from the gaseous discharge point. For stage 3 and short-term dose assessment, the human receptors are also assumed to be located at a distance of 100 m from the gaseous discharge point and food production is located at 500m from the gaseous discharge point with conservative consideration, which is consistent with data used in stage 1 and stage 2 radiological assessments.

2.4.5.3.2 Terrestrial Food Ingestion Rates

For the Stage 1 and 2 assessments, the terrestrial food ingestion rates are the default data used in PC-CREAM 08. The data is general and is considered adequate in circumstances where doses are not expected to approach limits or constraints, and where regional variations in habits are likely to be small, Reference [10].

The high and average levels of the terrestrial food consumption rates (from PC-CREAM 08) are presented in T-2.4-3. The relative contributions of the food consumption rates vary considerably between individuals, with distinct regional variations.

The appropriate food consumption rates are determined considering the overall objective of the impact assessment. The average consumption rates are used to determine the dose to average individual and the high consumption rates are used for dose or risk estimates for comparison with limits or constraints. The generic site data in Reference [15] and the actual data of Bradwell in Reference [18] are considered for determining the appropriate food consumption rates for UK HPR1000 generic site, as presented in T-2.4-3. The 97.5^{th} percentile data is appropriate for most assessment purposes where critical groups are considered, and this approach is consistent with Reference [15].

The “top two” approach defined in Reference [16] is used for setting out the more realistic terrestrial food consumption rates. The “top two” terrestrial food consumption rates are identified based on 100% high consumption rates and used for stage 3 (representative person) and short-term dose assessments. The habit data for which the “top two” approach is used for different age groups are listed in T-2.4-3.

T-2.4-3 Food Consumption Data of Local Resident Family in Reference [6] and Reference [16]

Food Consumption Rates (kg/y)	High Consumption Data[∞]			Average Consumption Data[∞]			Values used in "top two" approach[*]		
	Adult	Child	Infant	Adult	Child	Infant	Adult	Child	Infant
Green vegetables	80	35	16.8[$]/15	59.4[$]	15	13.7[$]	59.4	15	13.7
Root vegetables	130	95	45	68.4[$]	50	15	130	95	45
Fruit	75	50	35	32.9[$]	15.2[$]	9	32.9	15.2	9
Grain[**]	100	75	30	50	45	15	---	---	---
Sheep meat	25	10	3	8	4	0.8	8	4	0.8
Sheep liver	10	5	2.75	2.75	1.5	0.5	2.75	1.5	0.5
Cow meat	45	30	10	15.8[$]	15	3	15.8	15	3
Cow liver	10	5	2.75	2.75	1.5	0.5	2.75	1.5	0.5
Cow milk	240	240	320	95	110	130	240	240	320
Cow milk products[**]	60	45	45	20	15	15	---	---	---

[*] Data taken from Reference [16].

[∞] Data taken from Reference [6].

[**] Grain is not considered because there is no evidence to indicate that grain in the UK is grown, milled and consumed on a very local scale; Cow milk products are not considered, as it is considered unlikely that individuals will produce milk products themselves and consume them in significant quantities, Reference [11].

[$] These values come from the habits survey report of Bradwell in 2015 referring to Reference [18].

2.4.5.3.3 Breathing Rates and Indoor Occupancy

The breathing rates in the short-term assessment are presented for periods of a few hours. Two scenarios for adult breathing rates are considered including the average rate over the working day for light work and the average rate over the working day for heavy work. The average adult breathing rate over the working day for heavy work is selected as the conservative value for all assessments.

Indoor occupancy data is used where more survey information is available. This data is age dependent, and is selected for all assessments to be 50% for adults, 80% for children and 90% for infants, Reference [15].

Doses to people indoors will be significantly lower to doses to people outdoors owing to shielding provided by building structures. The 0.2 cloud gamma value is selected for general assessments as it is a typical value for EU countries. The location factor for external irradiation from electrons (cloud beta) is set as 1 because the exposure is only from activity in the immediate vicinity of the radionuclides and the activity concentration in air is considered to be the same indoors and outdoors. The gamma dose rate indoors from deposited activity is assumed to be 0.1 of the dose rate outdoors in a rural environment for the same deposition density on soil, Reference

[10].

T-2.4-4 Habit Data of Local Resident Family, Reference [6] and Reference [17]

	Values Used in Stage 1&2&3 Assessment			Values Used in Short Term Assessment∞		
	Adult	**Child**	**Infant**	**Adult**	**Child**	**Infant**
Breathing rates (m^3/h)	0.92	0.64	0.22	1.69	0.87	0.31
Occupancy at habitation (h/y)	8760	8760	8760	8760/24#	8760/24#	8760/24#
Fraction of time spent indoors	0.5	0.8	0.9	0.5/0##	0.8/0##	0.9/0##
Location factor cloud gamma*	0.2	0.2	0.2	0.2	0.2	0.2
Location factor cloud beta*	1	1	1	1	1	1
Indoor dose reduction factor for inhalation*	1	1	1	1	1	1
Shielding factor from deposited radionuclides*	0.1	0.1	0.1	0.1	0.1	0.1

* Data taken from Reference [10].

∞ Date taken from Reference [17].

Value of 8760 is used for radiation from ground external radiation and ingestion of terrestrial foodstuffs; the value of 24 which is the release time is used for radiation from external radiation (including gamma dose and beta dose) and inhalation of radionuclides from plume.

In short-term assessment, the values of 0.5/0.8/0.9 for the fraction of time spent indoors are used for ground external radiation and ingestion of terrestrial foodstuffs. For external radiation and inhalation of radionuclides from plume, the value of 0 is used as it is conservatively assumed that individuals stay outdoors during the entire passage of the plume.

2.4.5.4 Habit Data Used for Direct Radiation

The direct radiation from the sources on the site is a contributor to the annual dose assessment. The layout of the UK HPR1000 is not determined at present, so the distance for direct radiation assessment is conservatively considered to be 100m from the buildings which contain radioactive materials to the members of the public, who are assumed conservatively to spend 100% of their time at that location.

The habit data used for direct radiation assessment are selected to be the same as for annual discharges assessment (sub-chapter 2.4.5.3), Reference [9], and are presented in T-2.4-5.

T-2.4-5 Habit Data Used for Direct Radiation Assessment

Parameter	Proposed Value		
	Adult	Child	Infant
Occupancy(h/y)	8760	8760	8760
Location factor for being indoors	0.1	0.1	0.1
Location factor for being outdoors	1	1	1
Fraction of time spent indoors	0.5	0.8	0.9
Fraction of time spent outdoors	0.5	0.2	0.1

2.4.6 Aquatic Ecosystem

An assumption is made that the site is coastal in nature and the liquid radioactive discharges will be made to a marine or estuarine environment.

2.4.6.1 Local Compartment Data for Liquid Discharges

For first two stages of assessment, the IRAT system has a fixed default local compartment, and for stage 3 dose assessment, the local compartment of Bradwell A has been selected as it reflects conservative consideration of potential site. A summary of the proposed parameters for the local compartment for generic UK HPR1000 is provided in T-2.4-6. The low level of dispersion means that the resulting dose assessment is conservative.

It is assumed that the receptors (human and non-human) are located in this local compartment.

T-2.4-6 Local Compartment Data for generic UK HPR1000, Reference [6] and [10]

Parameter	Stage 1	Stage2	Stage 3
Volume (m^3)	1.0×10^8	1.0×10^8	2.0×10^8
Depth (m)	10	10	10
Coastline length (km)	10	10	10
Volumetric exchange rate (m^3/y)	3.2×10^9	$4.1 \times 10^{9*}$	4.0×10^9
Suspended sediment load (t/m^3)	1.0×10^{-5}	1.0×10^{-5}	2.0×10^{-4}
Sedimentation rate ($t/m^2/y$)	4.9×10^{-3}	4.9×10^{-3}	1.0×10^{-4}
Density of dry sediment particles (t/m^3)	2.6	2.6	2.6
Bioturbation rate (coastal water) (m^2/y)	3.6×10^{-5}	3.6×10^{-5}	3.6×10^{-5}
Diffusion rate (sediment diffusion coefficient) (m^2/y)	3.15×10^{-2}	3.15×10^{-2}	3.15×10^{-2}

* Lowest value from the table 4 of Reference [8].

2.4.6.2 Habit Data for Liquid Discharges

The fisherman family receive doses from:

a) External irradiation from radionuclides deposited in shore sediments;

b) The consumption of seafood incorporating radionuclides released from nuclear power plant.

For these exposure pathways, relevant habit data are presented in T-2.4-7 to T-2.4-9:

1) The generic intake rates are based on ingestion data in the UK, Reference [15]. The generic data in Reference [15] are recommended to be used when there is no site specific data and have been used in previous GDAs. For UK HPR1000 GDA, they are also selected for use as they are deemed to be conservative enough.

2) For the Stage 3 assessment, the habit data of Bradwell B, Reference [18], have also been considered mainly because they are more conservative than generic data. The more conservative values between these two data sources have been selected to ensure the assessment of dose to members of the public in GDA stage was bounding.

T-2.4-7 Habit Data for Fisherman Family (High Level Data for Stage 1&2 Assessment), Reference [6]

	Adult	Child	Infant	Fraction in compartment	
				Local	Regional
Food Consumption Rates (kg/y)					
Fish	100	20	5	0.5	0.5
Crustaceans	20	5	0	1	0
Molluscs	20	5	0	1	0
Seaweed	0	0	0	1	0
Occupancy on Beach (h/y)	2000	300	30	1	0
Time Spend Handing Fishing Equipment (h/y)	2000	---	---	1	0

T-2.4-8 Habit Data for Fisherman Family (High Level Data for Stage 3 Assessment), Reference [6]

	Adult	Child	Infant	Fraction in compartment	
				Local	Regional
Food Consumption Rates (kg/y)					
Fish	100	29.5*	5	0.5	0.5
Crustaceans	20	5	0	1	0
Molluscs	20	5	0	1	0
Seaweed	0.7*	0.6*	0	1	0
Occupancy on Beach (h/y)	7424*	300	849*	1	0
Time Spend Handing Fishing Equipment (h/y)	2151*	144*	0	1	0

* These values come from the habits survey report of Bradwell in 2015, Reference [18].

T-2.4-9 Habit Data for Fisherman Family (Average Level Data for Stage 3 Assessment), Reference [6]

	Adult	Child	Infant	Fraction in compartment	
				Local	Regional
Food Consumption Rates (kg/y)					
Fish	21.2*	29.5*	3.5	0.5	0.5
Crustaceans	1.75	1.25	0	1	0
Molluscs	5*	1.25	0	1	0
Seaweed	0.5*	0.6*	0	1	0
Occupancy on Beach (h/y)	5138*	300	849*	1	0
Time Spend Handing Fishing Equipment (h/y)	2000	144*	---	1	0

* These values come from the habits survey report of Bradwell in 2015, Reference [18].

2.4.7 Sensitive Areas and Species

For the GDA stage, designated sites, sensitive habitats and protected species are only defined in a general sense in order to characterise the potential ecological receptors that may be present at a generic coastal or estuarine site.

European designated sites include the Ramsar Sites, the Special Protection Areas and the Special Areas for Conservation. The Nationally Designated Sites mainly include the Sites of Special Scientific Interest and National Nature Reserves. Information on designated sites will be detailed at the appropriate time, i.e. at the site-specific permitting stage.

The considered reference organisms used in the NHB assessment are presented in T-2.4-10, Reference [12]. The reference organisms used are those presented as the

reference organisms in the ERICA tool. The latest version of the Ar-Kr-Xe tool used to determine the impact of noble gas release in the terrestrial environment contains the same list of reference organisms as the ERICA tool. The reference organisms listed in the ERICA model are selected from four terrestrial and three aquatic ecosystems, which are typical for Europe, including the UK. Table T-2.4-10 lists the representative organisms of the NHB that are protected in Europe, including in the UK. An assessment of all of the reference organisms listed in Table T-2.4-10 is therefore appropriate as it will cover all potential reference organisms that might be present at the generic site. In GDA stage, the NHB are assumed to be located at 100m from the gaseous discharge point.

At the site specific stage, the specific NHB that will be present on the selected site, which will be a subset of Table T-2.4-10, can be identified and assessment of the NHB can be limited to those NHB that is relevant to the selected site.

T-2.4-10 Reference Organisms Used in the Dose Assessment for NHB

Marine Reference Organisms	Terrestrial Reference Organisms
Benthic fish	Amphibian
Bird	Annelid
Crustacean	Arthropod – detritivorous
Macroalgae	Bird
Mammal	Flying insect
Mollusc - bivalve	Grasses and herbs
Pelagic fish	Lichen and bryophytes
Phytoplankton	Mammal – small burrowing
Polychaete worm	Mammal – large
Reptile	Mollusc – gastropod
Sea anemones/true corals	Reptile
Vascular plant	Shrub
Zooplankton	Tree

2.5 Conclusions

This chapter describes the parameters which reflect the generic site characteristics (including meteorological data) to be used for the radiological and non-radiological environmental impact assessment of the UK HPR1000.

At the site specific environmental permit application stage, the specific characteristics of the site will be identified for the selected location for the UK HPR1000 (FAP task No. 2.1).

2.6 Forward Action Plan (FAP)

This chapter provides site characteristics used in the radiological environmental

impact assessment for the UK HPR1000 and there is no forward action plan for this chapter at GDA stage.

There are some actions at site-specific stage identified during GDA and these are given in T-2.6-1.

T-2.6-1 Post GDA FAP

Task No.	Summary of Task	Delivery Phase
2.1	The site characteristics will be reviewed when the site is identified for the UK HPR1000	Site-specific stage

2.7 References

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