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1. INTRODUCTION

This document deals with requirement 3.3 of EA P& I Document. The purpose is to provide relevant information about installations of the UK EPR that could be subject to Pollution Prevention Control (PPC) Regulations 2000. Within the Generic Design Acceptance (GDA) phase, the only Installation identified as being subject to a PPC permit are the diesel generators, as the total thermal input of these combustion plants will exceed 50 MW (Schedule 1, Section 1.1 Combustion Part A (1) Paragraph 9 (a) of the PPC Regulations 2000). The standby diesel generators consist of:

- Four emergency diesel generators (EDG), for a net thermal input of 4 x 17.6 MW;
- Two Ultimate emergency diesel generators for station blackout (SBO), for a net thermal input of 2 x 6 MW.

Notes:

- It is worth emphasising that detailed design of the UK EPR diesel generators is not available at this stage; it will be available only, once the manufacturers of the equipment are selected; Moreover, the power rates are indicative since they may have to be adapted to site specific conditions (especially ultimate heat sink design).
- Additional fuel powered facilities could also be required for the station operation, depending on site specific arrangements. They would consequently be included in the application for PPC permit at the site specific stage;
- Other small appliances which are powered by diesel or petrol (such as light portable pumps, generators and gardening equipment) but small in comparison, will not be taken into account in the PPC application since their environmental impact is not considered significant.

The document has been prepared on the basis of a recent application for similar Installations of a nuclear power plant in operation in the UK. Therefore, the references used in this document are the legislation contained within PPC Regulation 2000, and the Combustion Sector Guidance Note - S1.01 V2.03 08/2005. The potential regulatory impacts of the new Environmental Permitting Regulations (EPR) 2007 are not specifically considered in this statement. Any regulatory impact is likely to be administrative as opposed to technical.

All the items to be covered by a PPC application have been kept in the document structure, even if some of them will only be addressed during the site specific stage.

It is a requirement of the application for a PPC Permit that the Installation and the process equipment, technologies and management controls be assessed against Indicative Best Available Techniques (BAT) defined in relevant Sector Guidance Note. Therefore assessment of BAT is made throughout this document, in tables that present Indicative BAT, and with justification of the processes and / or equipment used to explain how it is or will have to be answered on site by the Operator. Throughout this document, Indicative BAT requirements, which are not applicable to the type of combustion plant such as diesel generators, have been omitted from the Indicative BAT tables.

Table 1 – Overview

1	Introduction
2.1.	Main Activities and in-Process Controls ➔ Provides a technical description of the diesel generators and the main activities. Covers the way the plant is designed and operated to reduce emissions.
2.2	Emission Controls and Abatement ➔ Details the abatement techniques used after measures for prevention and minimisation have been applied. The areas covered are point source emissions to air, surface water and groundwater, fugitive emissions to air, surface water and groundwater, and odour.
2.3	Management ➔ Outlines the management systems to be implemented for ensuring that all appropriate pollution prevention and control techniques will be delivered reliably and on an integrated basis.
2.4	Raw Materials ➔ Covers the use of raw materials and water and the techniques for both minimising their use and minimising their impact by selection.
2.5	Waste Handling ➔ Details the wastes produced by the diesel generators and key pollutants likely to be present. Covers the systems to be implemented to record the quantity, nature and origin and where relevant, the destination, frequency of collection, mode et transport and treatment method of any waste, which is disposed of or recovered.
2.6	Waste Recovery or Disposal ➔ Describes how each waste stream will be recovered or disposed of, and how any impacts on the environment from waste management activities will be reduced.
2.7	Energy ➔ Describes how the diesel generators will use as little energy as possible.
2.8	Accidents ➔ Covers accidents and their consequences, dealing with major accidents, but also with spills and abnormal operation.
2.9	Noise ➔ Assesses the major noise sources on Site in relation to the nearest sensitive receptors.
2.10	Monitoring ➔ Describes the proposed measures for monitoring emissions, including environmental monitoring.
2.11	Closure ➔ Describes the proposed measures, upon definitive cessation of activities, to avoid any pollution risk, and return the Site of operation to a satisfactory state; includes where appropriate, measures relating to the design and construction of the Installation.
2.12	Installation Issues ➔ Considers and describes the potential opportunities for synergies with other permit holders.
3	Emission Benchmarks ➔ Provides a comparison of emissions from the Installation against the respective emission benchmarks set in the Sector Guidance Note.
4	Impact on the Environment ➔ Assesses the potential impacts that may be caused by emissions from the Installation with respect to relevant sensitive receptors. Considers the requirements for the Operator under the Waste Management Licensing Regulations and the Habitats Regulations.
5	BAT Assessment ➔ Provides a summary of the main environmental issues that have been identified as part of the comparison of Site activities against Indicative BAT carried out under each of the sections listed above, as well as by the H1 Impact Assessment.
6	Improvement Programme ➔ List of suggested improvements to be considered at the site specific stage, relating to any aspects of the diesel generators equipment, Installation and management covered under BAT.

2. TECHNIQUES FOR POLLUTION CONTROL

2.1. MAIN ACTIVITIES AND IN PROCESS CONTROLS

The function of the UK EPR standby diesel generators is to produce back up electrical supply to essential systems, to enable safe shutdown of the station in case of emergency:

- Main emergency diesel generators (EDG): There are four separated and identical main diesel generators, which are required to restore the power supply in the event of loss of off-site power when house load operation fails or is not possible.

- Ultimate emergency diesel generators for station blackout (SBO): There are two separate and identical ultimate emergency diesel generators to supply power to the actuators required in the event of a Plant Blackout (i.e. loss of both off-site supplies and the EDGs). SBO are started manually from the main control room within two hours (reserve time of batteries).

It may be emphasised that:

- Choice of diesel generators rather than gas fired engines, for the EPR emergency power supply, is considered as BAT, with regards to safety aspects and based on the experience feedback available on the French NPP fleet, which has shown that this equipment is highly reliable and well-tried;

- Diesel generator technology has been retained as BAT for SBOs against steam powered electrical generator, (non polluting technology), for reliability aspects;

- Safety analyses require EDGs and SBOs to be of diversified technologies.

Design requirements for these nuclear safety engines will be included in a Technical Specification Document for diesel generators.

The standby diesel generators are installed in separate rooms in the two diesel buildings: two EDGs and one SBO per building. Each engine exhausts through its individual silencer/stack, which is located on the roof of the diesel building, i.e. about 30m above ground level.

Each engine is fitted with a crankcase fume extract system. Fumes from this system are discharged at roof level. All leakage from the engines are collected into the SEH sumps and routed depending on their physical and chemical characteristics to the site dirty lubricating oil drain tank or to a drum for disposal.

Both the main and ultimate emergency diesel generators will be test run to demonstrate reliability. Test running of each diesel generator will be required every other month and a qualification test will be performed after maintenance and at least once per operating cycle. If for any reason a diesel generator fails to start up during a test run, then an additional start would be required. The detailed test programme will depend on the station safety specification, the manufacturer's recommendations, and the test required in the PPC permit.

The estimated annual running time per diesel generator is less than 20 hours.

EDGs and SBOs will use fuel oil grades with characteristics complying with the requirements of the applicable standards. For example, current fuel oil is class A2/D fuel oil, supplied to the specification of BS 2869, which allows, since January 2008, a maximum of 0.1% sulphur by weight.

2.1.1. Material Storage and Handling

Fuel Oil

As stated above, the diesel generators on the UK EPR site will use fuel oil with characteristics complying with the requirements of applicable standards.

The design of the UK EPR allows the supply to be delivered by road tanker and transferred into bulk storage tanks, which are located inside the Diesel Buildings. The fuel oil storage is described in Table 2.1.1.

Oil storage areas of the UK EPR will meet the requirements of the Control of Pollution (Oil Storage) (England) Regulations 2001.

Table 2.1.1 - Fuel oil storage and handling arrangements for diesels generators within the Installation

Diesel	Expected Annual Fuel Oil Usage	Fuel Oil Storage	Method of Delivery	Notes
EDGs	31 tonnes per EDG	One bulk storage tank per EDG, each of 180 m^3 capacity One day tank per EDG, each of 4 m^3 capacity	By tanker to bulk storage tanks	Bulk and day tanks are located within bunded rooms within the diesel building
SBOs	10.5 tonnes per SBO	One bulk storage tank per SBO, each of 25 m^3 capacity One day tank per SBO, each of 3 m^3 capacity	By tanker to bulk storage tanks	Bulk and day tanks are located within bunded rooms within the diesel building

Lubricating Oil

Handling and storage of lubricating oil are associated with the operation of EDGs and SBOs.

Each EDG and SBO has its own lubricating oil system using an SAE40 oil, compatible with the fuel used. Main oil storage will consist of either the motor sump if this constitutes an oil reserve, or by storage tank and oil return line. In the UK EPR reference design, the EDG's motor sump holds approximately 4 m^3 of oil, whilst the SBO's holds approximately 0.4 m^3 of oil. For each engine, dirty lubricating oil and waste oil from maintenance activities can be collected in sumps and transferred to the station waste oil tank for disposal, in compliance with the Waste Management Policy of the operator (see Sections 2.5 and 2.6).

It will be the responsibility of the Operator to handle oils in the concerned areas following best practice guidelines, such as to place oil spillage kits close to areas where oil is routinely handled and to ensure that Operators are experienced in the use of this equipment. The issue of handling will be addressed through training, instructions and procedures.

Water

The diesel engines are water cooled by a sealed cooling system. Therefore there is no need for handling or storage of water.

Miscellaneous Handling and Storage

The following operations associated with the diesel generators involve minimal storage and handling requirements.

Fire protection
The Diesel Building rooms are protected by the station fire protection systems, which do not require significant storage or handling of water in the affected areas.

Antifreeze
The EDGs' and SBOs' engines are cooled by demineralised water in re-circulating systems, which contain antifreeze. In the UK EPR reference design, the cooling liquid used for the dry air coolers and the autonomous circuits consists of ready-to-use 50/50 mixture of monoethyleneglycol and water and is stored on site in drums. For EDG engines the cooling systems capacity is approximately 8 m^3 in total, comprising 5 m^3 for the first circuit known as the High Temperature cooling water circuit, and 3 m^3 for the second circuit called Low Temperature cooling water circuit. The cooling system capacity for SBOs engines is approximately 3 m^3 in total, comprising 1.7 m^3 for High Temperature water and 1.3 m^3 for the Low Temperature water.

The cooling circuits are replenished with antifreeze using a storage tank (approximately 1 m^3), which is filled with antifreeze directly from drums. Cooling mixture drained from the cooling circuits during maintenance will be disposed of as a hazardous waste.

Best Available Techniques

The Installation's performance is assessed against Indicative BAT requirements for material storage and handling in Table 2.1.2.

Table 2.1.2 - Indicative BAT requirements for material storage and handling

Indicative BAT	Installation Activities
Storage of raw materials: Fuel oil is stored in vertical storage tanks, which should be contained within an appropriately sized impervious bund. Floating roof and vented tanks are commonly used. Where fuel viscosity needs to be controlled, the tanks may be fitted with heaters. In such circumstances the tanks should be insulated.	Fuel oil is stored in closed vented tanks, situated in bunded rooms, as described in Table 2.1.1. Fuel viscosity is such that heating controls are not required therefore negating the requirement for heated tanks.

2.1.2. Primary Measures for NOx Control

The operation of diesel generators (EDGs and SBOs) will lead to a discharge of nitrogen oxides, mostly formed by fixation of nitrogen in the combustion air[1].

Optimisation of the diesel engine with regards to NOx control will be considered at the engine procurement phase, bearing in mind that the priority for this equipment is the reliability.

[1] Typical nitrogen content is 0.01 to 0.05% nitrogen by weight. Estimate supplied by Total Fina Ltd for class A2/D fuel oil.

As with other gaseous emissions, NOx control could be addressed by the maintenance programme applied to the diesel generators (EDGs and SBOs), if deemed necessary, to ensure optimum performance, with the reservation that optimising the NOx emission does not require longer hours of operation.

The maintenance of EDG and SBO engines will be addressed in the Operator's Maintenance Policy, which will specify the work programme required to maintain the diesel engines in the best possible standby state to ensure optimum engine availability. This work programme will be based on engine running hours and manufacturer's recommendations. It should be noted that in the event of maintenance activities, which can significantly affect the engine performance, specific tests, such as stack testing, could be performed following completion of the work if deemed necessary.

2.1.3. Primary Measures for SO2 Control

The operation of diesel generators (EDGs and SBOs) will lead to a discharge of sulphur oxides, mainly sulphur dioxide.

The operation of the diesel generators will use fuel oil, which will ensure low emission of sulphur dioxide. For example, class A2/D fuel oil must contain, since January 2008, a maximum of 0.1% sulphur by weight, under legislation outlined in SI200/1460.

As a general rule, fuel oil grade for EDGs and SBOs will be chosen taking into account the requirements of UK regulation and EU directives.

2.1.4. Environmental Performance Indicators

Information related to the environment will be collected at the station operation stage, such as hours of operation, fuel oil consumption, and concentration measurements.

The relevance of providing specific Environmental Performance Indicators (EPIs) for the diesel generators, beside the periodic measurements mentioned above, will have to be examined at the operational stage. However, since the EPR diesel generators will only operate for maintenance purposes, the use of such indicators seems limited.

2.2. EMISSIONS CONTROL

2.2.1. Point Source Emissions to Air

Emissions to air from point sources are:

- Emissions from the stacks of the diesel generators (i.e. hot flue/exhaust gases containing smoke (particulate matter), oxides of carbon, sulphur and nitrogen and traces of volatile organic compounds (VOCs));
- Emissions from the EDG's crankcase fume extract system vents. Fumes from this system will be discharged at roof level on the diesel building. This emission will occur only during engine operation, and will consist of air with traces of lubricating oil fumes. Abatement could be installed in the form of a coalescer filter if deemed viable given the few operational hours;
- Emission from the EDGs' and SBOs' bulk and daily fuel tanks vents;
- Lubricating oil fumes from the SBOs are recycled in the air intake.

Since the emergency diesels generators are to be operated on an intermittent basis (i.e. less than 20 hours per year), no monitoring system, which would require maintenance, has been foreseen to continuously monitor stack emissions. Diesel engines could be fitted with simple process control instruments to monitor smoke density and oxygen if required by the permit

Manufacturer's data, typical of the size of the EDGs and SBOs that will be installed at the EPR station, are shown in Table 2.2.1 as indicative point source emissions to air.

Table 2.2.1 - Point source emissions to air from the installation

Diesels	Emission Point Characteristics					
	Stack Height	NOx (NO_2) mg/m^3	SO_2 mg/m^3 (at 5% O_2)	CO mg/m^3	Unburned Hydrocarbons (HC) mg/m^3	Particulates mg/m^3
EDGs	About 30 m	2,542	143.5	137.5*	0.7g/KWh*	Not available
SBOs	About 30 m	2,000	143.5	Not available	150*	50*

* To be confirmed at the site specific phase

The diesel generators provide back up to systems on the nuclear station. None of them is used to directly generate electricity for sale and therefore there is no commercial gain associated with extending operation. Thus the emissions will be kept as low as possible.

Due to the low frequency of operation, the fitting of abatement equipment to the diesel generators have not been considered on the reference EPR, and will be considered only if economically viable. Some assessment of available techniques, for abatement of NOx emissions for EDGs and SBOs, is summarised in Section 2.2.2 below.

2.2.2. Abatement of Nitrogen Oxide Emissions

Considering the very low amount of annual running hours, there is no installed end of pipe NOx abatement plant on the reference EPR. It is likely that any abatement plant will require steady operating conditions to function effectively, and none of the diesel generators operate within a suitable regime.

Nevertheless the necessity for a NOx abatement plant on UK EPR will be examined once emissions inventory, impact assessment and a review of abatement techniques availability, at the site specific stage, have been performed.

Table 2.2.2 - Indicative BAT requirements for the abatement of emissions of NOx

Indicative BAT	Installation Activities
Emissions of NOx should be controlled in plant by a combination, as applicable, of:	
Combustion control systems;	The Operator shall control through periodic test and maintenance that EDGs and SBOs reliability is maximised to ensure that, under emergency conditions, they will be able to function in order to safely shut down the nuclear reactors. The maintenance and servicing regime shall ensure routine engine and injection system maintenance and some performance monitoring on the EDGs and SBOs but keeping the running time reasonably low; Due to the low operating frequency of the diesel generators the gains to be made from installing advanced combustion control equipment may be proportionally small when compared to the technical difficulty, practicalities and cost of implementing and maintaining such systems. In addition, the type of testing following maintenance activities, which can significantly affect the engine performance of the EDGs and SBOs, will be considered at the site specific stage. For smaller plant (described as <100MW or regulated by aggregation of smaller units), the sector guidance states that the use of combustion modification techniques may be sufficient in the consideration of BAT for the control of NOx. The EDGs and SBOs are considered “small” by this definition, and in addition will only be operated approximately 0.2% of the year. These periods of operation are to ensure efficient and reliable operations in support of the nuclear plant safety case and to comply with best practice for the maintenance of such plant. The characteristics of the standby diesel generators combustion control systems will be further considered at the procurement stage, and balance between technical feasibility, environmental benefit and cost will be assessed.

Indicative BAT	Installation Activities
Combustion temperature reduction;	Systems of combustion temperature reduction will be studied with the manufacturer. However, we can already give the following information: The engines are designed to operate within defined temperature ranges and the injection is optimized to have the NOx emission as low as possible with a minimized fuel oil consumption; The Installation of advanced temperature control systems would lead to limited environmental gains. For this reason, installing such a system in the EPR design has not been retained. Engines are liquid cooled (via radiators) and therefore rely on ambient temperature to provide adequate cooling of components. Advanced gas cooling is unlikely to yield net environmental benefits, given the requirements to draw energy to circulate and cool the gases.
For coal and oil-fired plant, low NOx burners are required where applicable;	This requirement will be specified in the UK EPR EDGs and SBOs contracts, but priority will be given to the technical devices that will ensure reliability of the engines.
Over fire air (OFA)	Not applicable for liquid-fuelled plant.
Flue/exhaust gas recycling (FGR);	FGR is most effective on gas or oil systems where the NOx is derived from combustion air rather than the fuel (as in coal fired systems). FGR can offer 10-20% NOx reduction on oil burning systems but this may result in an increase in particulate emissions. Given the small reduction in NOx emissions, significant technical / engineering complexities in implementing this process the addition of FGR is not considered to be BAT for the EPR diesel generators.
Reburn;	Not considered appropriate to the standby emergency diesel generators.
Selective Catalytic Removal or Selective Non-Catalytic Removal for smaller plant (<100 MW) is considered BAT where required to meet air quality standards or other environmental standards.	To be confirmed at the site specific stage.

2.2.3. Sulphur Dioxide Abatement

As stated in the Combustion Sector Guidance Note, the abatement techniques, such as end of pipe desulphurisation techniques are BAT for large coal of oil fired plant, whilst the use of low sulphur fuels is a primary BAT measure for all plants.

Considering the very low amount of annual running hours of the standby emergency diesel generators, it is considered as BAT to comply with the primary requirement of using low sulphur fuel.

Table 2.2.3 summarises the assessment of EDGs and SBOs against Indicative BAT requirements for abatement of emissions of SO_2.

Table 2.2.3 - Indicative BAT requirements for the abatement of emissions of SO_2

Indicative BAT	Installation Activities
Use of low sulphur fuels is a primary measure.	The Installation will operate in line with the Sulphur Content of Liquid Fuels (England and Wales) (SCOLF) Regulations. The diesel generators use Class A2/D fuel oil, which complies with the specification BS 2869. The current limit is 0.1% sulphur maximum by weight (since January 2008). Section 2.1.3 of the Guidance states that For plant <100MW, the use of low sulphur fuels may be sufficient.
Dry sorbent injection should be considered for pulverised and liquid fuel furnaces where too small to justify FGD.	The use of low sulphur fuels is considered to be BAT for smaller plant.

2.2.4. Abatement of Particulate Matter Emissions

There is no abatement plant foreseen on the reference UK EPR diesel generators to reduce particulate emissions. However, filtering of fuel could be claimed as contributing to improved fuel quality, and hence lower particulate emissions. In addition, fitting the stacks of EDGs and SBOs with a cyclone, to reduce particulate emissions could be considered. The viability of such additional devices will be analysed at the procurement stage.

The Installation's performance is assessed against Indicative BAT requirements for abatement of particulate matter emissions in Table 2.2.4.

Table 2.2.4 - Indicative BAT requirements for the abatement of emissions of particulate matter

Indicative BAT	Installation Activities
Where particulate abatement is required, the options include: • Electrostatic Precipitators (ESPs) • Fabric Filters • Ceramic Filters • Wet Scrubbers, or • Cyclones	The Installation will use only high-grade fuel oil in the standby diesel generators. Therefore emissions of particulates, originating from the input fuel will be minimised. Fabric filter and cyclone to reduce particulate emissions will be considered at the EDGs' and SBOs' procurement stage.

2.2.5. Other Releases

Operation of the diesel generators results in emissions of CO2, carbon monoxide (CO) and VOCs.

It is recognised in the Combustion Sector Guidance Note that, at the present stage of research development, the only means of abatement of CO2 emission is to minimise the operation of the diesel generators.

For what concerns the EDGs and SBOs of the UK EPR, their operation will be limited to tests and maintenance, therefore CO2 emissions will be kept as low as possible.

Abatement of CO and VOCs will be addressed by plant maintenance to ensure efficient and reliable combustion, which will in turn ensure minimised releases.

Reduction of CO in small stationary diesel engines using catalytic oxidation in the exhaust stream may be feasible. However, it is not considered as justified since there would be insignificant environmental benefit due to the low operating hours for these engines.

The Installation's performance is assessed against Indicative BAT requirements for point source emissions to air in Table 2.2.5.

Table 2.2.5 - Indicative BAT requirements for the control of point source emission to air

Indicative BAT	Installation Activities
VOC and dioxins — these should be minimised through good combustion control.	In general, the plant will only be run for testing and post maintenance checks, in order to ensure availability during emergency conditions. Combustion control will be kept within normal operational ranges through engine servicing and Operator checks.
The benchmark values for point source emissions to air, listed in Section 3.2.1, should be achieved unless alternative values are justified and agreed with the Regulator.	This will be the responsibility of the Operator at the site specific stage.
The main chemical constituents of the emissions should be identified, including VOC speciation where practicable.	VOCs (methane equivalent carbon) will be tested and reported in accordance with the PPC permit when issued. VOCs are not anticipated to be a significant component of the exhaust gases and, as such, speciation is not considered to be necessary to demonstrate BAT.
Control of Visible Particulate Plumes	
Even where particulate benchmarks are already met, the aim should be to avoid visible emissions. However, because plume visibility is extremely dependent on the particle size and reflectivity, the angle of the light, and the sky background, it is accepted that even when BAT is employed, and very low emissions are being achieved, some plumes may still be visible under particular conditions.	Visual impacts from plumes on start up and during operation will be assessed at the site specific stage. Given that the EDGs and SBOs will be operated for maintenance purposes only (during normal operating conditions) the impact should be limited.
Control of Visible Condensed Water Plumes	
The need to minimise water vapour plumes should always be considered as, in addition to possible local visual amenity issues, in severe cases, plumes can cause loss of light, fogging, icing of roads, etc. High moisture content can also adversely affect plume dispersion so, where practicable, water content of the exhaust stream should be reduced. Ideally, the exhaust should be discharged at conditions of temperature and moisture content that avoids saturation under a wide range of meteorological conditions, including cold damp conditions.	There is no significant water vapour in the EDGs and SBOs engine exhausts. The EDGs and SBOs should not give rise to plumes that have a visual impact outside the site boundary.
The use of primary energy to reduce a plume simply because it is visible is not considered BAT. However, it may be appropriate to use waste or recovered heat. For example, heat in a gas stream prior to wet scrubbing can be used for re-heating the exhaust stream after scrubbing, by means of a gas-gas heat exchanger. The use of energy for exhaust gas re-heat should be balanced against the benefits gained.	Site specific.

Indicative BAT	Installation Activities
For cooling towers, plume abatement may be achieved by combining conductive heat exchange and evaporative cooling, in the design of the tower. The degree of abatement required will depend upon local conditions and the distance from the towers at the nearest sensitive area. Plume modelling should be employed by an applicant to confirm that the visible (condensed) plume will not ground beyond the boundary fence nor reach areas of habitation at a height that will cause significant loss of light. As a guide, the width of the plume should not file an arc, which subtends an angle greater than 10° when viewed vertically from the ground.	There are no cooling towers for the standby diesel generators.

2.2.6. Point source emissions to surface water and sewer

When the UK EPR standby diesel generators are ready to operate, authorisation will have been granted to the station under the Water Resources Act 1991 in respect of non-radiological discharges to water.

The consent will describe the site drainage, including the drainage associated with the Diesel Building, which will correspond to the following specification:

- Plant drainage associated with the diesel generators areas consists of water, which can contain traces of fuel oil, lubricating oil and possibly antifreeze solution. This water is pumped from the bunded areas in the diesel generator buildings to oil separation sumps; there is no direct drainage route from these sumps to the surface water drainage system. These sumps will have to be routinely checked for antifreeze and oil, and, if acceptable, contents will be transferred to the surface water system, for combined discharge to water. If antifreeze or quantities of oil are found in a sump, they will have to be removed and disposed of as a hazardous waste.

2.2.7. Point source emissions to Groundwater

There are no point source emissions to groundwater from the diesel buildings.

2.2.8. Control of Fugitive emissions to air

There will be small emission to air of fuel oil vapour, a saturated hydrocarbon VOC emission, from the vents of the fuel oil storage tanks. During tanker filling operations, vapour will be displaced from the bulk storage tanks supplying diesel generators. There will also be emissions associated with transfer to day storage tanks from the bulk tanks.

The EPR fuel oil tanks are closed vessels equipped with vent for safety purposes. This is considered as BAT with regards to abatement of fugitive emissions to air.

Indicative BAT requirements for fugitive emissions to air concerning dust will be assessed at the site specific stage, since most of the requirements are related to the site design and / or to the Operator's procedures. The diesel generators do not employ coal as a fuel and, as such, does not have the associated dust issues. Table 2.2.6 only assesses Indicative BAT requirements for VOCs.

Table 2.2.6 - Indicative BAT requirements for fugitive emission to air

Indicative BAT	Installation Activities
VOCs	
When transferring volatile liquids, the following techniques should be employed — subsurface filling via (anti-syphon) filling pipes extended to the bottom of the container, the use of vapour balance lines that transfer the vapour form the container being filled to the one being emptied, or an enclosed system with extraction to suitable abatement plant. Vent systems should be chosen to minimise breathing emissions (for example pressure/vacuum valves) and, where relevant, should be lifted with knock-out pots and appropriate abatement equipment. Maintenance of bulk storage temperatures as low a practicable, taking into account changes due to solar heating etc. The following techniques should be used (together or in any combination) to reduce losses from storage tanks at • Atmospheric pressure: • Tank paint with low solar absorbency; • Temperature control; • Tank insulation; • Inventory management; • Floating roof tanks; • Bladder roof tanks; • Pressure/vacuum valves, where tanks are designed to withstand pressure fluctuations; • Specific release treatment (such as absorption condensation).	The fuel oil used for the standby generator will be Class A2/D diesel, which is not considered to be a particularly volatile liquid. The delivery of diesel to the Installation should be an infrequent occurrence due to the limited use of the EDGs and SBOs. The EPR fuel oil tanks are closed vessels, situated inside ventilated buildings, which allows minimum evaporation.

2.2.9. Fugitive emissions to surface water, sewer and groundwater

Operation of the diesel generators involves the storage and handling of fuel and lubricating oil and antifreeze. There is no significant bulk storage or handling of other chemicals on site for the emergency diesel generators use.

Handling of lubricating oil can result in spillage of a limited volume of oil, since refuelling or replacement is generally carried out by transfer from drum or smaller container. Areas, such as rooms in the diesel buildings associated with handling of lubricating oil have protection against spillage in the form of drainage, fitted with oil interception; wherever necessary on site, the Operator will make oil spillage kits available.

It should be noted that antifreeze leakage or spillage within the diesel buildings will be collected into sumps, which are subject to inspection prior to discharge. If antifreeze is found in a sump, then it will be removed and disposed of as a hazardous waste.

The design of reference EPR includes protection against fugitive emissions, which could impact land, water and groundwater. Compliance with the Indicative BAT requirements for fugitive emissions to water, listed in Table 2.2.7, will be addressed at the site specific detailed design stage. Site Environmental Management Policy will include procedures related to inspection of the surfaces and sumps, where needed, under the responsibility of the Operator.

Table 2.2.7 - Indicative BAT requirements for fugitive emission to water

Indicative BAT
1 For **subsurface structures**: • establish and record the routing of all Installation drains and subsurface pipework; • identify all sub-surface sumps and storage vessels; • engineer systems to minimise leakages from pipes and ensure swift detection if they do occur, particularly where hazardous (ie. Groundwater-listed) substances are involved; • provide secondary containment and/or leakage detection for sub-surface pipework, sumps and storage vessels; • establish an inspection and maintenance programme for all subsurface structures, eg. Pressure tests, leak tests, material thickness checks or CCTV. All sumps should: • be impermeable and resistant to stored materials; • be subject to regular visual inspection and any contents pumped out or otherwise removed after checking for contamination; • where not frequently inspected, be fitted with a high level probe and alarm, as appropriate; • be subject to programmed engineering inspection (normally visual, but extending to water testing where structural integrity is in doubt).
2 For **surfacing**: • design appropriate surfacing and containment or drainage facilities for all operational areas, taking into consideration collection capacities, surface thicknesses, strength /reinforcement; falls, materials of construction, permeability, resistance to chemical attack, and inspection and maintenance procedures; • have an inspection and maintenance programme for impervious surfaces and containment facilities; • unless the risk is negligible, have improvement plans in place where operational areas have not been equipped with: – an impervious surface; – spill containment kerbs; – sealed construction joints; – connection to a sealed drainage system.
3 All **above-ground tanks** containing liquids whose spillage could be harmful to the environment should be bunded. For further information on bund sizing and design, see the Releases to water references. Bunds should: • be impermeable and resistant to the stored materials; • have no outlet (that is, no drains or taps) and drain to a blind collection point; • have pipework routed within bunded areas with no penetration of contained surfaces; • be designed to catch leaks from tanks or fittings; • have a capacity greater than 110 percent of the largest tank or 25 percent of the total tankage, whichever is the larger; • be subject to regular visual inspection and any contents pumped out or otherwise removed under manual control after checking for contamination; • where not frequently inspected, be fitted with a high-level probe and an alarm, as appropriate; • where possible, have tanker connection points within the bund, otherwise provide adequate containment; be subject to programmed engineering inspection (normally visual, but extending to water testing where structural integrity is in doubt).
Storage areas for IBCs, drums, bags, etc, should be designed and operated to minimize the risk of releases to the environment. In particular: • Storage areas should be located away from watercourses and sensitive boundaries, (e.g. those with public access) and should be protected against vandalism, • Storage areas should have appropriate signs and notices and be clearly marked-out, and all containers and packages should be clearly labeled, • The maximum storage capacity of storage areas should be stated and not exceeded, and the maximum storage period for containers should be specified and adhered to, • Appropriate storage facilities should be provided for substances with special requirements (e.g. flammable, sensitive to heat or light) and formal arrangements should be in hand to keep separate

Indicative BAT
packages containing incompatible substances (both “pure” and waste), • Containers should be stored with lids, caps and valves secured and in place - and this also applies to emptied containers, • All stocks of containers, drums and small packages should be regularly inspected (at least weekly), • Procedures should be in place to deal with damaged or leaking containers.

2.2.10. Odour

The EPR diesel generators are not considered to have significant odour related environmental impact, even though there will possibly be fumes associated with fuel oil handling and stack emissions during periodic tests and maintenance. The location of the fuel oil tank vents and the emission stacks, ensure that odours due to tank venting or plant operation, should not be noticeable at the site boundary. Detailed impact assessment for the entire station will be prepared at the site specific stage, when the site environment is known.

However, if complaints of odour do arise, a monitoring programme would have to be prepared and implemented by the Operator as part of the investigation, and agreed with the relevant regulatory authority. An assessment of the Installation against the "Indicative BAT requirements for odour control" of the IPPC Technical Guidance Note S0.01 would be performed.

2.3. MANAGEMENT

As a business whose prime activity is the generation of electricity from nuclear power, it will be the duty of the UK EPR Operator, to demonstrate high standards of performance, in a manner that ensures safety and protects the environment.

The Operator will have to ensure compliance with quality and environmental management systems to international standards (e.g. IAEA standards for nuclear safety related activities, ISO 9001:2000 and ISO 14001:2004 for all activities). In particular, the organisation and procedures to comply with the ISO 14001:2004 requirements will be stated. Table 2.3.1 summarises the necessary aspects.

Table 2.3.1 - Clauses of the ISO 14001:2004 environmental standard

SECTION	CLAUSE NUMBER	CLAUSE TITLE
General Requirements	4.1	General requirements
Environmental Policy	4.2	Environmental Policy
Planning	4.3	Planning
	4.3.1	Environmental aspects
	4.3.2	Legal and other requirements
	4.3.3	Objectives, targets and programme
	4.3.4	Environnemental management programme
implementation & Operations	4.4	Implementation & Operations
	4.4.1	Resources, roles, responsibility and authority
	4.4.2	Training, awareness & competence
	4.4.3	Communication
	4.4.4	Documentation
	4.4.5	Control of Documents
	4.4.6	Operational Control
	4.4.7	Emergency preparedness & response
Checking	4.5	Checking
	4.5.1	Monitoring and measurement
	4.5.2	Evaluation of compliance
	4.5.3	Nonconformity, corrective and preventative action
	4.5.4	Control of records
	4.5.5	Internal audit
	4.5.6	Management review

The Operator's quality and environment management system will have to cover all aspects from the description of its organisation, the competences and training of staff and contractors working on site, and the management of incident and non-conformances, to the consideration of Operational Experience worldwide and, the auditing of systems.

The Operator will identify the environmental aspects of activities, including the diesel generators, and will have to ensure that significant health, safety and environment aspects and impacts are identified and assessed in order to minimise the impact, when implementing and operating processes. The Operator will also be responsible for identifying opportunities for enhancement.

The environmental aspects that will be assessed are those discussed in the different sections of the PCER. The diesel generators' operational specifications will be described in written procedures. Maintenance and periodic testing will ensure that the generators' characteristics will be kept within the limits provided in the PPC permit.

Finally, it will be the Operator's responsibility to answer how management systems meet the BAT requirements for Management techniques indicated in Combustion Sector Guidance Note S1.01, V2.03, and summarised in Table 2.3.2.

Table 2.3.2 - Indicative BAT requirements for management techniques

Indicative BAT
Operations and maintenance
Effective operational and maintenance systems should be employed on all aspects of the process whose failure could impact on the environment, in particular there should be: • Demonstration of top management's commitment to, and role in such systems; • Documented procedures to control operations that may have an adverse impact on the environment; • A defined procedure for identifying, reviewing and prioritising items of plant for which a preventative maintenance regime is appropriate; • Documented procedures for monitoring emissions or impacts; • A preventative maintenance programme covering all plant, whose failure could lead to impact on the environment, including regular inspection of major "non productive" items such as tanks, pipework, retaining walls, bunds ducts and filters. The maintenance system should include auditing of performance against requirements arising from the above and reporting the result of audits to top management.
Competence and training
Training systems should be in place for all relevant staff and cover the following items: • Awareness of the regulatory implications of the Permit for the activity and their work activities; • Awareness of all potential environmental effects from operation under normal and abnormal circumstances; • Awareness of the need to report deviation from the Permit; • Prevention of accidental emissions and action to be taken when accidental emissions occur.
The skills and competencies necessary for key posts should be documented and records of training needs and training received for these posts maintained.
The key posts should include contractors and those purchasing equipment and materials.
The potential environmental risks posed by the work of contractors should be assessed and instructions provided to contractors about protecting the environment while working on site.
Where industry standards or codes of practice for training exist (e.g. WAMITAB) they should be complied with.
Accidents / Incidents / Non-conformance
There should be an accident plan, as described in Section 2.8 of the Guidance, which: • Identifies the likelihood and consequence of accidents; • Identifies actions to prevent accidents and mitigate any consequences.

Indicative BAT
There should be written procedures for handling, investigating, communicating and reporting actual or potential non-compliance with operating procedures or emission limits.
There should be written procedures for handling, investigating, communicating and reporting environmental complaints and implementation of appropriate actions.
There should be written procedures for investigating incidents, (and near misses) including identifying suitable corrective action and following up.
Organisation
The following are indicators of good performance which may impact on the Regulator's resources, but not all will necessarily be insisted upon as Permit conditions:
The company should adopt an environmental policy and programme which: • Includes a commitment to continual improvement and prevention of pollution; • Includes a commitment to comply with relevant legislation and other requirements to which the organisation subscribes; • Identifies, sets, monitors and reviews environmental objectives and key performance indicators independently of the Permit.
The company should have demonstrable procedures (e.g. written instructions) which incorporate environmental considerations into the following areas: The control of process and engineering change on the Installation Design, construction and review of new facilities and other capital projects (including provision for their decommissioning).
Capital approval.
Purchasing policy.
The company should conduct audits, at least annually, to check that all activities are being carried out in conformity with the above requirements. Preferably, these should be independent.
The company should report annually on environmental performance, objectives and targets, and future planned improvements. Preferably, these should be published environmental statements
The company should operate a formal Environmental Management System. Preferably, this should be a registered or certified EMAS/ISO 14001 system (issued and audited by an accredited certification body).
The company should have a clear and logical system for keeping records of, amongst others: • Policies; • Roles and responsibilities; • Targets; • Procedures; • Results of audits; • Results of reviews.

2.4. RAW MATERIALS

The raw materials used by the diesel generators are listed and described below the handling and storage arrangements are described in Section 2.1.1.

2.4.1. Raw Materials Selection

All raw materials used on the UK EPR site will have Material Safety Data Sheets, which will be stored accordingly to the station Management System. These sheets will list the properties of raw materials and branded products used on the site and include toxicological and ecological data with information on suitable disposal routes.

The main types of raw materials related to diesel generators to be taken into account are:

- Fuel oil: class A2/D according to the BS 2869 will be use for the standby emergency diesel generators (see Section 2.1). The approximate consumption will be 145te per year;

- Lubricating oil: for the operation diesel generator; standard lubricating oil type SAE 40 is recommended. The amount of oil used per annum depends of the chemical analysis performed on samples that will be regularly taken, whose results may or may not lead to the emptying of the motors;

- Antifreeze: the product used for the diesel generators is a mix of ethylene glycol and water (50/50);

- Lead/acid batteries: these components are used for the supply of the speed governor of the SBO generators.

In some cases raw material alternatives could be identified, the use of which may have reduced environmental impact. However, for the EPR design, the selection of currently used raw material is considered justified, based on the following criteria:

- The use of diesel generators rather than gas fired generators is based on the experience feedback available on the French fleet, which has shown that this equipment is highly reliable and well-tried. Moreover the use of compressed gaseous fuel with pipes would introduction new hazards to the site, and

- Considering the recent reduction in the sulphur content of Class A2/D fuel oil under SI 2000/1460, the benefit of using kerosene, Class C2, rather than Class A2/D fuel oil, appears very small. This could be reconsidered at the procurement stage, with regards to the limits of sulphur in force at that time.

Table 2.4.1 - Indicative BAT requirements for material selection

Indicative BAT	Installation Activities
The Operator should maintain a list of raw materials and their properties as noted above.	There will be Material Safety Data Sheets for all raw materials in the station Management System. This system will list the properties of all raw materials and branded products used on the site and provide toxicological and ecological data and information on suitable disposal routes.

Indicative BAT	Installation Activities
The Operator should have procedures for the regular review of new developments in raw materials and for the implementation of any suitable ones with an improved environmental profile	To be considered at the site specific stage.
The Operator should have quality-assurance procedures for controlling the impurity content of raw materials.	This is a site specific issue.
The Operator should complete any longer-term studies needed into the less polluting options and should make any material substitutions identified.	To be considered at the procurement and site specific stage.

2.4.2. Waste Minimisation Audit (minimising the use of raw materials)

As specified in the Combustion Sector Guidance Note S1.01 a waste minimisation audit will have to be carried out at least every four years by the Operator. For a new station a first audit will have to be carried out within 2 years of the issue of the Permit.

Therefore it will be the responsibility of the Operator to compare the Installation's performance with Indicative BAT requirements for waste minimisation audits (see Section 2.4;2 of the Combustion Sector Guidance Note), and to look for opportunities for improvements in the overall waste produced by the station, in particular by the diesel generators. It should be noted that, minimising waste from the diesel generators should not result in the reduction of the EDGs and SBOs reliability for lack of maintenance.

Table 2.4.2 - Indicative BAT requirements for waste minimisation audits

Indicative BAT
The Operator should carry out a waste minimisation audit at least every 4 years. If an audit has not been carried out in the 2 years prior to submission of the application, and the details made known at the time of the application, then the first audit shall take place within 2 years of the issue of the Permit. The methodology used and an action plan for reducing the use of raw materials should be submitted to the Regulator within 2 months of completion of the audit. The audit should be carried out as follows: The Operator should analyse the use of raw materials, assess the opportunities for reductions and provide an action plan for improvements using the following three essential steps: • process mapping; • materials mass balance; • action plan.
The use and fate of raw and other materials, including by-products, solvents and other support materials, such as fuels, catalysts and abatement agents, should be mapped onto a process flow diagram (see the *Waste minimisation support references*). This should be achieved by using data from the raw materials inventory and other company data as appropriate. Data should be incorporated for each principal stage of the operation in order to construct a mass balance for the Installation
Using this information, opportunities for improved efficiency, changes in process and waste reduction should be generated and assessed. An action plan should then be prepared for implementing improvements to a timescale approved by the Regulator.

2.4.3. Water Use

As mentioned in Section 2.1.1 there is no use of water for the operation of the EPR diesel generators.

Therefore no further assessment needs to be performed in the frame of the PPC application for EDGs and SBOs concerning this Section of the Combustion Sector Guidance Note - S1.01.

2.5. WASTE HANDLING

As mentioned in PCER sub-Chapter 3.3 waste handling will be part of the Site Environment Management System (EMS). The EMS shall comply with the requirements in UK legislation and seek to implement best practices for achieving more than basic compliance.

A specific area for waste storage will be included in the site, which will allow the storage and dispatch of the different types of waste.

Waste arising from the operation of standby diesel generators will be handled together with the other non-radioactive waste, thereby subject to segregation, storage, reuse or disposal, as presented in PCER sub-Chapter 3.3.

The standby diesel generators contribution to particular streams is as follows:

- Antifreeze;
- Fuel Oil;
- Lead Acid Batteries (for SBOs only);
- Lubricating Oil (minor contribution);
- Mixed Dry Chemical Waste; and
- Oily Rags.

There will also be occasional contributions to other waste streams due, for example, to the disposal of the diesel building fluorescent lamps.

The detailed handling and disposal arrangements for each of these waste streams will be addressed in the station implementation document, with the following described:

- Waste description and its EWC code;
- Primary disposal/transfer route on site;
- Secondary disposal if applicable;
- Management arrangements for this waste stream on site and any specific handling requirements;
- Registered Waste Carrier;
- Offsite disposal method, site and licence; and
- Any special requirements.

Disposal methods for station wastes will have to be reviewed as better environmental options become available, and waste will have to be recovered where practical.

Table 2.5.1 - Indicative BAT requirements for waste handling

Indicative BAT	Installation Activities
Characterisation and quantification of each waste stream, and description of measures for waste management, storage and handling.	This requirement will be the responsibility of the Operator.
A system should be in place and maintained which records the quantity, nature and origin of any waste that is disposed of or recovered. Also, where relevant, the destination, frequency of collection, mode of transport and treatment method for those wastes.	The system will be the responsibility of the EPR station's Operator.
Wastes should be segregated wherever practicable, and the disposal routes identified. Disposal should be as near to the point of generation as is practicable.	This requirement will be addressed at the site specific stage.
Records should be maintained of any waste sent off-site (Duty of care).	Records will have to be maintained by the EPR station Operator.
All appropriate steps should be taken to prevent emissions from waste storage or handling (e.g. liquid or solid spillage, dust or VOC emission, and odour).	The standby diesel generators will not produce waste streams having significant emissions, such as dust or odour. Spillage kits will be located in all handling areas and the waste storage area shall have containment for spills.
The remaining BAT requirements are considered to apply only to coal / heavy oil fired plant and are therefore not addressed herein.	Not applicable.

2.6. WASTE RECOVERY OR DISPOSAL

Waste recovery or disposal will be part of the waste management addressed in Section 2.5 above and in PCER sub-Chapter 3.3.

It will be the responsibility of the station Operator to compare the Installation's performances to the Indicative BAT requirement (see Table 2.6.1), as applicable to the diesel generators.

Table 2.6.1 - Indicative BAT requirements for waste recovery or disposal

Indicative BAT
Description of the manner in which each waste stream is recovered or disposed of.
Waste should be recovered, unless it is technically or economically impractical to do so.
Where waste must be disposed of, the Operator should provide a detailed assessment identifying the best environmental options for waste disposal unless the Regulator agrees that this is unnecessary. For existing disposal activities, this assessment may be carried out as an improvement condition on a timescale to be approved by the Regulator.
For Installations burning solid and some liquid fuels, ash will often be the major waste produced. Accordingly the Operator should consider alternative technically and economically feasible uses, for these. For example bottom ash can be used as an aggregate and PFA can be used in cement manufacture and for other construction products. Other by-product streams, such as FGD gypsum manufacture can also be used in the construction sector.
Where disposal occurs, the Operator should justify why recovery is technically or economically not feasible.
The Operator shall regularly audit the waste disposal / recovery routes to ensure that their waste is being properly handled and dealt with.
The remaining BAT requirements apply only to coal or heavy oil fired plant.

2.7. ENERGY

This Section summarises the information available at the GDA stage on the energy impacts from the PPC Installation. It is acknowledged that further guidance is given in the "Horizontal Guidance Note IPPC H2 Energy Efficiency".

It is not know at the GDA stage whether the Operator or the UK EPR will be a participant to a Climate Change Agreement (CCA) or a Direct Participant Agreement (DPA) within the Emissions Trading Scheme (ETS). In all cases, the Technical Combustion Sector Guidance Note requires that the Operator meet the basic energy requirements mentioned in its Sections 2.7.1 and 2.7.2.

On this basis, this section provides information on the following:

- Basic energy requirements (1): Energy consumption and specific energy consumption; and
- Basic energy requirements (2): Energy management and efficiency techniques.

2.7.1. Basic Energy Requirements (1)

Energy Consumption

The PPC combustion activities are limited to the diesel generators. Annual energy consumption information will be provided, and reported to demonstrate compliance with the Greenhouse Gas Emissions Permit of the Operators if any.

Small quantities of electrical power may be used to operate the facilities, but these are negligible.

Energy Production

All the electricity produced from loaded test runs will be exported to the grid with that generated by the reactor, but this is minor and will not be measured separately.

Table 2.7.1 - Estimated annual energy balance for the EPR diesel generators

Energy source	**Estimated energy consumption & production**			
	Delivered (Tonnes)	Thermal (MWh)	Electrical (MWh)	% of total
EDGs + SBOs	145	1,500	600	100%
Electricity	*n/a*	negligible	n/a	n/a

Specific Energy Consumption

The diesel generators are not used to support a production process or to convert raw materials. It is therefore not possible to provide data on Specific Energy Consumption.

Environmental Emissions

Environmental Emissions linked to the combustion of fuel oil are addressed in Section 2.2 of the present document. No other data is available at this stage, in particular on annual CO_2 emission.

This Section of the Combustion Sector Guidance Note will be further addressed at the site specific stage.

2.7.2. Basic Energy Requirements (2)

Many of the Indicative BAT issues identified in the guidance note H2 Energy efficiency for IPPC are more appropriate to activities that consume power on a near continuous basis, such as chemical plant or the iron and steel industry, rather than stand-by power generation. For this reason, no Indicative BAT tables have been included in this energy section. Nevertheless, the following sections consider how energy consumption is minimised.

Operating, Maintenance and Housekeeping Measures

The energy consumption of the emergency diesel generators will be minimised since they will not run more than required by the planned nuclear safety related periodic tests to prove reliability, planned maintenance and qualification tests in case of modification.

There will be optimisation of fuel efficiency via emission testing as much as is possible, as long as this does not require a significantly longer operating period. Due to the low operational hours for the diesel generators, the payback period for any additional energy efficiency measures would be considerable. This approach is deemed to be BAT.

Energy Management Techniques

The diesel generators are designed to supply a specific standby or essential power need, and as such each operates for a small percentage of the time for testing purposes. For this reason, energy management techniques such as monitoring energy flows or targeting areas for reduction are not anticipated to be appropriate.

Energy Management Plan

Due to the low operational hours and the most important attribute of the diesel generators being reliability, no additional Energy Management Plan seems worthwhile. The generators are designed and should operate for 60 years.

2.7.3. Further energy-efficiency requirements

This section of the Technical Guidance Note for Combustion Sector is not considered relevant for the standby diesel generators.

Nevertheless, it may be stated that periodic reviews will be undertaken to assess the efficiency / feasibility of the use of more modern fuels.

2.8. ACCIDENTS

This section will describe the mechanisms developed by the Operator to enable the identification, assessment, management and mitigation of hazards associated with the activities undertaken at the Installation under normal operation and abnormal operating conditions.

As mentioned in PCER sub-Chapter 3.3, the analysis related to the Control of Major Accident Hazards (COMAH) within GDA concludes that no further COMAH application is necessary (based on the preliminary data of substances kept on site). Nevertheless, a new analysis will be performed when the site facilities are fully defined.

It will be necessary, at the site specific stage, to produce a more detailed accident analysis, once the site facilities and the site environment are known. This analysis will cover accidents and their consequences, including spills and abnormal operation, taking into consideration the methodology proposed in Combustion Sector Guidance Note S1.01.

The analysis already performed in PCER sub-chapter 3.3 includes the fuel oil tanks for the diesel generators.

Typical Hazardous Events that could be addressed at the site specific stage are:

- Significant loss fuel oil during delivery;
- Damage to the fuel oil tanks and bunds through accidental rupture or spontaneous failure of tank, leading to loss of oil tank contents;
- Loss of fuel oil from distribution system during transfer from the bulk storage tanks to the day storage tanks;
- Loss of fuel oil from distribution system during transfer from the day storage tanks to the burner;
- Fire / explosion of combustible materials, including fuel oil;
- Loss of antifreeze during delivery / storage / dispensing.

2.9. NOISE

Noise and vibration sources for the entire UK EPR installation, which include the diesel generators, are presented in PCER Chapter 3. As mentioned in PCER Chapter 12, detailed assessment of the impact of noise is a site specific issue.

The detailed assessment will be performed taking into account the actual site environment. Where noise issues are likely to be relevant, the Technical Guidance Note for the Combustion Sector (S1.01) will be followed, and thus H3 Part 1 Noise shall be consulted and information on the following will be provided:

- The main sources of noise and vibration that will fall within the IPPC Installation and also any less frequent sources of noise and vibration;
- The nearest noise-sensitive sites;
- Conditions or limits on noise / vibration imposed by other regimes;
- The local noise environment; and
- Any environmental noise measurement surveys, modelling, or any other noise measurements, and any specific local issues and proposals for improvements.

2.9.1. Sources of Noise

The activity of the UK EPR, which falls within the scope of the PPC application, is the operating of the emergency diesel generators. It should however be noted that, as a standby facility, they are only intermittently operational for test purposes, and noise associated with their activity is therefore also intermittent.

Test run frequency and duration will be a requirement of the nuclear safety case. The foreseen cumulated duration of all diesel generators' test run is around 100 hours per year.

Only in case of grid connection loss, emergency generators would have to be operated continuously until the connection is restored, which could be several days; the associated noise would thus be continuous.

2.9.2. Noise Receptors and Sensitive Sites

Noise receptors and sensitive sites will be identified at the site specific stage.

2.9.3. Noise Measurements and Monitoring

Environmental surveys of noise will be undertaken outside the Installation boundary if required, this being a site specific issue.

2.9.4. Complaint History

Complaints and other communications with external parties are site specific issues, which will be covered by the site’s procedures.

2.9.5. Initial Risk Assessment

During their operation the diesel generators do have the potential to disturb sensitive receptors in the proximity of the site. However the risk is minimised through the following measures:

- The standby diesel generators are housed in concrete buildings which offers significant attenuation of the noise generated through combustion operations, while engine exhausts are equipped with silencers at the stack level;
- The diesel generators will be part of the site routine maintenance programme and, as such, shall be maintained to a high standard that is reflective of the operational control required at a nuclear power station; and
- The intermittent nature the diesel generators operation is such, that noise is not generated on a continual basis; where periodic tests and maintenance are required, they should be planned within daylight hours where possible, to minimise potential disturbance to local residents.

2.9.6. Assessment of BAT

The PPC Regulations require Installations to be operated in such a way that "all the appropriate preventative measures are taken against pollution, in particular through the application of BAT". The definition of pollution within the Sector Guidance Note includes "emissions that may be harmful to human health or quality of the environment, cause offence to human senses or impair or interfere with amenities and other legitimate uses of the environment".

Although the diesel generators do have the potential to disturb sensitive receptors during testing operation, they do operate for relatively short periods during the year and all reasonable measures to minimise noise levels will have to be taken by the Operator, as presented in Section 2.9.1 above.

It can therefore be concluded that there will be "no pollution" relating to noise as defined in the PPC Regulations, and no further assessment is proposed. The Installation's performance will be compared with Indicative BAT requirements as given in Table 2.9.1.

Table 2.9.1 - Indicative BAT requirements for noise

Indicative BAT	Installation Activities
Identification of the main sources of noise and vibration (including infrequent sources), the nearest noise-sensitive locations and relevant environmental surveys which have been undertaken and the techniques and measures used for the control of noise.	Refer to Section 2.9.1 above.
The Operator should employ basic good practice measures for the control of noise, including adequate maintenance of any parts of plant or equipment whose deterioration may give rise to increases in noise.	This requirement will be addressed at the site specific stage by the Operator.
The Operator should also employ such noise control techniques to ensure that the noise from the Installation does not give rise to reasonable cause for annoyance, in the view of the Regulator and, in particular, should justify where either Rating Levels (Laeq,T) from the Installation exceed the numerical value of the Background Sound Level (LA90,T).	The techniques employed at the EPR design stage to minimise the noise are the followings: - The generators are housed in concrete buildings. - The stacks of the generators are equipped with silencers. Rating Levels are a site specific issue.

Indicative BAT	Installation Activities
Further justification will be required should the resulting field rating level (LAR,TR) exceed 50 dB by day and a façade rating level exceed 45 dB by night, with day being defined as 07.00 to 23.00 and night 23.00 to 07.00.	Site specific issue, depending on the results of the Rating Levels result above.
In some circumstances “creeping background’ may be an issue. Where this has been identified in pre-application discussions with the local authority, the Operator should employ such noise control techniques as are considered appropriate to minimise problems to an acceptable level within the BAT criteria.	Site specific stage issue.
Noise surveys, measurement, investigation (which can involve detailed assessment of sound power levels for individual items of plant) or modelling may be necessary for either new or existing Installations depending upon the potential for noise problems. Operators may have a noise management plan as part of their management system.	This requirement will be under the Operator's responsibility.

2.10. MONITORING

2.10.1. Emissions Monitoring

As mentioned in PCER Chapter 7, a monitoring program for the EPR emissions to air will be developed, taking into account the requirements of UK legislation and EU directives, and will be in line with EA Monitoring Certification Scheme (MCERTS), where relevant standard and procedures exist.

Monitoring and reporting of emissions to air

As far as emissions to air are concerned, sulphur and nitrogen oxides present in the exhaust gases from the diesel generators will be discharged. It may be stated that, due to the intermittent nature of standby diesel generator, the emissions will not be continuous. The PPC permit will specify the continuous emission monitoring and extractive test monitoring that is required, in accordance with Environment Agency guidance, including:

- Technical Guidance Note M1 – Sampling requirements for monitoring stack emissions to air from industrial Installations;
- Technical Guidance Note M2 – Monitoring of stack emissions to air.

The type of monitoring required (which can range from occasional extractive sampling to continuous emission monitoring) will be determined in accordance with this guidance and the quantities and frequency of pollutant releases. Monitoring will also be considered as part of the generators procurement, as some generators may already be provided (or not) with monitoring equipment.

Monitoring and reporting of emission to water and sewer

No discharges are made from the diesel generators Installation to water or to sewer.

Monitoring and reporting of waste emissions

The monitoring and reporting of waste emissions is described in Section 2.6.

Table 2.10.1 - Indicative BAT requirements for emissions monitoring

Indicative BAT	Installation Activities
Monitoring should generally be undertaken during all phases of operation (i.e. commissioning, start-up, normal operation and shutting-down) unless the Regulator agrees that it is inappropriate.	For EDGs and SBOs, the engines start-up and shut down within a very short period of time, and monitoring is therefore not considered necessary,unless explicitly required.
Continuous monitoring (or at least sampling in the case of water) and recording are likely to be required under the following circumstances: • Where the potential environmental impact is significant or the concentration of substance varies widely; • Where a substance is abated continuous monitoring of the substance is required to show the performance of the abatement plant. For example continuous monitoring of dust is needed after a fabric filter to show the effectiveness of the filter and indicate when maintenance is needed, or sampling BOD from an	Continuous monitoring of air emissions is not considered to be appropriate at the Installation due to the intermittent and limited operation of the equipment. Continuous Emission Monitors (CEMs) would be redundant for much of the year whilst the EDGs and SBOs are in stand-by mode. All discharges to water from the site will be made in accordance with the discharge consent. This is not specific to the PPC permit,

Indicative BAT	Installation Activities
effluent treatment plant; • Where other control measures are required to achieve satisfactory levels of emission (e.g. material selection).	since the contribution of EGDs and SBOs to discharges to water is not significant, and is collected in the overall water treatment system.
Where effective surrogates are available, they may be used to minimise monitoring costs.	Not considered to be applicable.
Where monitoring shows that substances are not emitted in significant quantities, it may be possible to reduce monitoring frequency.	Not considered to be applicable.
Monitoring and reporting of Emissions to Air	
Where appropriate, periodic visual and olfactory assessment of releases should be undertaken to ensure that all final releases to air should be essentially colourless, free from persistent trailing mist or fume and free from droplets.	Site specific issue.
Many plants in this sector will be subject to the detailed monitoring requirements of Annex VIII of the Large Combustion Plant Directive (LCPD).	Not applicable.
Monitoring and reporting of emissions to water and sewer	
For combustion plants co-incinerating waste and operating air pollution control equipment with an aqueous discharge, Operators should comply with Article 8 or Annexes III and IV of the Waste incineration Directive[2] (WID).	Not applicable to the diesel generators Installation.
The Operator should also have a fuller analysis carried out covering a broad spectrum of substances to establish that all relevant substances have been taken into account when setting the release limits. This should cover the substances listed in Schedule 5 of the Regulations, unless it is agreed with the Regulator that they are not applicable. The need to repeat such a test will depend upon the potential variability in the process and, for example, the potential for contamination of raw materials. Where there is such potential, tests may be appropriate.	The contribution of the emissions of the diesel generators to water and sewer is considered as not significant. Further analysis will have to be carried out by the Operator at the site specific stage.
Any substances found to be of concern, or any other individual substances to which the local environment may be susceptible and upon which the operations may impact, should also be monitored more regularly. This would particularly apply to the common pesticides and heavy metals. Using composite samples is the technique most likely to be appropriate where the concentration does not vary excessively.	Not considered to be applicable.
Monitoring and reporting of waste emissions	
For waste emissions, the following should be monitored and recorded: • The physical and chemical composition of the waste; • Its hazard characteristics; • Handling precautions and substances with which it cannot be mixed.	Waste from the EDGs and SBOs will be recorded as a contribution to the total waste generated from the Installation activities. This record will be maintained as part of the overall management of the power station, under the Operator's responsibility.

[2] Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste. Official Journal of the European Communities 28.12.2000 L232/91

2.10.2. Environmental Monitoring (beyond the Installation)

As explained in PCER Chapter 12, a site-specific protection and monitoring programme will be established to monitor the environment around the UK EPR site. The exact extent of the monitoring programme will be dependent on the particular characteristics of the area in and around the selected EPR site. The air monitoring required (if any) will be determined taking into account the air quality impact assessment carried out for the Installation in accordance with H1, the conclusions of the local air quality strategy, the existence and location of any air quality management areas, any sensitive local receptors, the DEFRA national guidance and the relevant Environment Agency guidance, including:

- Technical Guidance Note M8 – Environmental Monitoring Strategy – Ambient air
- Technical Guidance Note M9 – Monitoring methods for ambient air

Table 2.10.2 - Indicative BAT requirements for environmental monitoring (Beyond Installation)

Indicative BAT	Installation Activities
Describe the proposed measures for monitoring emissions, including any environmental monitoring, and the frequency, measurement methodology and evaluation procedure proposed.	Site specific information.
The Operator should consider the need for environmental monitoring to assess the effects of emissions to controlled water, groundwater, air or land, or emissions of noise or odour.	The emissions from the Installation will be intermittent and probably of limited environmental impact. Nevertheless this has to be confirmed during the site-specific stage by the detailed impact assessment. Emissions to water will be monitored in accordance with the discharge consent. The limits set out in the consent capture all potentially significant substances that could be discharged from the nuclear power plant. Environmental monitoring beyond the Installation will probably not be considered to be appropriate, given the low level and chemical nature of aqueous discharges from the Installation. The processes operated at the Installation are inherently non-odorous, and therefore monitoring of the odour beyond the site boundary is not considered to be appropriate. Although combustion engines do generate noise, the location and containment of the engines within solid structures and buildings maintains an effective barrier between the source and the receptor.
Environmental monitoring may be required, for example, when: • There are vulnerable receptors; • The omissions are a significant contributor to an Environmental Quality Standard (EQS) that may be at risk; • The Operator is looking for departures from standards based on lack of effect on the environment; • To validate modelling work. To inform operating conditions, through direct linking of ambient monitoring station real time outputs to the	Site specific information.

Indicative BAT	Installation Activities
plant control room, e.g. to inform the choice of fuel/switching to low sulphur fuels when weather conditions and monitoring indicates that an EQS may be at risk.	
The need should be considered for: • Groundwater, where it should be designed to characterise both quality and flow and take into account short- and long-term variations in both. Monitoring will need to take place both up-gradient and down-gradient of the site; • Surface water, where consideration will be needed for sampling, analysis and reporting for upstream and downstream quality of the controlled water; • Air, including odour; • Land contamination, including vegetation, and agricultural products; • Assessment of health impacts; • Noise.	Site specific information.
Where environmental monitoring is needed, the following should be considered in drawing up proposals: • Determination to be monitored, standard reference methods, sampling protocols; • Monitoring strategy, selection of monitoring points, optimisation of monitoring approach; • Determination of background levels contributed by other sources; • Uncertainty for the employed methodologies and the resultant overall uncertainty of measurement; • Quality assurance (QA) and quality control (QC) protocols, equipment calibration and maintenance, sample storage and chain of custody / audit trail; • Reporting procedures, data storage, interpretation and review of results, reporting format for the provision of information for the Regulation.	Site specific information.

2.10.3. Monitoring of Process Variables

The Installation will monitor process variables that may affect emissions to the environment through plant operation or direct discharge. The relevant variables will be defined, in line with Indicative BAT requirements.

Typical proposed process variables that could be monitored are:

- Hours of operation;
- Consumption of fuel oil;
- Consumption of lubricants and cleaning chemicals (in the frame of the station balance of substance consumption).

Table 2.10.3 - Indicative BAT for process variables

Indicative BAT	Installation Activities
Describe the proposed measures for monitoring emissions, including any environmental monitoring, and the frequency, measurement methodology and evaluation procedure proposed.	To be considered at the site specific stage, depending on the impact assessment results.
Some process variables may affect the environment and these should be identified and monitored as appropriate. Examples might be: • For solid and liquid fuel fired plants, fuel feedstock should be sampled and analysed at a frequency and manner appropriate to the type of plant concerned; • Differential pressure across abatement equipment which can indicate removal efficiency, filter failures, etc • Potential difference across EP plates; • Reagent injection or feed rates; • Oxygen content of flue gas.	Since January 2008, fuel to be used in diesel generators' engines must contain less than 0.1% sulphur. This will limit the amount of sulphur released to the atmosphere during combustion and therefore reduces the environmental impacts associated with higher SO2 concentrations in the environment. Flue gas temperature of the EDGs shall be monitored during testing to ensure combustion temperatures are at an appropriate level to maintain full combustion with maximum efficiency therefore reducing the likelihood of higher pollutant concentrations, particularly CO, particulate matter and VOCs.

2.10.4. Monitoring Standards (Standard Reference Methods)

To be completed at the site specific stage.

Table 2.10.4 - Indicative BAT requirements for monitoring standards (Standard Reference Methods)

Indicative BAT	Installation Activities
Describe the proposed measures for monitoring emissions, including any environmental monitoring, and the frequency, measurement methodology and evaluation procedure proposed.	Site specific.
As far as possible, Operators should ensure their monitoring arrangements comply with the requirements of MCERTS where available, for example using certified instruments and equipment, and using a stack testing organisation accredited to MCERTS standards. Where the monitoring arrangements are not in accordance with MCERTS requirements, the Operator should provide justification and describe the monitoring provisions in detail. See MCERTS approved equipment for future information on MCERTS and a listing of MCERTS equipment.	Site specific.
Sampling and Analysis Standards	

Indicative BAT	Installation Activities
The analytical methods given in *Appendix 1* of the Guidance should be used. If other substances need to be monitored the standard should be selected in the order of priority as given in the IPPC. • Bureau's Reference Document on the General Principles of Monitoring. This order is: • Comité Européen de Normalisation (CEN); • International Standardisation Organisation (ISO). If the substance cannot be monitored using CEN or ISO standards then a method can be selected from any one of the following: • American Society for Testing and Materials (ASTM); • Association Française de Normalisation (AFNOR); • British Standards Institution (BSI); • Deutsches Institute fur Normung (DIN); • United States Environmental Protection Agency (US EPA); • Verein Deustcher Ingenieure (VDI). If the substance cannot be monitored using any of the standards above then other methods may be adapted for use, following the requirements for validation in ISO 17025. For stack emission monitoring the following occupational methods may be adapted: • Methods for the Determination of Hazardous Substances (MHDS) series published by the Health and Safety Executive (HSE); • National Institute for Occupational Safety and Health (NIOSH); • Occupational Safety and Health Administration (OSHA). The intended application of the standard method must always be taken into account. For example, a CEN method may be less suitable than another less rigorously validated standard method if the application is not one for which the CEN method was developed. Operators should be expected to be able to demonstrate compliance with the above hierarchy and validate use of non-standard methods, in-house designed/developed methods, standard methods used outside their intended scope and modifications of standard methods to confirm that these methods are fit for purpose. These procedures will be formalised under forthcoming European standards.	The analytical methods will have to be defined by the station's Operator.
Further guidance on standards for monitoring gaseous releases relevant to IPC/IPPC is given in the Monitoring Guidance. A series of updated Guidance Notes covering this subject is being prepared. This guidance specifies manual methods of sampling and analysis that will also be suitable for calibration of continuous emission monitoring instruments. Further guidance relevant to water and waste is available from the publications of the Standing Committee of Analysts.	
If in doubt the Operator should consult the Regulator.	

2.11. CLOSURE

The EPR power plant will be designed and built for a 60 year operation period. Shutting down and decommissioning of emergency diesel generators will be part of the Site Closure and the NPP Decommissioning Plan..

Diesel generators will be taken out of service when no longer required to provide backup power supply to safety related activities, once the nuclear fuel has been removed from the fuel building into the interim storage.

Although it is not practicable to develop a precise decommissioning plan for the standby generators at this time, the approach will be based on existing plant closure and demolition methodologies for diesel fuelled power plants. These methodologies cover demolition of the plant and buildings and removal of uncontaminated, contaminated and hazardous material from the site. It is likely that there will be a continuous improvement in these methodologies over the station life, and the best practice at the time of site closure will be employed.

Much of the diesel generators are made of metal suitable for recycling and some items may be suitable for re-use. It is probable that some of the diesel generators will be at the end of its useful operating life, will be obsolete and unsuitable for further use, and may need to be dismantled for recycling. Decisions on re-use of plant items, recycling of materials or their disposal as waste will be made at the time of decommissioning, in the light of the technology then available, economic considerations and legislation.

The Installation's performance assessment for closure will be performed against Indicative BAT requirements presented in Table 2.11.1.

Table 2.11.1 - Indicative BAT requirements for closure

Indicative BAT	Installation Activities
Operations during the IPPC Permit	
Operations during the life of the IPPC Permit should not lead to any deterioration of the site if the requirements of the other sections of this and the specific-sector notes are adhered to. Should any instances arise which have, or might have, impacted on the state of the site, the Operator should record them along with any further investigation or ameliorating work carried out. This will ensure that there is a coherent record of the state of the site throughout the period of the IPPC Permit. This is as important for the protection of the Operator as it is for the protection of the environment. Any changes to this record should be submitted to the Regulator.	To be addressed at the site specific stage.
Steps to be taken at the design-and-build stage of the activities	
Care should be taken at the design stage to minimise risks during decommissioning. For existing Installations, where potential problems are identified, a programme of improvements should be put in place to a timescale agreed with the Regulator. Designs should ensure that: - underground tanks and pipe work are avoided where possible (unless protected by secondary containment or a suitable monitoring programme); - there is provision for the draining and clean-out of vessels and pipe work prior to dismantling;	As presented in PCER Chapter 5, decommissioning is taken into consideration in the EPR Installation design.

Indicative BAT	Installation Activities
- lagoons and landfills are designed with a view to their eventual clean-up or surrender; - insulation is provided that is readily dismantled without dust or hazard; - materials used are recyclable (having regard for operational or other environmental objectives).	
The site-closure plan	
A site closure plan should be maintained to demonstrate that, in its current state, the Installation can be decommissioned to avoid any pollution risk and return the site of operation to a satisfactory state. The plan should be kept updated as material changes occur. Common sense should be used in the level of detail, since the circumstances at closure will affect the final plans. However, even at an early stage, the closure plan should include: - either the removal or the flushing out of pipelines and vessels where appropriate and their complete emptying of any potentially harmful contents; - plans of all underground pipes and vessels; - the method and resource necessary for the clearing of lagoons; - the method of ensuring that any on-site landfills can meet the equivalent of surrender conditions; - the removal of asbestos or other potentially harmful materials unless agreed that it is reasonable to leave such liabilities to future owners; - methods of dismantling buildings and other structures, see Closure references which gives guidance on the protection of surface and groundwater at construction and demolition-sites testing of the soil to ascertain the degree of any pollution caused by the activities and the need for any remediation to return the site to a satisfactory state as defined by the initial site report.	The Baseline Decommissioning Plan of the EPR site will be prepared at a later stage, in accordance with licensing requirements, and will address these requirements as much as practicable.
For existing activities, the Operator should complete any detailed studies, and submit the site closure plan as an improvement condition to a timescale to be agreed with the Regulator but in any case within the timescale given in Section 1.1 (Note that radioactive sources are not covered by this legislation, but decommissioning plans should be coordinated with responsibilities under the Radioactive Substances Act 1993.)	The final site closure plan will be prepared when the decision to decommission the site has been taken, on a timescale agreed with the regulator.

2.12. INSTALLATION ISSUES

The EDGs and SBOs are facilities dedicated to a single EPR Unit.

Hence, it will not be possible to minimise environmental impacts to the environment as a whole, via joint operation with other permit holders.

3. EMISSIONS

3.1. EMISSIONS INVENTORY

The Environment Agency IPPC Technical Guidance Note (IPPC S1.01) for the Combustion Sector gives guidance on release concentrations or mass release rates, achievable for key substances, using the best combination of techniques for different combustion processes.

Since this is a new installation, no precise data relating to annual pollution inventory is available for the UK EPR standby diesel generators. Therefore the BAT-based benchmark values are presented below against the estimated data. Significant emissions, such as sulphur and nitrogen dioxides, have been considered within the H1 assessment (i.e. plant > 2MW), in Section 4.

As previously stated, diesel generator operation will have a very limited contribution to the site emissions to water. Therefore it is not considered relevant to develop further this section for the diesel generators, which is consistent with The Combustion Sector Guidance Note Section 3.2.2.

Releases of solid waste are minimal and deemed to be insignificant. The main substances for waste related to diesel generators will be water with antifreeze; this will be generated whenever replacement is performed during maintenance (typical volumes of antifreeze are provided in Section 2.1.1).

The assumptions for the releases estimates (used in PCER Chapters 3 and 12) are the following:

- Release rate of SO_2: 1.34 kg / hour per MWe;
- Release rate of NO_2: 14 kg / hour per MWe;
- Each EDG rates at around 7.5 MWe, and each SBO rates at around 2.5 MWe;
- Fuel burn rate around 1,440 kg/hr for EDGs, and 535 kg/hr for SBOs.

Data provided in Tables 3.1.1 and 3.1.2 are typical values from diesel generators of the required power of the EPR generators. New assessment will be provided at the UK EPR site specific stage, including assessment for CO, particulate matter and VOCs.

Table 3.1.1 - Estimated inventory of EPR EDGs' releases to air

Process	Substance	Average Emissions			Continuous (c), or Intermittent (%)	Calculated (c), Measured (m) or Estimated (e)	Comments: Current Release, Variability, EQS /Benchmark
		g / hr	mg / m3	Tonnes / yr			
EDG (each one of 4)	Oxides of Nitrogen (as NO_2)	105,000	2,542	1.7	Intermittent - 0.2% (<20 hours)	E	Estimates from manufacturer's data
	Sulphur dioxide	10,050	143.5	0.2	Intermittent - 0.2% (<20 hours)	E	Estimates from manufacturer's data

Table 3.1.2 - Estimated inventory of EPR SBOs' releases to air

Process	Substance	Average Emissions			Continuous (c), or Intermittent (%)	Calculated (c), Measured (m) or Estimated (e)	Comments: Current Release, Variability, EQS /Benchmark
		g / hr	mg / m3	Tonnes / yr			
SBO (each one of 2)	Oxides of Nitrogen (as NO_2)	35,000	2,000	0.6	Intermittent - 0.2% (<20 hours)	E	Estimates from manufacturer's data
	Sulphur dioxide	3,350	143.5	0.05	Intermittent - 0.2% (<20 hours)	E	Estimates from manufacturer's data

3.2. ENVIRONMENTAL BENCHMARKS

This section details the key point sources for releases to air and the Installation performance against benchmark values for the combustion sector.

Table 3.2.1 - Indicative BAT requirements for emission benchmarks

Indicative BAT	Installation Activities
The Operator should compare the emissions with the benchmark values given in the remainder of this Section.	See Section 3.2.1
Where the benchmarks are not met, the Operator should revisit the responses made in Section 2 as appropriate, and make proposals for improvements or justify not doing so, as part of the BAT assessment.	See Section 3.2.1

3.2.1. Emissions to Air

Table 3.1 of Combustion Sector Guidance Note details benchmark release values applicable to the main diesel generators used at the Installation. A comparison between the UK EPR standby diesel generators performance and benchmark values will be presented, once the actual generators have been purchased and tested.

The EDGs' and SBOs' emission performance will be compared against the benchmark values, (2 MW_{th} < Size of each generator < 50 MW_{th}), at the site specific stage.

3.2.2. Emissions to Water

Not applicable (see 3.1 above).

4. IMPACT

4.1. IMPACT ASSESSMENT

The Environment Agency IPPC Technical Guidance Note for the Combustion Sector (v2.03) details specific requirements that should be addressed with regard to the assessment of impact from Installation activities. Table 4.1.1 below, identifies Indicative requirements for impact assessment, which will have to be considered when preparing the impact assessment for the site specific application.

The methodology that will be used for the identification of the site environmental characteristics, human reference state, and sensitive areas and species for the UK EPR, are described in PCER Chapter 10.

Table 4.1.1 - Indicative requirements for impact assessment

Indicative BAT Requirements
Provide a description, including maps as appropriate, of the receiving environment to identify the receptors of pollution. The extent of the area may cover the local, national and international (for example, transboundary effects) environment as appropriate.
Identify important receptors, which may include: areas of human population including noise or odour-sensitive areas, flora and fauna (that is, Habitat Directive sites, special areas of conservation, Sites of Special Scientific interest (SSSI or in Northern Ireland ASSI) or other sensitive areas), soil, water, that is groundwater (water below the surface of the ground in the saturation zone and in direct contact with the ground and subsoil) and watercourses (for example, ditches, streams, brooks, rivers), air, including the upper atmosphere, landscape, material assets and the cultural heritage.
Identify the pathways by which the receptors will be exposed (where not self-evident).
Carry out an assessment of the potential impact of the total emissions from the activities on these receptors. IPPC Environmental Assessments for BAT provides a systematic method for doing this and will also identify where modelling needs to be carried out, to air or water, to improve the understanding of the dispersion of the emissions assessment will include comparison (see IPPC: A Practical Guide) with: • community EQS levels; • other statutory obligations; • non-statutory obligation; • environmental action levels (EALs) and the other environmental, and • regulatory parameters defined in IPPC Environmental Assessments for BAT.
In particular it will be necessary to demonstrate that an appropriate assessment of vent and chimney heights has been made to ensure that there is adequate dispersion of the minimised emission(s) to avoid exceeding local ground-level pollution thresholds and limit national and transboundary pollution impacts, based on the most sensitive receptor, be it human health, soil or terrestrial ecosystems.

4.1.1. Impact Assessment for Emissions to Air

An assessment of the impact of the EPR EDGs and SBOs emissions using the IPPC H1 (Environment Agency, July 2003)[3] is provided in PCER Chapter 12. The assessment was performed using SO2 and NOx estimated data for emissions, since the actual measurement on site are not available at this stage.

This assessment is performed using the conservative assumptions of the H1 guidance. A first comparison of Long Term and Short Term impacts with the thresholds of significance shows that the emissions of sulphur and nitrogen dioxides are above the thresholds of significance. Consequently and will require a further detailed assessment at the site specific phase.

The detailed assessment will include emissions from all relevant point source releases identified, and will be performed for all the substances associated with diesel generators exhausts (i.e. SO_2, NOx, CO, PM).

4.1.2. Assessment of the Impact of Emissions to Water

As stated in Section 3.2.2, there it is not intended to perform a specific assessment of the impact of emissions to water associated to the diesel generators' Installation. The methodology of impact of non-radioactive discharges to water for the overall EPR Installation is presented in PCER Chapter 12.

[3] Horizontal Guidance Note H1, Environmental Assessment and Appraisal of BAT v6, Environment Agency 2003.

4.2. WASTE MANAGEMENT LICENSING REGULATIONS

The activities at the site will not be covered by the Waste Management Licensing Regulations (WMLR) 1994. Therefore demonstration that the relevant objectives of the WMLR have been addressed, in particular for diesel generators, is not required.

Nevertheless, the waste management strategy (radioactive and non-radioactive waste) is addressed for the whole UK EPR process in PCER Chapters 3 and 6, in accordance with several requirements of EA P& I Document.

The Waste Management programme will be the responsibility of the Operator as stated in Section 2.6 above.

4.3. THE HABITATS REGULATIONS

The PPC Regulations require the Habitats Regulations[4], including the EU Birds[5] and Habitats Directives[6], to be taken into consideration to determine whether the Installation activity will have a significant effect on any of the sites protected under these regulations.

The methodology for the site specific impact assessment of the EPR Installation is described in PCER Chapters 9 and 10.

Further assessment of whether the Installation is likely to have a significant impact on protected site in the UK, and an assessment of the implications of the Installation for the purposes of these Regulations will be performed at the site specific stage.

[4] The Conservation (Natural Habitats, &c.) Regulations 1994.

[5] The Birds Directive (European Communities Council Directive on the Conservation of Wild Birds *(79/409/EEC))* aims to preserve, maintain or re-establish biotopes and habitats to maintain populations of all species of wild birds naturally occurring in the Member States.

[6] The Habitats Directive (European Communities Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora (92/43/EEC, amended by 97/62/EC)) requires measures to be taken to maintain or restore to favourable conservation status habitats and/or species, which are rare or threatened on a European scale.

5. BAT ASSESSMENT

An assessment of indicative BAT requirements (as detailed in Combustion Sector Guidance Note S1.01) has been presented throughout the present document in BAT tables appropriate to each section.

For those aspects that relate to generic design the assessment gives confidence that BAT is met; for site specific aspects, that will be assessed later by the Operator, no point of immediate concern has been identified.

6. IMPROVEMENT PROGRAMME

The current review of the standby emergency diesel generators, at the light of the Combustion Sector Guidance Note S1.01 V2.03, has demonstrated that the control and abatement measures for the emissions from the Installation should be considered in the procurement stage, in order that the Installation can benefit from the best techniques available at that time with regard to reducing the emissions while maintaining reliability of the engines.

Several BAT indicative requirements have been noted as "site specific". These will therefore need to be addressed by the Operator at that stage.

Review of the emission assessment with site specific data will also be part of the improvement plan.