Acciona Industrial

NESS Energy from Waste Facility

Pollution Prevention and Control Permit Application - BAT conclusions checklist

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Abbreviations

Table 1: List of technical abbreviations

Abbreviation	Meaning
BAT	Best Available Technique
BAT-AEPLs	Best Available Techniques - associated performance emission level, as described in Section 3.3.2 of Commission Implementing Decision 2012/119/EU
CEMS	Continuous Emission Monitoring System
EAL	Environmental Assessment Level
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EN standards	European Standards
FGC	Flue Gas Cleaning
IBA	Incinerator Bottom Ash
IBC	Intermediate Bulk Container
IED	Industrial Emissions Directive
IPPC	Integrated Pollution Prevention and Control
OTNOC	Other Than Normal Operating Conditions
PCDD/F	Dioxins and Furans
SCR	Selective Catalytic Reduction
SNCR	Selective Non-Catalytic Reduction
TOC	Total Organic Carbon
TSS	Total Suspended Solids
TVOC	Total Volatile Organic Compounds

Table 2: List of environmental permit application documentation abbreviations

Abbreviation	Meaning
E&IR	Emission and Impact Report
SCR	Site Condition Report
STR	Supporting Technical Report

1 Introduction

This Best Available Techniques Reference (BREF) document conclusions checklist is part of a suite of documents[1] submitted to the Scottish Environment Protection Agency (SEPA) in support of an application by EfW NESS Limited for a Pollution Prevention and Control (PPC) permit to operate the Aberdeen City, Aberdeenshire Council and Moray Council Joint Energy Project (the NESS Energy Project[2]) Energy from Waste (EfW) facility. EfW NESS Limited is a whole owned subsidiary of Acciona Industrial and is subsequently referred to as Acciona in this report.

The checklist has been prepared to identify where evidence is provided in the suite of application documents to demonstrate how the proposed installation will comply with the Best Available Techniques (BAT) requirements set out in the BREF for Waste Incineration final working draft, published in December 2018[3]. The measures set out in the report as BAT are informed by the proposed design and operation of the plant which has been designed to meet BAT standards.

The following documentation forms part of the permit application documents:

- Three permit application forms (including PPC Part a, Part b and Part f)
- Supporting Technical Report (STR)
- Site Condition Report (SCR)
- Emission and Impact Report (E&IR)
- Air Quality assessment
- Human Health Impact assessment
- Noise assessment
- H1 software tool assessment
- Heat and Power Plan (H&PP)
- Energy Efficiency Directive Cost Benefit Analysis (EED CBA)
- Non-technical Summary (NTS)
- Documents submitted by Acciona in response to the Information Notice issues by SEPA during determination

[1] Application documents include: Applications forms A, B and F; Supporting technical report; Emissions and impacts report; Site condition report; Air Quality report, Human health risk assessment report; Habitats risk assessment report; Noise report, Accident risk assessment; and Fugitive emissions assessment.
[2] North East Scotland Shared Energy (from Waste) project.
[3] European Integrated Pollution Prevention and Control (IPPC) Bureau of the European Commission's Joint Research Centre. 2018. Best Available Techniques (BAT) Reference (BREF) Document for Waste Incineration' final working draft.

Where there are different BAT requirements for new and existing plants, only the requirements for new plants were included, as the NESS Facility is a new plant.

The NESS Facility is, hereafter, referred to as ‘the facility’.

2 Checklist

2.1 Environmental management systems

Table 3: BAT conclusions checklist for Environmental management systems

BAT ref.	Requirements	NESS permit application reference	Comments
BAT 1	In order to improve the overall environmental performance, BAT is to elaborate and implement an environmental management system (EMS) that incorporates all of the following features:		
	i. Commitment, leadership, and accountability of the management, including senior management, to the implementation of an effective EMS	STR • Section 4.1 (Operations and Maintenance)	-
	ii. An analysis that includes the determination of the organisation's context, the identification of the needs and expectations of interested parties, the identification of characteristics of the installation that are associated with possible risks for the environment (or human health) as well as of the applicable legal requirements relating to the environment	STR • Section 4.1 (Operations and Maintenance) • Section 4.2 (Competence and Training) • Section 4.3 (Accidents Incidents/ Non – Conformance)	-
	iii. Development of an environmental policy that includes the continuous improvement of the environmental performance of the installation	STR • Section 4.4 (Organisation) • Appendix C6 (Quality and Environmental Policy)	-
	iv. Establishing objectives and performance indicators in relation to significant environmental aspects, including safeguarding compliance with applicable legal requirements	STR • Section 4.4 (Organisation) • Section 8.2 (Measures for Improvement of Energy Efficiency) • Section 9.2 (Fire Protection and Detection) • Appendix C5 (Legal Requirements and Environmental Aspects)	-

BAT ref.	Requirements	NESS permit application reference	Comments
	v. Planning, and implementing the necessary procedures and actions (including corrective and preventive actions where needed), to achieve the environmental objectives and avoid environmental risks	STR • Section 4.1 (Operations and Maintenance) • Section 4.3 (Accidents Incidents/ Non – Conformance) • Section 8.2 (Measures for Improvement of Energy Efficiency) • Appendix B3 (Fugitive Emissions Risk Assessment) • Appendix B4 (Accident Risk Assessment)	-
	vi. Determination of structures, roles and responsibilities in relation to environmental aspects and objectives and provision of the financial and human resources needed	STR • Section 4.1 (Operations and Maintenance) • Section 4.2 (Competence and Training) • Section 4.4 (Organisation)	
	vii. Ensuring the necessary competence and awareness of staff whose work may affect the environmental performance of the installation (e.g. by providing information and training)	STR • Section 4.2 (Competence and Training)	
	viii. Internal and external communication	STR • Section 4.1 (Operations and Maintenance) • Section 4.4 (Organisation) • Section 8.2 (Measures for Improvement of Energy Efficiency)	
	ix. Fostering employee involvement in good environmental management practices	STR • Section 4.1 (Operations and Maintenance) • Section 4.2 (Competence and Training)	

BAT ref.	Requirements	NESS permit application reference	Comments
		• Section 4.4 (Organisation) • Appendix B3 (Fugitive Emissions Risk Assessment):	
	x. Establishing and maintaining a management manual and written procedures to control activities with significant environmental impact as well as relevant records	STR • Section 2.1 (Municipal waste and raw material management) • Appendix C11 (Acciona IMS Manual)	
	xi. Effective operational planning and process control	STR • Section 2.8 (Control Philosophy) • Section 3.5 (Fugitive Emissions to Surface Water, Sewer and Groundwater) • Section 8.2 (Measures for Improvement of Energy Efficiency)	
	xii. Implementation of appropriate maintenance programmes	STR • Section 3.5 (Fugitive Emissions to Surface Water, Sewer and Groundwater) • Section 4.1 (Operations and Maintenance) • Section 4.4 (Organisation) • Section 8.2 (Measures for Improvement of Energy Efficiency • Appendix B3 (Fugitive Emissions Risk Assessment): • Appendix B4 (Accident risk assessment)	
	xiii. Emergency preparedness and response protocols, including the prevention and/or mitigation of the adverse (environmental) impacts of emergency situations	STR • Section 2.1 (Municipal waste and raw material management) • Section 2.8 (Control Philosophy)	

BAT ref.	Requirements	NESS permit application reference	Comments
		• Section 3.5 (Fugitive Emissions to Surface Water, Sewer and Groundwater) • Section 4.1 (Operations and Maintenance) • Section 9.1 (Accident Management Plan) • Appendix B3 (Fugitive Emissions Risk Assessment) • Appendix B4 (Accident risk assessment)	
	xiv. When (re)designing a (new) installation or a part thereof, consider its environmental impacts throughout its life, which includes construction, maintenance, operation and decommissioning	STR • Section 12 (Site closure) E&IA Environmental Impact Assessment	
	xv. Implementation of a monitoring and measurement programme. If needed, information can be found in the Reference Report on Monitoring of Emissions to Air and Water from Industrial Emissions Directive (IED) Installations	STR • Section 4.4 (Organisation) • Section 8.2 (Measures for Improvement of Energy Efficiency) • Section 10.1 (Minimisation of Noise) • Section 10.4 (Ongoing Management) • Section 11 (Monitoring): • Section 12.1 (Operations During the PPC Permit)	
	xvi. Application of sectoral benchmarking on a regular basis	STR • Section 4.1 (Operations and Maintenance)	
	xvii. Periodic independent (as far as practicable), internal auditing and periodic, independent external auditing in order to assess the environmental performance and to determine	STR • Section 4.4 (Organisation) • Section 5.3 (Waste Minimisation Audit)	

BAT ref.	Requirements	NESS permit application reference	Comments
	whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained	• Appendix C12	
	xviii. Evaluation of causes for nonconformities, implementation of corrective actions in response to nonconformities, review of the effectiveness of corrective actions, and determination of whether similar nonconformities exist or could potentially occur	STR • Section 4.3 (Accidents Incidents / Non-Conformance)	
	xix. Periodic review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;	STR • Section 4.3 (Accidents Incidents / Non-Conformance) • Section 4.4 (Organisation)	
	Specifically, for incineration plants and, where relevant, bottom ash treatment plants, BAT is also to incorporate the following features in the EMS:		
	xx. For incineration plants, waste stream management (see BAT 9)	STR • Section 2.1.1 (Incoming Municipal waste) • Section 5.2 (Waste to be incinerated) • Section 5.3 (Waste Minimisation Audit) • Section 6 (Waste handling) • Section 7 (Waste Recovery and Disposal) • Appendix C10 (NESS Environmental Management Plan)	The EMP will be developed to include the necessary procedures to meet the requirements to meet the BAT conditions.
	xxi. For bottom ash treatment plants, output quality management (see BAT 10)	STR • Section 6 (Waste handling) • Section 7 (Waste Recovery and Disposal) • Appendix C10 (NESS Environmental Management Plan)	The EMP will be developed to include the necessary procedures to meet the requirements to meet the BAT conditions.

BAT ref.	Requirements	NESS permit application reference	Comments
	xxii. Residues management plan including measures aiming to: a) Minimise the generation of residues b) Optimise the reuse, regeneration, recycling of, and/or energy recovery from the residues c) Ensure the proper disposal of residues	STR • Section 2.2 (Waste charging) • Section 2.3 (Furnace), • Section 2.6 (Boiler design) • Section 2.8 (Control philosophy) • Section 6 (Waste handling) • Section 7 (Waste Recovery and Disposal) • Appendix C10 (NESS Environmental Management Plan)	The EMP will be developed to include the necessary procedures to meet the requirements to meet the BAT conditions.
	xxiii. For incineration plants, other than normal operating conditions (OTNOC) management plan (see BAT 18)	STR • Section 4.2 (Competence and Training) • Appendix C10 (NESS Environmental Management Plan) E&IA • Appendix B (Air Quality assessment)	The EMP will be developed to include the necessary procedures to meet the requirements to meet the BAT conditions.
	xxiv. For incineration plants, accident management plan	STR • Section 4.3 (Accidents Incidents / Non-Conformance)	
	xxv. For bottom ash treatment plants, diffuse dust emissions management (see BAT 23)	STR • Section 3.4 (Control of Fugitive Emissions to Air) • Appendix B3 (Fugitive Emissions Risk Assessment): • Appendix B4 (Accident risk assessment) • Appendix C10 (NESS Environmental Management Plan)	

BAT ref.	Requirements	NESS permit application reference	Comments
	xxvi. Odour management plan where an odour nuisance at sensitive receptors is expected and/or has been substantiated	STR • Section 2.1 (Municipal waste and raw material management) • Section 3.6 (Odour) • Appendix B3 (Fugitive Emissions Risk Assessment): • Appendix B4 (Accident risk assessment) • Appendix C10 (NESS Environmental Management Plan)	
	xxvii. Noise management plan (see also BAT 37) where a noise nuisance at sensitive receptors is expected and/or has been substantiated	STR • Section 10 (Noise): • Appendix C10 (NESS Environmental Management Plan)	-

2.2 Monitoring

Table 4: BAT conclusions checklist for Monitoring

BAT ref.	Requirements	NESS permit application reference	Comments
BAT 2	BAT is to determine either the gross electrical efficiency, the gross energy efficiency, or the boiler efficiency of the incineration plant as a whole or of all the relevant parts of the incineration plant. In the case of a new incineration plant, the gross electrical efficiency, the gross energy efficiency, or the boiler efficiency is determined by carrying out a performance test at full load:		
	i. Determine either the gross electrical efficiency, the gross energy efficiency; or	STR • Section 8.1 (Energy consumption and generation)	Performance testing of the combustion process and energy
	ii. The boiler efficiency of the incineration plant as a whole; or		

BAT ref.	Requirements	NESS permit application reference	Comments
	iii. Of all the relevant parts of the incineration plant		generation will be undertaken as part of the commissioning of the plant.
	Note: *For the performance test, no EN standard is available for the determination of the boiler efficiency of incineration plants. For grate-fired incineration plants, the FDBR guideline RL 7 may be used*.		
BAT 3	Continuous measurement of:		
	i. Flue-gas from the incineration of waste: Flow, oxygen content, temperature, pressure, water vapour content	STR • Section 11.1.1 (Monitoring and Reporting of Emissions to Air) • Section 11.3 (Monitoring and Reporting of Emissions to Air)	-
	ii. Combustion chamber: Temperature	STR • Section 2.3.3 (Combustion Chambers, Secondary Air System Designs) • Section 11.3 (Monitoring of Process Variables) • Appendix B3.2 (Risk Assessment) – Table B3.3	-
	iii. Waste water from wet flue gas cleaning (FGC): Flow, pH, temperature	Not applicable.	The facility will be designed to be wastewater free, except from the sanitary wastewater from the administrative buildings and operator sanitary facilities. – See: STR - Section 11.1 (Emissions Monitoring)
	iv. Waste water from bottom ash treatment plants: Flow, pH, conductivity	Not applicable.	The incinerator bottom ash (IBA) will be transferred for treatment offsite at an appropriately permitted

BAT ref.	Requirements	NESS permit application reference	Comments
			site – See: STR - Section 7.2 (Incinerator Bottom Ash)
BAT 4	BAT is to monitor channelled emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.		
	i. NOx – Incineration of waste - Generic EN standards – Continuous monitoring – Monitoring associated with BAT 29	STR ● Section 3.1.5 (Primary NOx Measures) ● Section 11.1 (Emissions Monitoring)	- NOx to be monitored using a Continuous Emission Monitoring System (CEMS), in line with monitoring requirements set out in the SEPA Waste Incineration Template 2015
	ii. NH_3 - Incineration of waste when SNCR and/or SCR is used – Generic EN standards – Continuous monitoring - Monitoring associated with BAT 29	STR ● Section 11.1 (Emissions Monitoring)	- NH_3 to be monitored using a Continuous Emission Monitoring System (CEMS).
	iii. N_2O - Incineration of waste in fluidised bed furnace & Incineration of waste when SNCR is operated with urea – EN 21258 – Monitoring once every year - Monitoring associated with BAT 29	Not applicable	The combustion chamber will use moving grate technology.
	iv. CO – Incineration of waste – Generic EN standards – Continuous monitoring - Monitoring associated with BAT 29	STR ● Section 11.1 (Emissions Monitoring)	- NOx to be monitored using a Continuous Emission Monitoring System (CEMS), in line with monitoring requirements set out in the SEPA Waste Incineration Template 2015
	v. SO_2 - Incineration of waste – Generic EN standards – Continuous monitoring - Monitoring associated with BAT 27	STR ● Section 11.1 (Emissions Monitoring)	
	vi. HCl - Incineration of waste – Generic EN standards – Continuous monitoring - Monitoring associated with BAT 27	STR ● Section 11.1 (Emissions Monitoring)	
	vii. HF - Incineration of waste – Generic EN standards – Continuous monitoring - Monitoring associated with BAT 27	STR ● Section 11.1 (Emissions Monitoring)	
	viii. Dust a. Bottom ash treatment – EN 13284-1 – Monitoring once every year - Monitoring associated with BAT 26	a) Not applicable b) STR	a) IBA will be exported for treatment at an appropriately

BAT ref.	Requirements	NESS permit application reference	Comments
	b. Incineration of waste – Generic EN standards and EN 13284-2 – Continuous monitoring - Monitoring associated with BAT 25	• Section 11.1 (Emissions Monitoring)	permitted site – See: STR - Section 7.2 (Incinerator Bottom Ash) b) Dust is given as particulate matter (PM10 and PM2.5)
	ix. Metals and metalloids except mercury (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Tl, V) – Incineration of waste - EN 14385 – Monitoring once every six months - Monitoring associated with BAT 25	STR Section 11.1 (Emissions Monitoring)	Monitoring will be in line with monitoring requirements set out in the SEPA Waste Incineration Template 2015
	x. Hg – Incineration of waste - Generic EN standards and EN 14884 – Continuous monitoring - Monitoring associated with BAT 31		Regular 6 monthly monitoring of mercury, in line with BAT4 where it is demonstrated that the waste stream has a low and stable content mercury content. Information was provided by Acciona to demonstrate that the feed stock is of low and stable content, through referred information for two difference plants of similar type with a similar waste stream to the NESS project that are in commercial operation. The information was provided on 21/07/21, reference NSS-E-ACC-EN-SEP-0095 - PPCA1189430 - INFORMATION NOTICE Question 27.
	xi. TVOC - Incineration of waste - Generic EN standards – Continuous monitoring - Monitoring associated with BAT 30	STR Section 11.1 (Emissions Monitoring)	
	xii. Dioxins and furans (PBDD/F)	STR	No sampling is proposed. The facility is designed to accommodate

BAT ref.	Requirements	NESS permit application reference	Comments
	a. Incineration of waste - No EN standard available - Monitoring once every six months - Monitoring associated with BAT 30	Section 11.1 (Emissions Monitoring)	later installation if required, ref NSS-E-ACC-EN-SEP-0051
	xiii. Dioxins and furans (PCDD/F) a. Incineration of waste - EN 1948-1, EN 1948-2, EN 1948-3 – Monitoring once every six months for short-term sampling - Monitoring associated with BAT 30 b. Incineration of waste - No EN standard available for long-term sampling, EN 1948-2, EN 1948-3 – Monitoring once every month for long-term sampling – Monitoring associated with BAT 30	STR Section 11.1 (Emissions Monitoring)	No sampling is proposed. The facility is designed to accommodate later installation if required, ref NSS-E-ACC-EN-SEP-0051
	xiv. Dioxin-like PCBs a. Incineration of waste - EN 1948-1, EN 1948-2, EN 1948-4 – Monitoring once every six months for short-term sampling - Monitoring associated with BAT 30 b. Incineration of waste - No EN standard available for long-term sampling, EN 1948-2, EN 1948-4 – Monitoring once every month for long-term sampling - Monitoring associated with BAT 30	STR Section 11.1 (Emissions Monitoring)	
	xv. Benzo[a]pyrene – Incineration of waste - No EN standard available – Monitoring once every year - Monitoring associated with BAT 30	STR Section 11.1 (Emissions Monitoring)	
BAT 5	Appropriately monitor channelled emissions to air from the incineration plant during OTNOC:		
	i. The monitoring can be carried out by direct emission measurements (e.g. for the pollutants that are monitored continuously); or	STR • Section 11.1 (Emissions Monitoring) • Section 11.2 (Environmental Monitoring)	During the period that the combustion process is operating the continuous emission monitoring system (CEMS) will operate, including during OTNOC.
	ii. By monitoring of surrogate parameters if this proves to be of equivalent or better scientific quality than direct emission measurements; and	Not applicable.	-

BAT ref.	Requirements	NESS permit application reference	Comments
	iii. Emissions during start-up and shutdown while no waste is being incinerated, including emissions of PCDD/F, are estimated based on measurement campaigns, e.g. every three years, carried out during planned start-up/shutdown operations.	Not applicable.	-
BAT 6	Monitor emissions to water from FGC and/or bottom ash treatment with at least the frequency given below and in accordance with EN standards.		
	i. Total organic carbon (TOC) – FGC – EN 1484 – Monitoring once every month – Monitoring associated with BAT 34	Not applicable.	There will be no aqueous emission from the EfW facility. The FGC system will be a semi dry process, that will not result in any aqueous emissions. The IBA will be exported and treated off site, as an appropriately permitted treatment facility. The manufacturing and end-use of IBAA will comply with SEPA's 2018 Draft Position Statement on the Use of Incinerator Bottom Ash Aggregate.
	ii. TOC – Bottom ash treatment – EN 1484 – Monitoring once every month – Monitoring associated with BAT 34	Not applicable.	
	iii. Total suspended solids (TSS) – FGC – EN 872 - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	iv. TSS – Bottom ash treatment – EN 872 - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	v. As – FGC - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	vi. Cd – FGC - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	vii. Cr – FGC - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	viii. Cu – FGC - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	ix. Mo – FGC - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	

BAT ref.	Requirements	NESS permit application reference	Comments
	x. Ni – FGC - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	xi. Pb – FGC and Ash treatment - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	xii. Sb – FGC - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	xiii. Tl – FGC - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	xiv. Zn – FGC - Various EN standards available (e.g. EN ISO 11885, EN ISO 15586 or EN ISO 17294-2) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	xv. Hg – FGC - Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	xvi. Ammonium-nitrogen (NH4-N) - Bottom ash treatment - Various EN standards available (e.g. EN ISO 11732, EN ISO 14911) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	xvii. Chloride (Cl^-) - Bottom ash treatment - Various EN standards available (e.g. EN ISO 10304-1, EN ISO 15682) - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	xviii. Sulphate (SO_4^{2-}) - Bottom ash treatment - EN ISO 10304-1 - Monitoring once every month - Monitoring associated with BAT 34	Not applicable.	
	xix. PCDD/F: a) FGC - No EN standard available - Monitoring once every month - Monitoring associated with BAT 34 b) Bottom ash treatment - No EN standard available – Monitoring once every six months - Monitoring associated with BAT 34	Not applicable.	

BAT ref.	Requirements	NESS permit application reference	Comments
	Note: a) *For TOC emissions from bottom ash treatment, TSS emissions from bottom ash treatment, Pb emissions from bottom ash treatment, Chloride (Cl) emissions from bottom ash treatment and PCDD/F emissions from FGC, the monitoring frequency may be at least once every six months if the emissions are proven to be sufficiently stable.* b) *For TSS emissions from FGC, the daily 24-hour flow-proportional composite sampling measurements may be substituted by daily spot sample measurements*		
BAT 7	Monitor the content of unburnt substances in slags and bottom ashes at the incineration plant with at least the frequency given below and in accordance with EN standards.		
	i. Loss on ignition - EN 14899, and either EN 15169 or EN 15935 – Monitoring once every three months - Monitoring associated with BAT 14	Total organic carbon in the IBA will be tested.	
	ii. Total organic carbon - EN 14899, and either EN 13137 or EN 15936 - Monitoring once every three months - Monitoring associated with BAT 14	STR • Section 6.1 (Procedures for the handling of residual waste)	The Environmental Services Association (ESA) Protocol for Sampling and Testing will be followed for the IBA.
	Note: *a) For loss on ignition, Either the loss on ignition or the total organic carbon is monitored* *b) For TOC, elemental carbon (e.g. determined according to DIN 19539) may be subtracted from the measurement result.*		
BAT 8	The POP content in the output streams (e.g. slags and bottom ashes, flue-gas, waste water) is determined by:		
	i. Direct measurements; or	Not relevant. The facility will treat non-hazardous municipal waste	
	ii. By indirect methods (e.g. the cumulated quantity of POPs in the fly ashes, dry FGC residues, waste water from FGC and related waste water treatment sludge may be determined by monitoring the POP contents in the flue-gas before and after the FGC system); or	Not relevant. The facility will treat non-hazardous municipal waste	
	iii. Based on studies representative of the plant.	Not relevant. The facility will treat non-hazardous municipal waste	
	Note*: Only applicable for plants that:*		

BAT ref.	Requirements	NESS permit application reference	Comments
	a) Incinerate hazardous waste with POP levels prior to incineration exceeding the concentration limits defined in Annex IV to Regulation (EC) No 850/2004 and amendments; and *b) Do not meet the process description specifications of Chapter IV.G.2 point (g) of the UNEP technical guidelines UNEP/CHW.13/6/Add.1/Rev.1.*		

2.3 General environmental and combustion performance

Table 5: BAT conclusions checklist for General environmental and combustion performance

BAT ref.	Requirements	NESS permit application reference	Comments
BAT 9	In order to improve the overall environmental performance of the incineration plant by waste stream management (see BAT 1), BAT is to use all of the techniques (i) to (iii) given below, and, where relevant, also techniques (iv), (v) and (vi).		
	i. Determination of the types of waste that can be incinerated	STR ● Section 2.1 (Municipal waste and raw material management) ● Section 5.2 (Waste to be Incinerated)	-
	ii. Set-up and implementation of waste characterisation and pre-acceptance procedures	STR ● Section 2.1 (Municipal waste and raw material management)	-
	iii. Set-up and implementation of waste acceptance procedures	STR ● Section 2.1 (Municipal waste and raw material management)	-
	iv. Set-up and implementation of a waste tracking system and inventory	STR ● Section 2.1 (Municipal waste and raw material management)	-
	v. Waste segregation	STR ● Section 2.1 (Municipal waste and raw material management) ● Section 6 (Waste handling)	Further pre-treatment of the incoming waste is not proposed at the facility, as the incoming waste will have been subject to source segregation, meaning that only residual waste will arrive to the facility for treatment.

BAT ref.	Requirements	NESS permit application reference	Comments
	vi. Verification of waste compatibility prior to the mixing or blending of hazardous wastes	Not applicable.	The facility will not accept hazardous waste. Hazardous waste will be rejected.
BAT 10	i. An output quality management system is set up and implemented, so as to ensure that the output of the bottom ash treatment is in line with expectations, using exiswaste ii. ting EN standards where available. This management system also allows the performance of the bottom ash treatment to be monitored and optimised.	Not applicable.	The IBA will exported for treatment at an appropriately permitted facility. The Environmental Services Association (ESA) Protocol for Sampling and Testing will be followed for the IBA
BAT 11	In order to improve the overall environmental performance of the incineration plant, BAT is to monitor the waste deliveries as part of the waste acceptance procedures		
	i. Municipal solid waste and other non-hazardous waste a) Radioactivity detection b) Weighing of the waste deliveries c) Visual inspection d) Periodic sampling of waste deliveries and analysis of key properties/substances (e.g. calorific value, content of halogens and metals/metalloids). For municipal solid waste, this involves separate unloading.	STR • Section 2.1 (Municipal waste and raw material management)	a) The contract waste stream (Municipal Solid Waste) is the predominant waste stream. MSW is subject to source segregation in line with the Aberdeen City, Aberdeenshire, and Moray Councils' waste collection guidelines. All non-contract waste is subject to individual contracts with detailed specification as to the materials contained within each waste stream. Waste will not be accepted from industries where there is potential for radioactive material to be present in the waste stream, such waste from the oil and gas industry or medical waste. These pre acceptance controls together with regular checking of the waste stream on arrival at the EfW means that the risk of radioactive materials being present in the waste stream is very low to negligible.

BAT ref.	Requirements	NESS permit application reference	Comments
			These risks that Ionising Radiation might be in contained within the waste is assessed in the Contract Waste risk assessment, see Appendix A. The cost to install a Radiation Portal Monitors (RPM) designed for the detection of very low radioactive contamination is estimated to be £30,000, based on a previous quote. The cost is considered dis-proportional in relation to the risk that radioactive waste might be included in the incoming waste stream. BAT 11 '*is to monitor the waste deliveries as part of the waste acceptance procedures including, depending on the risk posed by the incoming waste, the elements given below*'. Based on the proposed waste to be accepted, the assessment of the risk of radioactive material being included within the waste stream and the dis-proportionate cost of installing monitoring equipment we consider that radioactivity detection is not BAT. The approaches to BAT 11 b – d are described in Section 2.1 of the 'NESS Energy from Waste Facility, Pollution Prevention and Control Permit Application Supporting Technical Report', that was submitted as part of the permit application.
	ii. Sewage sludge a) Weighing of the waste deliveries (or measuring the flow if the sewage sludge is delivered via pipeline), b) Visual inspection, as far as technically possible, c) Periodic sampling and analysis of key properties/substances (e.g. calorific value, content of water, ash and mercury)	Not applicable.	-

BAT ref.	Requirements	NESS permit application reference	Comments
	iii. Hazardous waste other than clinical waste a) Radioactivity detection b) Weighing of the waste deliveries c) Visual inspection, as far as technically possible d) Control and comparison of individual waste deliveries with the declaration of the waste producer e) Sampling of the content of: all bulk tankers and trailers, packed waste (e.g. in drums, intermediate bulk containers (IBCs) or smaller packaging), and analysis of: combustion parameters (including calorific value and flashpoint), waste compatibility, to detect possible hazardous reactions upon blending or mixing wastes, prior to storage (BAT 9), key substances including POPs, halogens and sulphur, metals/metalloids	Not applicable.	-
	iv. Clinical waste a) Radioactivity detection b) Weighing of the waste deliveries c) Visual inspection of the packaging integrity	Not applicable.	-
BAT 12	In order to reduce the environmental risks associated with the reception, handling and storage of waste, BAT is to use both of the techniques given below.		
	i. Impermeable surfaces with an adequate drainage infrastructure - Depending on the risks posed by the waste in terms of soil or water contamination, the surface	i STR	-

BAT ref.	Requirements	NESS permit application reference	Comments
	of the waste reception, handling and storage areas is made impermeable to the liquids concerned and fitted with an adequate drainage infrastructure (see BAT 32). The integrity of this surface is periodically verified, as far as technically possible.	• Section 3.5 (Fugitive Emissions to Surface Water, Sewer and Groundwater) SCR • Section 5.4 (Emissions control)	
	ii. Adequate waste storage capacity - Measures are taken to avoid accumulation of waste, such as: a) The maximum waste storage capacity is clearly established and not exceeded, taking into account the characteristics of the wastes (e.g. regarding the risk of fire) and the treatment capacity b) The quantity of waste stored is regularly monitored against the maximum allowed storage capacity c) For wastes that are not mixed during storage (e.g. clinical waste, packed waste), the maximum residence time is clearly established	ii STR • Section 2.1 (Municipal waste and raw material management) • Section 2.2. (Waste Charging)	
BAT 13	In order to reduce the environmental risk associated with the storage and handling of clinical waste, BAT is to use a combination of the techniques given below.		
	i. Automated or semi-automated waste handling - Clinical wastes are unloaded from the truck to the storage area using an automated or manual system depending on the risk posed by this operation. From the storage area the	Not applicable.	The facility will only receive MSW and appropriate C&I waste. The facility will not accept clinical waste.

BAT ref.	Requirements	NESS permit application reference	Comments
	clinical wastes are fed into the furnace by an automated feeding system.		
	ii. Incineration of non-reusable sealed containers, if used - Clinical waste is delivered in sealed and robust combustible containers that are never opened throughout storage and handling operations. If needles and sharps are disposed of in them, the containers are puncture-proof as well.		
	iii. Cleaning and disinfection of reusable containers, if used - Reusable waste containers are cleaned in a designated cleaning area and disinfected in a facility specifically designed for disinfection. Any leftovers from the cleaning operations are incinerated.		
BAT 14	In order to improve the overall environmental performance of the incineration of waste, to reduce the content of unburnt substances in slags and bottom ashes, and to reduce emissions to air from the incineration of waste, BAT is to use an appropriate combination of the techniques given below.		
	i. Waste blending and mixing - Waste blending and mixing prior to incineration includes for example the following operations: - bunker crane mixing; - using a feed equalisation system; blending of compatible liquid and pasty wastes. In some cases, solid wastes are shredded prior to mixing.	STR • Section 2.1 (Municipal waste and raw material management)	-
	ii. Advanced control system – a) Applicability: Generally applicable	STR • Section 2.2 (Waste charging) • Section 2.3 (Furnace), • Section 2.6 (Boiler design)	-

BAT ref.	Requirements	NESS permit application reference	Comments
		• Section 2.8 (Control philosophy)	
	iii. Optimisation of the incineration process	STR • Section 2.3 (Furnace)	-
	BAT-associated environmental performance levels (BAT – AEPL) for unburnt substances in slags and bottom ashes from the incineration of waste.		
	i. TOC content in slags and bottom ashes: 1-3% dry weight	STR • Section 6.1 (Procedures for the handling of residual waste)	The Environmental Services Association (ESA) Protocol for Sampling and Testing will be followed for the IBA.
	ii. Loss on ignition of slags and bottom: 1-5% dry weight	Not applicable.	The TOC of the IBA will be monitored
	Note: *a) Either the BAT-AEPL for TOC content or the BAT-AEPL for the loss on ignition applies* *b) The lower end of the BAT-AEPL range can be achieved when using fluidised bed furnaces or rotary kilns operated in slagging mode.*		
BAT 15	In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT is to set up and implement procedures for the adjustment of the plant's settings, e.g. rough the advanced control system, as and when needed and practicable, based on the characterisation and control of the waste (see BAT 11).	STR • Section 2.1 (Municipal waste and raw material management) • Section 2.2 (Waste charging) • 2.3 (Furnace), • 2.6 (Boiler design) • 2.8 (Control philosophy)	-
BAT 16	In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT is to set up and implement operational procedures (e.g. organisation of the supply chain, continuous	STR • Section 4.1 (Operations and Maintenance) • Section 4.4 (Environmental Management System)	-

BAT ref.	Requirements	NESS permit application reference	Comments
	rather than batch operation) to limit as far as practicable shutdown and start-up operations.	• Section 8.2 (Measures for Improvement of Energy Efficiency)	
BAT 17	In order to reduce emissions to air and, where relevant, to water from the incineration plant, BAT is to ensure that the FGC system and the waste water treatment plant are appropriately designed (e.g. considering the maximum flow rate and pollutant concentrations), operated within their design range, and maintained so as to ensure optimal availability.	STR • Section 3.1 (Abatement of Point Source Emissions to Air • Section 3.2 (Abatement of Point Source Emissions to Surface Water and Sewer)	-
BAT 18	In order to reduce the frequency of the occurrence of OTNOC and to reduce emissions to air and, where relevant, to water from the incineration plant during OTNOC, BAT is to set up and implement a risk-based OTNOC management plan as part of the environmental management system (see BAT 1) that includes all of the following elements:		
	i. Identification of potential OTNOC (e.g. failure of equipment critical to the protection of the environment ('critical equipment')), of their root causes and of their potential consequences, and regular review and update of the list of identified OTNOC following the periodic assessment below	STR • Appendix B4 (Accident risk assessment) • Appendix C (Environmental Management Plan)	-
	ii. Appropriate design of critical equipment (e.g. compartmentalisation of the bag filter, techniques to heat up the flue-gas and obviate the need to bypass the bag filter during start-up and shutdown, etc.)	STR • Section 3.1 (Abatement of Point Source Emissions to Air) • Appendix B4 (Accident risk assessment)	The flue gas from the flue gas treatment reactor, is directed via the flue gas duct to the filter bag system. The filter consists of six compartments, each with a set of filter bags, arranged to one side of this duct.
	iii. Set-up and implementation of a preventive maintenance plan for critical equipment (see BAT 1)	STR • Section 2.9 (Maintenance) Section 4.1 (Operations and Maintenance)	The preventative maintenance strategy which will define the maintenance schedule of all operating plant, based on the facility's operation & maintenance requirements.

BAT ref.	Requirements	NESS permit application reference	Comments
		• Appendix C10 (NESS Environmental Management Plan)	
	iv. Monitoring and recording of emissions during OTNOC and associated circumstances (see BAT 5)	STR • Section 4.2 (Competence and Training) • Section 11.2 (Environmental Monitoring) • Appendix C10 (NESS Environmental Management Plan)	Any abnormal emissions and levels of dust will be recorded on the Plant Check/Shift Record sheet and be fully investigated.
	v. Periodic assessment of the emissions occurring during OTNOC (e.g. frequency of events, duration, amount of pollutants emitted) and implementation of corrective actions if necessary.	STR • Section 4.2 (Competence and Training) • Section 11.2 (Environmental Monitoring) • Appendix C10 (NESS Environmental Management Plan)	-

2.4 Energy efficiency

Table 6: BAT conclusions checklist for Energy efficiency

BAT ref.	Requirements	NESS permit application reference	Comments
BAT 19	In order to increase the resource efficiency of the incineration plant, BAT is to use a heat recovery boiler. The energy contained in the flue-gas is recovered in a heat recovery boiler producing hot water and/or steam, which may be exported, used internally, and/or used to produce electricity.	STR • Section 2.6 (Boiler) • Section 2.7 Steam turbine) • Section 8.1 (Energy consumption and generation)	-
	In order to increase the energy efficiency of the incineration plant, BAT is to use an appropriate combination of the techniques given below.		

BAT ref.	Requirements	NESS permit application reference	Comments
BAT 20	i. Drying of sewage sludge - After mechanical dewatering, sewage sludge is further dried, using for example low-grade heat, before it is fed to the furnace. The extent to which sludge can be dried depends on the furnace feeding system. Applicable within the constraints associated with the availability of low-grade heat.	Not applicable.	-
	ii. Reduction of the flue-gas flow - The flue-gas flow is reduced through: a) Improving the primary and secondary combustion air distribution b) Flue-gas recirculation A smaller flue-gas flow reduces the energy demand of the plant (e.g. for induced draft fans). For existing plants, the applicability of flue-gas recirculation may be limited due to technical constraints (e.g. pollutant load in the flue-gas, incineration conditions).	STR • Section 2.3 (Furnace)	-
	iii. Minimisation of heat losses - Heat losses are minimised through, e.g.: a) Use of integral furnace-boilers, allowing for heat to also be recovered from the furnace sides b) Thermal insulation of furnaces and boilers c) Flue-gas recirculation d) Recovery of heat from the cooling of slags and bottom ashes Integral furnace-boilers are not applicable to rotary kilns or to other furnaces dedicated to the high temperature incineration of hazardous waste.	STR • Section 2.3 (Furnace) • Section 2.6 (Boiler) • Section 8.2 (Measures for Improvement of Energy Efficiency	-
	iv. Optimisation of the boiler design - The heat transfer in the boiler is improved by optimising, for example, the: a) Flue-gas velocity and distribution b) Water/steam circulation c) Convection bundles d) On-line and off-line boiler cleaning systems in order to minimise the fouling of the convection bundles Applicable to new plants and to major retrofits of existing plants.	STR • Section 2.3 (Furnace) • Section 2.5 (Cooling system) • Section 2.6 (Boiler Design)	-

BAT ref.	Requirements	NESS permit application reference	Comments
	v. Low-temperature flue-gas heat exchangers - Special corrosion-resistant heat exchangers are used to recover additional energy from the flue-gas at the boiler exit, after an ESP, or after a dry sorbent injection system - Applicable within the constraints of the operating temperature profile of the FGC system. In the case of existing plants, the applicability may be limited by a lack of space.	STR • Section 2.6 (Boiler)	Flue gas heat exchange downstream the FGT is not included on the design to avoid the risk of plume visibility.
	vi. High-steam conditions - The higher the steam conditions (temperature and pressure), the higher the electricity conversion efficiency allowed by the steam cycle. Working at high steam conditions (e.g. above 45 bar, 400 °C) requires the use of special steel alloys or refractory cladding to protect the boiler sections that are exposed to the highest temperatures. Applicable to new plants and to major retrofits of existing plants, where the plant is mainly oriented towards the generation of electricity. The applicability may be limited by the stickiness of the fly ashes and the corrosiveness of the flue-gas.	STR • Section 2.3 (Furnace) • Section 2.6 (Boiler Design)	-
	vii. Cogeneration - Cogeneration of heat and electricity where the heat (mainly from the steam that leaves the turbine) is used for producing hot water/steam to be used in industrial processes/activities or in a district heating/cooling network - Applicable within the constraints associated with the local heat and power demand and/or availability of networks	STR • Section 8.1 (Energy consumption and generation)	-
	viii. Flue-gas condenser - A heat exchanger or a scrubber with a heat exchanger, where the water vapour contained in the flue-gas condenses, transferring the latent heat to water at a sufficiently low temperature (e.g. return flow of a district heating network). The flue-gas condenser also provides co-benefits by reducing emissions to air (e.g. of dust and acid gases). The use of heat pumps can increase the amount of energy recovered from flue-gas condensation. Applicable within the constraints associated with the demand for low-temperature heat, e.g. by the availability of a district heating network with a sufficiently low return temperature	Not applicable.)	Flue gas condenser downstream the FGT is not included on the design to avoid the risk of plume visibility.
	ix. Dry bottom ash handling - Dry, hot bottom ash falls from the grate onto a transport system and is cooled down by ambient air. Useful energy is recovered by using the cooling air for combustion - Only applicable to grate	Not applicable.	IBA extractors will be filled with water to create a seal against air leak into the furnace to optimise combustion conditions and to ensure

BAT ref.	Requirements	NESS permit application reference	Comments
	furnaces. There may be technical restrictions that prevent retrofitting to existing furnaces.		that the IBA will be cooled below 60°C.
	BAT – AEEL (%) for new plant processing municipal solid waste, other non-hazardous waste and hazardous wood waste:		
	x. Gross electrical efficiency – 25- 35%	STR • Section 8.1 (Energy consumption and generation)	The facility will have an electrical efficiency of 29.2% when operating in power only mode.
	xi. Gross energy efficiency 72-91%	STR • Section 8.1 (Energy consumption and generation)	-The facility will have a gross energy efficiency of 46.4% when operating in CHP mode.
	Note: *a) The BAT-AEELs for gross electrical efficiency only apply to plants or parts of plants producing electricity using a condensing turbine* b) *The higher end of the BAT-AEEL range can be achieved when using BAT 20 (vi)* *c) The BAT-AEELs for gross energy efficiency only apply to plants or parts of plants producing only heat or producing electricity using a back-pressure turbine and heat with the steam leaving the turbine.* *A gross energy efficiency exceeding the higher end of the BAT-AEEL range (even above 100 %) can be achieved where a flue-gas condenser is used.*		

2.5 Emissions to air

Table 7: BAT conclusions checklist for Emissions to air

BAT ref.	Requirements	NESS permit application reference	Comments
	In order to prevent or reduce diffuse emissions from the incineration plant, including odour emissions, BAT is to:		

BAT ref.	Requirements	NESS permit application reference	Comments
BAT 21	i. Store solid and bulk pasty wastes that are odorous and/or prone to releasing volatile substances in enclosed buildings under controlled sub atmospheric pressure and use the extracted air as combustion air for incineration or send it to another suitable abatement system in the case of a risk of explosion	STR • Section 2.1.3 (Odour) • Section 3.6 (Odour)	-
	ii. Store liquid wastes in tanks under appropriate controlled pressure and duct the tank vents to the combustion air feed or to another suitable abatement system	STR • Section 2.1 (Municipal Waste and Raw Material Management) • Section 3.1 (Fugitive Emissions to Surface Water, Sewer and Groundwater)	The facility will not receive liquid waste for treatment, unless within containers as part of the MSW. Effluent produced during the treatment process will be contained within the energy from waste building wastewater tank. Depending on the water it will be re-used within the facility for FGT or slag extractor cooling. Refer to NSS-00-PM-AN-ACC-003 Water Balance Description
	iii. Control the risk of odour during complete shutdown periods when no incineration capacity is available, e.g. by: a) Sending the vented or extracted air to an alternative abatement system, e.g. a wet scrubber, a fixed adsorption bed b) Minimising the amount of waste in storage, e.g. by interrupting, reducing or transferring waste deliveries, as a part of waste stream management (see BAT 9)	STR • Section 2.1.3 (Odour) • Section 3.6 (Odour)	Refer to Odour Study NSS-00PM-AN-ACC-0002 Deodorisation Proposal_02 – issued under NSS-E-ACC-EN-SEP-0100.
	iv. Storing waste in properly sealed bales	Not applicable.	-
BAT 22	In order to prevent diffuse emissions of volatile compounds from the handling of gaseous and liquid wastes that are odorous and/or prone to releasing volatile substances at incineration plants, BAT is to feed them to the furnace by direct feeding. For gaseous and liquid wastes delivered in bulk waste containers (e.g. tankers), direct feeding is carried out by connecting the waste container to the furnace feeding line.	STR • Section 2.1.1 (Incoming municipal waste and raw materials)	Gaseous and liquid wastes accepted at the facility will be as part of the MSW waste stream, which will be fed directly into the furnace as part

BAT ref.	Requirements	NESS permit application reference	Comments
	The container is then emptied by pressurising it with nitrogen or, if the viscosity is low enough, by pumping the liquid. For gaseous and liquid wastes delivered in waste containers suitable for incineration (e.g. drums), direct feeding is carried out by introducing the containers directly in the furnace.		of the MSW, within the containers they arrive in.
BAT 23	In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to include in the environmental management system (see BAT 1) the following diffuse dust emissions management features:		
	i. Identification of the most relevant diffuse dust emission sources (e.g. using EN 15445)	STR • Section 4.4 (Organisation) Section 3.4 (Control of Fugitive Emissions to Air) • Section 6 (Waste handling)	-
	ii. Definition and implementation of appropriate actions and techniques to prevent or reduce diffuse emissions over a given time frame	STR • Section 3.4 (Control of Fugitive Emissions to Air)	-
BAT 24	In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below.		
	i. Enclose and cover equipment - Enclose/ encapsulate potentially dusty operations (such as grinding, screening) and/or cover conveyors and elevators. Enclosure can also be accomplished by installing all of the equipment in a closed building - Installing the equipment in a closed building may not be applicable to mobile treatment devices.	STR • Section 6.2 (Incinerator Bottom Ash Handling)	-
	ii. Limit height of discharge - Match the discharge height to the varying height of the heap, automatically if possible (e.g. conveyor belts with adjustable heights) - Generally applicable	STR • Section 6.2 (Incinerator Bottom Ash Handling)	-

BAT ref.	Requirements	NESS permit application reference	Comments
	iii. Protect stockpiles against prevailing winds - Protect bulk storage areas or stockpiles with covers or wind barriers such as screening, walling or vertical greenery, as well as correctly orienting the stockpiles in relation to the prevailing wind - Generally applicable	STR • Section 6.2 (Incinerator Bottom Ash Handling)	-
	iv. Use water sprays - Install water spray systems at the main sources of diffuse dust emissions. The humidification of dust particles aids dust agglomeration and settling. Diffuse dust emissions at stockpiles are reduced by ensuring appropriate humidification of the charging and discharging points, or of the stockpiles themselves. - Generally applicable	STR • Section 6.2 (Incinerator Bottom Ash Handling)	-
	v. Optimise moisture content - Optimise the moisture content of the slags/bottom ashes to the level required for efficient recovery of metals and mineral materials while minimising the dust release – Generally applicable	Not applicable.	The IBA will be exported from the facility for treatment at another appropriately permitted site. The manufacturing and end-use of IBAA will comply with SEPA's 2018 Draft Position Statement on the Use of Incinerator Bottom Ash Aggregate.
	vi. Operate under sub atmospheric pressure - The treatment of slags and bottom ashes is carried out in enclosed equipment or buildings under sub atmospheric pressure to enable treatment of the extracted air with an abatement technique (see BAT 26) as channelled emissions - Only applicable to dry-discharged and other low-moisture bottom ashes	Not applicable.	
BAT 25	In order to reduce channelled emissions to air of dust, metals and metalloids from the incineration of waste, BAT is to use one or a combination of the techniques given below.		
	i. Bag filter - Generally applicable to new plants. Applicable to existing plants within the constraints associated with the operating temperature profile of the FGC system	STR • Section 3.1 (Abatement of Point Source Emissions to Air)	-
	ii. Electrostatic precipitator – Generally applicable	Not applicable.	Not required as emissions will be passed through a bag filter.
	iii. Dry sorbent injection - Not relevant for the reduction of dust emissions. Adsorption of metals by injection of activated carbon or other reagents in	STR • Section 3.1 (Abatement of Point Source Emissions to Air)	Flue gas treatment will consist of dry scrubbing using hydrated lime.

BAT ref.	Requirements	NESS permit application reference	Comments
	combination with a dry sorbent injection system or a semi-wet absorber that is used to reduce acid gas emissions. – Generally applicable		
	iv. Wet scrubber - Wet scrubbing systems are not used to remove the main dust load but, installed after other abatement techniques, to further reduce the concentrations of dust, metals and metalloids in the flue-gas. - There may be applicability restrictions due to low water availability, e.g. in arid areas	Not applicable.	Flue gas treatment will consist of dry scrubbing using hydrated lime.
	v. Fixed- or moving-bed adsorption - The system is used mainly to adsorb mercury and other metals and metalloids as well as organic compounds including PCDD/F, but also acts as an effective polishing filter for dust. - The applicability may be limited by the overall pressure drop associated with the FGC system configuration. In the case of existing plants, the applicability may be limited by a lack of space.	STR • Section 3.1.3 (Particulate matter) • Section 3.1.9 (Dioxins and Furans)	-
	BAT-associated emission levels (BAT-AELs) for channelled emissions to air of dust, metals and metalloids from the incineration of waste:		
	i. Dust - < 2 -5 mg/Nm^3 – Daily average	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 5 mg/Nm^3
	ii. Cd+Tl - 0.005–0.02 mg/Nm^3 - Average over the sampling period	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 0.02 mg/Nm^3
	iii. Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V - 0.01–0.3 mg/Nm^3 - Average over the sampling period	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 0.3 mg/Nm^3
BAT 26	In order to reduce channelled dust emissions to air from the enclosed treatment of slags and bottom ashes with extraction of air (see BAT 24 f), BAT is to treat the extracted air with a bag filter:		

BAT ref.	Requirements	NESS permit application reference	Comments
	i. Dust – 2-5 mg/Nm^3 - Average over the sampling period	STR • Section 3.1 (Abatement of Point Source Emissions to Air) • Section 6 (Handling of waste) • Section 7 (Waste recovery and disposal)	Slag and bottom ash will be stored but not be treated on site. The IBA will be exported from the facility for treatment at another appropriately permitted site.
BAT 27	In order to reduce channelled emissions of HCl, HF and SO_2 to air from the incineration of waste, BAT is to use one or a combination of the techniques given below.		
	i. Wet scrubber - There may be applicability restrictions due to low water availability, e.g. in arid areas	Not applicable.	-
	ii. Semi-wet absorber – Generally applicable	Not applicable.	
	iii. Dry sorbent injection - Generally applicable	STR • Section 3.1 (Abatement of Point Source Emissions to Air)	
	iv. Direct desulphurisation - Used for partial abatement of acid gas emissions upstream of other techniques. - Only applicable to fluidised bed furnaces	Not applicable.	
	v. Boiler sorbent injection - Used for partial abatement of acid gas emissions upstream of other techniques -Generally applicable	Not applicable.	
BAT 28	In order to reduce channelled peak emissions of HCl, HF and SO_2 to air from the incineration of waste while limiting the consumption of reagents and the amount of residues generated from dry sorbent injection and semi-wet absorbers, BAT is to use technique (i) or both of the techniques given below.		
	i. Optimised and automated reagent dosage - The use of continuous HCl and/or SO_2 measurements (and/or of other parameters that may prove useful for this purpose) upstream and/or downstream of the FGC system for the optimisation of the automated reagent dosage – Generally applicable	STR • Section 3.1.7 (Secondary Acid Gas measures) • Section 3.1.8 (Carbon Monoxide (CO) and VOCs • Section 11.1 (Emissions Monitoring)	-

BAT ref.	Requirements	NESS permit application reference	Comments
	ii. Recirculation of reagents - The recirculation of a proportion of the collected FGC solids to reduce the amount of unreacted reagent(s) in the residues. The technique is particularly relevant in the case of FGC techniques operating with a high stoichiometric excess. - Generally applicable to new plants.	STR • Section 2.3.8 (Flue gas recirculation)	-
	BAT-AELs for channelled emissions to air of HCl, HF and SO_2 from the incineration of waste (for new plants):		
	i. HCl - < 2–6 mg/Nm^3 - Daily average	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 6 mg/Nm^3
	ii. HF - < 1 mg/Nm^3 - Daily average or average over the sampling period	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 1 mg/Nm^3
	iii. SO_2 - 5–30 mg/Nm^3 - Daily average	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 30 mg/Nm^3
	Note: *The lower end of the BAT-AEL range can be achieved when using a wet scrubber; the higher end of the range may be associated with the use of dry sorbent injection.*		
BAT 29	In order to reduce channelled NO_X emissions to air while limiting the emissions of CO and N_2O from the incineration of waste and the emissions of NH_3 from the use of SNCR and/or SCR, BAT is to use an appropriate combination of the techniques given below.		
	i. Optimisation of the incineration process – Generally applicable	STR • Section 2.2 (Waste charging) • Section 2.3 (Furnace)	-
	ii. Flue-gas recirculation - For existing plants the applicability may be limited due to technical constraints (e.g. pollutant load in the flue-gas, incineration conditions)	STR • Section 2.3.8 (Flue gas recirculation)	-

BAT ref.	Requirements	NESS permit application reference	Comments
	iii. Selective non-catalytic reduction (SNCR) – Generally applicable	STR • Section 3.1 (Abatement of Point Source Emissions to Air)	-
	iv. Selective catalytic reduction (SCR) - In the case of existing plants, the applicability may be limited by a lack of space	Not applicable.	-
	v. Catalytic filter bags - Only applicable to plants fitted with a bag filter	STR • Section 3.1 (Abatement of Point Source Emissions to Air)	-
	vi. Optimisation of the SNCR/ SCR design and operation - Optimisation of the reagent to NO_X ratio over the cross-section of the furnace or duct, of the size of the reagent drops and of the temperature window in which the reagent is injected - Only applicable where SNCR and/or SCR is used for the reduction of NO_X emissions	STR • Section 2.3 (Furnace)	-
	vii. Wet scrubber - Where a wet scrubber is used for acid gas abatement, and in particular with SNCR, unreacted ammonia is absorbed by the scrubbing liquor and, once stripped, can be recycled as SNCR or SCR reagent. - There may be applicability restrictions due to low water availability, e.g. in arid areas	Not applicable.	Dry acid gas scrubbing. See BAT 27
	BAT-AELs for channelled NO_X and CO emissions to air from the incineration of waste and for channelled NH3 emissions to air from the use of SNCR and/or SCR (for new plants):		
	i. NOx - 50–120 mg/Nm^3 – Daily average	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 120 mg/Nm^3
	ii. CO – 10-50 mg/Nm^3 - Daily average	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 50 mg/Nm^3

BAT ref.	Requirements	NESS permit application reference	Comments
	iii. NH_3 – 2-10 mg/Nm^3 - Daily average	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 10 mg/Nm^3
	Note: *The lower end of the BAT-AEL range for NOx and NH_3 can be achieved when using SCR. The lower end of the BAT-AEL range may not be achievable when incinerating waste with a high nitrogen content (e.g. residues from the production of organic nitrogen compounds).*		
BAT 30	In order to reduce channelled emissions to air of organic compounds including PCDD/F and PCBs from the incineration of waste, BAT is to use techniques (i), (ii), (iii), (iv), and one or a combination of techniques (v) to (ix) given below.		
	i. Optimisation of the incineration process - Optimisation of incineration parameters to promote the oxidation of organic compounds including PCDD/F and PCBs present in the waste, and to prevent their and their precursors' (re)formation – Generally applicable	STR • Section 2.6 (Boiler design)	-
	ii. Control of the waste feed - Knowledge and control of the combustion characteristics of the waste being fed into the furnace, to ensure optimal and, as far as possible, homogeneous and stable incineration conditions - Not applicable to clinical waste or to municipal solid waste	Not applicable.	The facility will only incinerate residual municipal solid waste.
	iii. On-line and off-line boiler cleaning - Efficient cleaning of the boiler bundles to reduce the dust residence time and accumulation in the boiler, thus reducing PCDD/F formation in the boiler. A combination of on-line and off-line boiler cleaning techniques is used. – Generally applicable	STR • Section 2.6 (Boiler Design)	-
	iv. Rapid flue-gas cooling - Rapid cooling of the flue-gas from temperatures above 400 °C to below 250 °C before dust abatement to prevent the de novo synthesis of PCDD/F. This is achieved by appropriate design of the boiler and/or with the use of a quench system. The latter option limits the amount of energy that can be recovered from the flue-gas and is used in particular in the case of incinerating. - Generally applicable	STR • Section 2.6 (Boiler Design)	-

BAT ref.	Requirements	NESS permit application reference	Comments
	v. Dry sorbent injection - Adsorption by injection of activated carbon or other reagents, generally combined with a bag filter where a reaction layer is created in the filter cake and the solids generated are removed. – Generally applicable	STR • Section 3.1.3 (Particulate matter) • Section 3.1.6 (Dioxins and Furans)	-
	vi. Fixed - or moving-bed adsorption - The applicability may be limited by the overall pressure drop associated with the FGC system. In the case of existing plants, the applicability may be limited by a lack of space	Not applicable.	-
	vii. SCR - Where SCR is used for NO_X abatement, the adequate catalyst surface of the SCR system also provides for the partial reduction of the emissions of PCDD/F and PCBs. The technique is generally used in combination with technique (v), (vi) or (ix). - In the case of existing plants, the applicability may be limited by a lack of space	Not applicable.	SNCR will be used for NOx abatement for the facility.
	viii. Catalytic filter bags - Only applicable to plants fitted with a bag filter	Not applicable.	-
	ix. Carbon sorbent in a wet scrubber - PCDD/F and PCBs are adsorbed by carbon sorbent added to the wet scrubber, either in the scrubbing liquor or in the form of impregnated packing elements. The technique is used for the removal of PCDD/F in general, and also to prevent and/or reduce the re-emission of PCDD/F accumulated in the scrubber (the so-called memory effect) occurring especially during shutdown and start-up periods - Only applicable to plants fitted with a wet scrubber	Not applicable.	
	BAT-associated emission levels (BAT-AELs) for channelled emissions to air of Total volatile organic carbon (TVOC), Polychlorinated dibenzo-p-dioxins and -furans (PCDD/F) and dioxin-like PCBs from the incineration of waste (for new plants):		
	i. TVOC - < 3–10 mg/Nm^3 – Daily average	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 10 mg/Nm^3

BAT ref.	Requirements	NESS permit application reference	Comments
	ii. PCDD/F: a) < 0.01–0.04 ng I-TEQ/Nm^3 - Average over the sampling period; **or** b) < 0.01–0.06 ng I-TEQ/Nm^3 - Long-term sampling period	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 0.04 ng I-TEQ/Nm^3
	iii. PCDD/F + dioxin-like PCBs: a) < 0.01–0.06 ng WHO-TEQ/Nm^3 - Average over the sampling period; **or** b) < 0.01–0.08 ng WHO-TEQ/Nm^3 - Long-term sampling period	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Refer to note a)
	Note: *a) Either the BAT-AEL for PCDD/F or the BAT-AEL for PCDD/F + dioxin-like PCBs applies.* *For long-term sampling, the BAT-AEL does not apply if the emission levels are proven to be sufficiently stable.*		
BAT 31	In order to reduce channelled mercury emissions to air (including mercury emission peaks) from the incineration of waste, BAT is to use one or a combination of the techniques given below.		
	i. A wet scrubber operated at a pH value around 1. The mercury removal rate of the technique can be enhanced by adding reagents and/or adsorbents to the scrubbing liquor, e.g.: a) Oxidants such as hydrogen peroxide to transform elemental mercury to a water-soluble oxidised form b) Sulphur compounds to form stable complexes or salts with mercury c) Carbon sorbent to adsorb mercury, including elemental mercury When designed for a sufficiently high buffer capacity for mercury capture, the technique effectively prevents the occurrence of mercury emission peaks. - There may be applicability restrictions due to low water availability, e.g. in arid areas.		Dry sorbent injection to be used
	ii. Dry sorbent injection - Adsorption by injection of activated carbon or other reagents, generally combined with a bag filter where a reaction layer is created in the filter cake and the solids generated are removed. – Generally applicable	STR • Section 3.1 (Abatement of Point Source Emissions to Air)	-

BAT ref.	Requirements	NESS permit application reference	Comments
	iii. Injection of special, highly reactive activated carbon - Injection of highly reactive activated carbon doped with sulphur or other reagents to enhance the reactivity with mercury. Usually, the injection of this special activated carbon is not continuous but only takes place when a mercury peak is detected. For this purpose, the technique can be used in combination with the continuous monitoring of mercury in the raw flue-gas – May not be applicable to plants dedicated to the incineration of sewage sludge		Dry sorbent injection to be used
	iv. Boiler bromine addition - Bromide added to the waste or injected into the furnace is converted at high temperatures to elemental bromine, which oxidises elemental mercury to the water-soluble and highly adsorbable $HgBr_2$. The technique is used in combination with a downstream abatement technique such as a wet scrubber or an activated carbon injection system. Usually, the injection of bromide is not continuous but only takes place when a mercury peak is detected. For this purpose, the technique can be used in combination with the continuous monitoring of mercury in the raw flue-gas – Generally applicable		Dry sorbent injection to be used
	v. Fixed- or moving-bed adsorption - When designed for a sufficiently high adsorption capacity, the technique effectively prevents the occurrence of mercury emission peaks. - The applicability may be limited by the overall pressure drop associated with the FGC system. In the case of existing plants, the applicability may be limited by a lack of space.		Dry sorbent injection to be used
	BAT-AELs for channelled mercury emissions to air from the incineration of waste (for new plants):		
	i. Hg - < 5–20 μg/Nm^3 - Daily average or average over the sampling period	E&IR • Section 2.1.2 (Emissions) • Appendix B (Air Quality assessment - Chapter 4)	Daily average of 0.02 mg/Nm^3
	ii. Hg - 1–10 μg/Nm^3 – Long term sampling period	Not applicable.	
	Note: *For daily averages, the lower end of the BATAEL ranges may be achieved when*:		

BAT ref.	Requirements	NESS permit application reference	Comments
	a) Incinerating wastes with a proven low and stable mercury content (e.g. mono-streams of waste of a controlled composition); or *b) Using specific techniques to prevent or reduce the occurrence of mercury peak emissions while incinerating non-hazardous waste*		

2.6 Emissions to water

Table 8: BAT conclusions checklist for Emissions to water

BAT ref.	Requirements	NESS permit application reference	Comments
BAT 32	In order to prevent the contamination of uncontaminated water, to reduce emissions to water, and to increase resource efficiency, BAT is to segregate waste water streams and to treat them separately, depending on their characteristics. Waste water streams (e.g. surface run-off water, cooling water, waste water from flue-gas treatment and from bottom ash treatment, drainage water collected from the waste reception, handling and storage areas (see BAT 12) are segregated to be treated separately based on their characteristics and on the combination of treatment techniques required. Uncontaminated water streams are segregated from waste water streams that require treatment. When recovering hydrochloric acid and/or gypsum from the scrubber's effluent, the waste waters arising from the different stages (acidic and alkaline) of the wet scrubbing system are treated separately. Generally applicable to new plants.	STR • Section 3.2 (Abatement of Point Source Emissions to Surface Water and Sewer)	-
BAT 33	In order to reduce water usage and to prevent or reduce the generation of waste water from the incineration plant, BAT is to use one or a combination of the techniques given below.		
	i. Waste-water-free FGC techniques - Use of FGC techniques that do not generate waste water (e.g. dry sorbent injection or semi-wet absorber) - May not be applicable to the incineration of hazardous waste with a high halogen content	STR • Section 3.1.7 (Secondary acid gas measures) • Section 3 2.1 (Process waste water)	-

BAT ref.	Requirements	NESS permit application reference	Comments
	ii. Injection of waste water from FGC - Waste water from FGC is injected into the hotter parts of the FGC system - Only applicable to the incineration of municipal solid waste	STR • Section 3 2.1 (Process waste water) • Section 5.4.1 (Water use and minimisation • Section 5.4.1 (Reuse and recycling of water)	-
	iii. Water reuse/ recycling - Residual aqueous streams are reused or recycled. The degree of reuse/recycling is limited by the quality requirements of the process to which the water is directed. – Generally applicable	STR • Section 3 2.1 (Process waste water) • Section 5.4.1 (Water use and minimisation • Section 5.4.1 (Reuse and recycling of water)	-
	iv. Dry bottom ash handling - Dry, hot bottom ash falls from the grate onto a transport system and is cooled down by ambient air. No water is used in the process. - Only applicable to grate furnaces. There may be technical restrictions that prevent retrofitting to existing incineration plants.	Not applicable.	
BAT 34	In order to reduce emissions to water from FGC and/or from the storage and treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below, and to use secondary techniques as close as possible to the source in order to avoid dilution.		
	i. Primary techniques: Optimisation of the incineration process (see BAT 14) and/or of the FGC system (e.g. SNCR/SCR, see BAT 29) - Organic compounds including PCDD/F, ammonia/ammonium targeted	STR • Section 2.1 (Municipal waste and raw material management) • Section 2.2 (Waste charging) • Section 2.3 (Furnace), • Section 2.6 (Boiler design) • Section 2.8 (Control philosophy) • Section 3.1 (Abatement of Point Source Emissions Air)	

BAT ref.	Requirements	NESS permit application reference	Comments
	ii. Secondary techniques – Preliminary and primary treatment: a) Equalisation – All pollutants targeted b) Neutralisation – Acids, alkalis targeted c) Physical separation, e.g. screens, sieves, grit separators, primary settlement tanks - Gross solids, suspended solids targeted	STR • Section 3.2 (Abatement of Point Source Emissions to Surface Water and Sewer) • Section 3 2.1 (Process waste water) • Section 5.4.1 (Water use and minimisation • Section 5.4.1 (Reuse and recycling of water)	Water rejected from the boiler water cycle, due to its quality, will be used in the process as conditioning water, for the acid gas treatment reagents or in the IBA extractors as quench water.
	iii. Physico-chemical treatment: a) Adsorption on activated carbon - Organic compounds including PCDD/F, mercury targeted b) Precipitation - Dissolved metals/metalloids, sulphate targeted c) Oxidation - Sulphide, sulphite, organic compounds targeted d) Ion exchange – Dissolved metals/ metalloids targeted e) Stripping – Purgeable pollutants (e.g. ammonia/ ammonium) targeted f) Reverse osmosis - Ammonia/ammonium, metals/metalloids, sulphate, chloride, organic compounds	Not applicable	There will be no aqueous emission.
	iv. Final solids removal (suspended solids, particulate-bound metals/ metalloids targeted): a) Coagulation and flocculation b) Sedimentation c) Filtration	Not applicable	There will be no aqueous emission.

BAT ref.	Requirements	NESS permit application reference	Comments
	d) Flotation		
	BAT-AELs for direct emissions to a receiving water body:		
	1. TSS – FGC Bottom ash treatment - 10–30 mg/l	STR • Section 3.2 (Abatement of Point Source Emissions to Surface Water and Sewer)	Through the efficient use of water and use of any contaminated water in the process, there will be no aqueous emission from the facility. See STR Section 5.4.1.
	2. TOC – FGC Bottom ash treatment – 15-40 mg/l		
	3. Metals and metalloids (from FGC process): a) As - 0.01–0.05 mg/l b) Cd - 0.005–0.03 mg/l c) Cr - 0.01–0.1 mg/l d) Cu - 0.03–0.15 mg/l e) Hg - 0.001–0.01 mg/l f) Ni - 0.03–0.15 mg/l g) Pb (from bottom ash treatment in addition to FGC) - 0.02–0.06 mg/l h) Sb - 0.02–0.9 mg/l i) Tl - 0.005–0.03 mg/l j) Zn - 0.01–0.5 mg/l		
	4. Ammonium-nitrogen (NH_4-N) - Bottom ash treatment – 10-30 mg/l		
	5. Sulphate (SO_4^{2-}) - Bottom ash treatment – 400 – 1,000 mg/l		
	6. PCDD/F – FGC – 0.01-0.05 ng I-TEQ/l		

2.7 Material efficiency

Table 9: BAT conclusions checklist for Material efficiency

BAT ref.	Requirements	NESS permit application reference	Comments
BAT 35	In order to increase resource efficiency, BAT is to handle and treat bottom ashes separately from FGC residues.	STR • Section 6 (Waste handling)	-
BAT 36	In order to increase resource efficiency for the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below based on a risk assessment depending on the hazardous properties of the slags and bottom ashes.		
	i. Screening and sieving - Oscillating screens, vibrating screens and rotary screens are used for an initial classification of the bottom ashes by size before further treatment – Generally applicable	Not applicable	The incinerator bottom ash (IBA) will be exported for treatment offsite at an appropriately permitted site – See: STR - Section 7.2 (Incinerator Bottom Ash)
	ii. Crushing - Mechanical treatment operations intended to prepare materials for the recovery of metals or for the subsequent use of those materials, e.g. in road and earthworks construction – Generally applicable		
	iii. Aeraulic separation - Aeraulic separation is used to sort the light, unburnt fractions commingled in the bottom ashes by blowing off light fragments. A vibrating table is used to transport the bottom ashes to a chute, where the material falls through an air stream that blows uncombusted light materials, such as wood, paper or plastic, onto a removal belt or into a container, so that they can be returned to incineration. – Generally applicable		
	iv. Recovery of ferrous and non-ferrous metals - Different techniques are used, including: a) Magnetic separation for ferrous metals b) Eddy current separation for non-ferrous metals c) Induction all-metal separation		

BAT ref.	Requirements	NESS permit application reference	Comments
	v. Ageing - The ageing process stabilises the mineral fraction of the bottom ashes by uptake of atmospheric CO_2 (carbonation), draining of excess water and oxidation. Bottom ashes, after the recovery of metals, are stored in the open air or in covered buildings for several weeks, generally on an impermeable floor allowing for drainage and run-off water to be collected for treatment. The stockpiles may be wetted to optimise the moisture content to favour the leaching of salts and the carbonation process. The wetting of bottom ashes also helps prevent dust emissions. – Generally applicable		
	vi. Washing - The washing of bottom ashes enables the production of a material for recycling with minimal leachability of soluble substances (e.g. salts) – Generally applicable		

2.8 Noise

Table 10: BAT conclusions checklist for Noise

BAT ref.	Requirements	NESS permit application reference	Comments
BAT 37	In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques given below.		
	i. Appropriate location of equipment and buildings - Noise levels can be reduced by increasing the distance between the emitter and the receiver and by using buildings as noise screens - In the case of existing plants, the relocation of equipment may be restricted by a lack of space or by excessive costs	STR Section 10.1 (Minimisation of Noise) Pollution Prevention and Control Permit Application - Noise Assessment. Revison A NSS00-ME-DE-ACC-0002_BAT Noise Justification. Appended to the above.	

BAT ref.	Requirements	NESS permit application reference	Comments
	ii. Operational measures - These include: a) Improved inspection and maintenance of equipment b) Closing of doors and windows of enclosed areas, if possible c) Operation of equipment by experienced staff d) Avoidance of noisy activities at night, if possible e) Provisions for noise control during maintenance activities	STR • Section 10.1 (Minimisation of Noise)	
	iii. Low-noise equipment - This includes low-noise compressors, pumps and fans - Generally applicable when existing equipment is replaced or new equipment is installed	STR • Section 10.1 (Minimisation of Noise)	
	iv. Noise attenuation - Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings. - In the case of existing plants, the insertion of obstacles may be restricted by a lack of space	STR • Section 10.1 (Minimisation of Noise)	
	v. Noise-control equipment/ infrastructure – This includes: a) Noise-reducers b) Equipment insulation c) Enclosure of noisy equipment d) Soundproofing of buildings In the case of existing plants, the applicability may be limited by a lack of space.	STR • Section 10.1 (Minimisation of Noise)	

Appendix A

Contract waste risk assessment

A1 Radioactive waste contamination risk assessment

Activity Being Assessed: Risk of Radioactive Waste being contained within Authority Contract Waste								**Location & Area: NESS Energy from Waste Plant, Aberdeen**					
Title and Number of Persons Who Perform the Activity: N/A								[redacted]					
Equipment Required for the Activity: N/A								**Date: 01/10/2020** **Revised: At Rev 01, 29/10/2020**					
Activity/Task/ Step Description	**Potential Hazards**	**Current Controls**	**Current Risk**				**Actions (Additional Controls Required)**	**Action Owner & Due Date**	**OFI / CAR / Goals**	**Residual Risk**			
			C	**F**	**S**	**R**				**C**	**F**	**S**	**R**
High-Activity Sealed Radioactive Source (HASS) contained within Contract Waste Stream	Personnel exposed to high levels of radiation may suffer immediate and significant health impacts such as burns and/or acute radiation syndrome (radiation sickness). In addition, it can also result in long-term health effects such as cancer and cardiovascular disease. Significant financial impact through cessation of operations and facility clean up. In an extreme event, the facility may need to be abandoned.	High-Activity Sealed Radioactive Sources (HASS) are potentially hazardous, and as such are subject to a rigorous regulatory regime and delivery to the NESS plant as waste is improbable. The EU Basic Safety Standards Directive (BSSD) 2013/59/EURATOM sets out requirements for the control of HASS, including requirements for maintaining accurate and up to date records of the location, composition and activity level of all HASS held in EU Member States. In Scotland, the Environmental Authorisations (Scotland) Regulations 2018 (EA(S)R) apply. All waste delivered to the NESS plant comes from “multi bin” domestic waste colections which is pre-sorted in accordance with published client guidelines. Therefore with pre-sorted domestic waste coupled with the controls required under the regulations outlined above, the likelihood of HASS waste arriving at the Ness plant is highly improbable.	0.2	0.5	40	4	No additional controls are required as HASS is covered by regulation and supporting monitoring schemes.			0.2	0.5	40	4
Naturally Occuring Radioative Material (NORM) being contained within Contract Waste Stream.	Personnel exposed to repeated exposere to NORM may develop radiation related helath issues due to aggregation of exposure levels over time.	Naturally occurring radioactive materials are substances that naturally contain radioactive isotopes and are commonly produced by industrial, mining and manufacturing processes. Materials that typically contain low concentrations of radioactive particles are shown below, however none of the waste streams listed are accepted at the NESS facility. • Fly Ash • Phosphogypsum • Petrochemical and refining sludges • Sand blast grit from refinery or refractory operations • Refractory • Pipe and pipeline scale from refinery or oil-field operations NORM is regulated in the UK under the Ionising Radiations Regulations 2017 (IRR17).	0.2	0.5	15	1.5	No additional controls as NORM is covered by regulation and supported monitoring schemes.			0.2	0.5	15	1.5

Activity Being Assessed: Risk of Radioactive Waste being contained within Authority Contract Waste									**Location & Area: NESS Energy from Waste Plant, Aberdeen**					
Title and Number of Persons Who Perform the Activity: N/A									**Assessed by** [redacted]					
Equipment Required for the Activity: N/A									**Date: 01/10/2020** **Revised: At Rev 01, 29/10/2020**					
Activity/Task/ Step Description	**Potential Hazards**	**Current Controls**	**Current Risk**				**Actions (Additional Controls Required)**	**Action Owner & Due Date**	**OFI / CAR / Goals**	**Residual Risk**				
			C	**F**	**S**	**R**				**C**	**F**	**S**	**R**	
Orphan Radioactive material being contained within Contract Waste Streams.	Repeated exposure to very low level sources over time may result in radiation related health issues due to aggregation of exposure level sover time.	Pre-sorting of waste in accordance with client published guidance. https://www.aberdeenshire.gov.uk/waste/household-rubbish/a-z-list-of-materials/ https://www.aberdeencity.gov.uk/services/bins-and-recycling/what-goes-each-bin http://www.moray.gov.uk/moray_standard/page_77339.html 2017 – waste analysis results confirming no presence of radioactive sources. The main source orphaned sources is expected to flow from care home waste which is collected under separate contract by the NHS, and so it is not anticipated to be contained within the Contract Waste Steam. Operational Waste Acceptance Protocol contained within the NESS ENERGY PROJECT, RESIDUAL WASTE TREATMENT CONTRACT between ABERDEEN CITY COUNCIL and EFW NESS Limited, dated 09/08/2019, at Scehdule 26, plus the associated Service Provision Method Statements.	0.5	0.5	3	0.75	Visual monitoring of loads as they are being discharged by the Tipping Hall Operative to identify any loads that do not look to be in accordance with the agreed Waste Acceptance Protocol. All new customers will operate in accordance with the agreed Waste Acceptance protocol. And initial loads will be subject to more frequent spot checks to ensure conformirmation with the agreed Protocol.			0.5	0.5	3	0.75