Notice of variation and consolidation with introductory note

The Environmental Permitting (England & Wales) Regulations 2016

Winnington CHP Limited

Winnington Sodium Carbonate Manufacturing Site
Winnington
Northwich
Cheshire
CW8 4GX

Variation application number

EPR/EP3337NY/V005

Permit number

EPR/EP3337NY

Winnington Sodium Carbonate Manufacturing Site
Permit number EPR/EP3337NY

Introductory note

This introductory note does not form a part of the notice.

Purpose of this variation:

The main features of the installation are as follows:

The installation is a Combined Heat and Power (CHP) plant located at Winnington (SJ65057467). The CHP falls under the following IED Schedule 1 listed activity description:

Section 1.1 Part A(1)(a) – Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts.

The CHP originally provided steam (400 MW) and electricity (140 MW) to the following sites:

- The sodium carbonate production plant at the Winnington site.
- A separate IED installation to the east of Northwich (Lostock Sodium Carbonate Manufacturing Site) and a small Sodium Bicarbonate plant on the same site, along a five km pipeline.

The Winnington sodium carbonate manufacturing plant is now largely closed with production of steam now mainly for the Lostock site. Approximately 98 MW of electricity is now produced with some exported to the National Grid.

There are two LCPs on-site, see below. A LCP is defined as a combustion plant discharging waste gases through a common windshield, where the total thermal input is 50 MW or more.

LCP 117
The CHP comprises two gas turbines (GT) fired by natural gas, each equipped with a heat recovery steam generator (HRSG). They are arranged as two parallel combined cycle gas turbine (CCGT) trains with emissions venting through emission points A1 and A2 located within a common windshield of height 60 m.

The steam generated is passed through a single steam turbine which was replaced in 2014 for a smaller unit to produce electricity. The residual steam is used within the sodium carbonate and sodium bicarbonate manufacturing processes and condensed steam as water is returned to the CHP for re-use.

In normal operation only one gas turbine/HRSG train is operational with the other unit off and on stand-by. Both gas turbines can run in open cycle mode (OCGT), and emit gases through their relevant by-pass stack at emission points A3 or A4, of height 35 m. This type of operation is limited to <500 hours/year.

Any surplus power feeds into the National Grid in both CCGT and OCGT operational modes.

The net thermal input of this LCP is 620.86 MWth, however this is now limited to <540 MWth due to the size of the replacement steam turbine. This means that only one CCGT train can operate at any one time. The LCP comprises:

GT1A/GT1B- each at 139.42 MWth
HRSG1A/HRSG1B- each at 171.01 MWth

LCP 408
There are three package boilers D, E and F with emissions venting through emission points A5, A6 and A7 located within a common windshield of height 60 m. They are on hot stand-by so that they can rapidly meet the required steam demand. This is required in the event of the gas turbine not being available or when the steam demand drops during outages at the chemical plants. The boilers operate on natural gas, with low sulphur distillate gas oil as a back-up in case of a gas supply interruption.

The net thermal input of this LCP is 289.2 MWth, comprising three 96.4 MWth boilers.

Emissions from the plant include combustion gases (mainly carbon monoxide and oxides of nitrogen) to air.

An effluent flow (mainly water treatment plant, boiler blow-down and cooling tower purge water) is directed via the sodium carbonate effluent treatment system, which is controlled by the permit holder (permit EPR/SP3630BE). The discharge is continuously monitored for pH and temperature.

The main purpose of the variation is as follows:

Winnington CHP are applying to vary the permit to include a carbon capture and utilisation plant as a directly associated activity. Approximately 11% of the exhaust gases from the CHP plant will be redirected to the carbon capture plant, which will capture approximately 85% of the CO_2 from the CHP exhaust gas to be stored on site, primarily prior to use in the sodium bicarbonate manufacturing processes at the adjacent sodium bicarbonate manufacturing plant.
Management procedures for the proposed plant will be incorporated into the existing site procedures.

The main raw materials used by the proposed carbon capture plant will include the following:

- Activated carbon (used in two places: MEA filter and carbon filter)
- Activated alumina (desiccant)
- Amine solution (c.34% Monoethanolamine (MEA))
- Anhydrous ammonia
- Cooling water

In addition to the main raw materials, smaller quantities of anti-foam, sodium hydroxide solution, propylene glycol coolant and compressor oils will also be used within the proposed carbon capture plant.

Proposed handling, storage and usage of the raw materials as well as disposal routes for the waste products are set out in accordance with the relevant guidance. There will be minimal storage of raw materials on site – materials will generally be brought in as and when top up of the relevant units is required.

Air quality and noise assessments were undertaken to assess the impact of the new plant on each and it was concluded that there will be no significant impact to air quality or noise as a result of operation of the carbon capture plant.

The variation to operate the carbon capture and utilisation plant will not change the thermal input or associated gas consumption of the CHP unit. Given the purpose of the proposals is to capture CO_2 emissions from a portion of the CHP exhaust gases, the proposed carbon capture and utilisation plant will provide an overall reduction in global warming effects.

Schedule 2 of the notice comprises a consolidated permit which reflects the variations being made.

The schedules specify the changes made to the permit.

The status log of a permit sets out the permitting history, including any changes to the permit reference number.

Status log of the permit		
Description	**Date**	**Comments**
Application SP3130BU	31/08/05	Duly made
Additional information received	12/12/05	
Response to Schedule 4 Notice received	20/01/06	
Permit determined SP3130BU	30/06/06	Original permit issued to E.ON UK CHP Limited

Status log of the permit		
Description	**Date**	**Comments**
Application EPR/EP3337NY/T001 (full transfer of permit EPR/SP3130BU)	06/08/13	Duly made Application to transfer the permit in full to Winnington CHP Limited
Transfer determined EPR/EP3337NY/T001	30/08/13	Full transfer of permit complete
Application EPR/EP3337NY/V002	17/04/14	Duly made Application to vary permit to allow gas turbine to run open cycle for 500 hours per year.
Variation determined EPR/EP3337NY/V002	01/09/14	Varied permit issued.
Regulation 60 Notice sent to the Operator	09/12/14	Issue of a Notice under Regulation 60(1) of the EPR. Environment Agency Initiated review and variation to vary the permit under IED to implement the special provisions for LCP under Chapter III, introducing new Emission Limit Values (ELVs) applicable to LCP, referred to in Article 30(2) and set out in Annex V. The permit is also updated to modern conditions.
Regulation 60 Notice response	31/03/15	Response received from the Operator.
Additional information received	03/07/15	Response to request for further information dated 03/06/15.
Additional information received	06/11/15	Confirmation of compliance route by operator.
Variation determined EPR/EP3337NY/V005 (Billing ref: CP3934AC)	23/12/15	Varied and consolidated permit issued in modern condition format. Variation effective from 01/01/16.
Regulation 61 Notice sent to the Operator	01/05/18	Issue of a Notice under Regulation 61(1) of the EPR. Environment Agency initiated review and variation to vary the permit under IED to implement Chapter II following the publication of the revised Best Available Techniques (BAT) Reference Document for LCP.
Regulation 61 Notice response	01/10/18	Initial submission (superseded)
Request for further information by email 21/02/19	04/03/19	Drainage plans
	08/03/19	Thermal input justification
	15/03/19	Turbine specification and thermal input justification (Appendix A)
Request for further information by email 14/03/19 Clarification on operational parameters.	18/03/19	Fresh air firing of HRSG
	20/03/19	Updated Regulation 61 response and appendices (supersedes initial submission received 01/10/18)
Response from the Operator	17/04/19	Updated Regulation 61 response and all appendices (supersedes all previous submissions)
Response from Operator	30/04/19	BAT Conclusion 1 – Environmental Management System (EMS)
Response from Operator	02/05/19	Operating techniques relating to existing permit conditions 2.3.4 and 2.3.5 and NOx limits

Status log of the permit		
Description	**Date**	**Comments**
Response from Operator	10/05/19	Technical information-auxiliary boiler output
Variation determined EPR/EP3337NY/VEPR/EP3337NY/V004 (Billing ref: ZP3831QR)	04/06/19	Varied and consolidated permit issued
Application EPR/EP3337NY/V005 (Billing Ref: AP3434QV)	12/11/19	Duly Made. Application for the addition of a Carbon Capture and Utilisation Plant as a DAA
Request for information via Schedule 5, dated 20th February 20	20/03/20 & 25/03/20	Submission of revised Air Quality Modelling and report.
Request for information via Schedule 5 Notice dated 20th February 2020	26/03/20	Emissions to water data and justifications. Further clarifications about PCs in Air Quality Report.
Request for information via Schedule 5 Notice dated 19th May 2020	19/06/20	Questions surrounding emissions to water, emissions to air and the Site Condition Report
Request for Schedule 5 Notice missing info emails dated 12th & 26th August 2020	11/09/20	Further clarification for all question responses required.
Request for information via Schedule 5 Notice dated 13th October 2020	03/11/20	Response received 3rd November 2020
Request for information sent via email, dated 12th November 2020	27/11/20	Responses to questions about the use of acid as the absorber scrubber liquor; the inclusion of absorber stack flue gas heating; a monitoring regime for the quality of the MEA intended for re-use
Request for information sent via email, dated 18th December 2021	29/01/21	Responses to questions surrounding more detailed modelling for impacts at Midlands Meres and Mosses Phase 1 Ramsar; absorber tower scrubber monitoring clarification; trigger concentration for MEA 'top-up'; details of dissolved trace metals and monitoring regime; confirmation of whether the Carbon Capture Plant will operate during CHP start-up and shut-down.
Request for information sent via email, dated 23rd February 2021	24/02/21	Responses to questions surrounding the absorber tower flue gas scrubber.
Request for information sent via email, dated 26th February 2021	09/03/21	Responses to questions surrounding point source emissions to water and revised drainage plan

Other Part A installation permits relating to this installation		
Operator	**Permit number**	**Date of issue**
TATA Chemicals Europe Limited	EPR/SP3630BE	09/02/07
INEOS Enterprises Limited	EPR/BS5444IA	22/06/06
INEOS Technologies Limited	EPR/BP3639XN	05/02/08

End of introductory note

Notice of variation and consolidation

The Environmental Permitting (England and Wales) Regulations 2016

The Environment Agency in exercise of its powers under regulation 20 of the Environmental Permitting (England and Wales) Regulations 2016 varies and consolidates

Permit number

EPR/EP3337NY

Issued to

Winnington CHP Limited ("the operator")

whose registered office is

Natrium House,
Northwich,
Cheshire,
CW8 4GW

company registration number **08568552**

to operate a regulated facility at

Winnington Sodium Carbonate Manufacturing Site
Winnington
Northwich
Cheshire
CW8 4GX

to the extent set out in the schedules.

The notice shall take effect from 21/06/2021

Name	Date
J Linton	**21/06/2021**

Authorised on behalf of the Environment Agency

Only the following conditions have been varied by the consolidated permit EPR/EP3337NY

The following conditions were varied as a result of an Environment Agency initiated variation:

- **Update to condition 4.3.2 to reflect the latest template**
- **Update to condition 2.4 & Table S1.3 - Improvement Condition Programme:**
    - **Inclusion of Black Start Improvement Condition IC17**
- **Update to Schedule 5 to reflect the latest template**
- **Update to Schedule 6 to reflect the latest template (include IED interpretation, EPR date change to 2016)**

The following conditions were varied as a result of the application made by the operator:

- **Update to the registered address**
- **Update to condition 2.1.1 & table S1.1 to include DAA**
- **Update to condition 2.3.1 & Table S1.2 – to include new operating techniques documents**
- **Update to condition 2.3.6 & table S2.1 - Raw materials table updated to include MEA**
- **Update to condition 2.4 & Table S1.3 - Improvement Condition Programme:**
    - **IC 11 has been marked as complete**
    - **Inclusion of new ICs (IC12 – IC19)**
- **Inclusion of condition 2.5 & Table S1.6 – Pre-operational measures – Inclusion of pre-op condition and Pre-ops (PO 01, PO 02 and PO 03) for the requirement of an intensive monitoring exercise plan, commissioning plan and establishing reference baseline data report**
- **Removal of Table S3.1d(i) and update to conditions 3.1.1, 3.1.3, 3.5.1, 3.5.4, 3.6.7 and Tables S3.4 & S4.4 and Schedule 6 to remove requirements of the Transitional National Plan (TNP)**
- **Inclusion of table S3.1f(i) & (ii) – condition 3.1.1 - Emission to air monitoring requirements and emission limits for the carbon capture plant**
- **Update to Condition 3.1.3 and table S3.4 - Inclusion of total annual emissions limit for total amines from the carbon capture plant**
- **Update to Condition 3.5.1 – inclusion of tables S3.1f(i) & (ii) and process monitoring table S3.5**
- **Update to Condition 3.5.4 – inclusion of tables S3.1f(i) & (ii)**
- **Update to Condition 3.1.1 - Table S3.2 - amendment to monitoring requirements of point source emission to water W2 and the inclusion of point source emission to water (W4) of carbon capture plant cooling water**
- **Update to Condition 4.2.2 - Table S3.5 – process monitoring requirements for the Carbon Capture Plant**
- **Inclusion of condition 4.2.2 (f) – inclusion of the requirement of a report which gives an account of the running of the process, functioning & monitoring of the carbon capture plant**
- **Update to Table S4.1 (condition 4.2.3) reporting requirements – Carbon Capture plant emission points to air and water included**
- **Update to Table S4.2 (condition 4.2.2) to include Carbon Capture parameters**
- **Table S4.4 – update to Form IED AR1 to include Carbon Capture Plant Parameters**
- **Schedule 6 – interpretation – amendment or addition of new definitions**

- **Schedule 7 (condition 2.2.1) – new site plan included that includes the CCU plant area and new point source emission points, a new site plan which shows the multi-operator areas (drawing 2) & a new plan which shows the locations of (water discharge) Outfalls 5 & 11 (drawing 3).**

Schedule 2 – consolidated permit

Consolidated permit issued as a separate document.

Permit

The Environmental Permitting (England and Wales) Regulations 2016

Permit number

EPR/EP3337NY

This is the consolidated permit referred to in the variation and consolidation notice for application EPR/EP3337NY/V005 authorising,

Winnington CHP Limited ("the operator"),

whose registered office is

Natrium House,
Northwich,
Cheshire,
CW8 4GW

company registration number **08568552**

to operate a regulated facility at

Winnington Sodium Carbonate Manufacturing Site
Winnington
Northwich
Cheshire
CW8 4GX

to the extent authorised by and subject to the conditions of this permit.

Name	Date
J Linton	**21/06/2021**

Authorised on behalf of the Environment Agency

Conditions

1 Management

1.1 General management

1.1.1 The operator shall manage and operate the activities:

(a) in accordance with a written management system that identifies and minimises risks of pollution, including those arising from operations, maintenance, accidents, incidents, non-conformances, closure and those drawn to the attention of the operator as a result of complaints; and

(b) using sufficient competent persons and resources.

1.1.2 Records demonstrating compliance with condition 1.1.1 shall be maintained.

1.1.3 Any person having duties that are or may be affected by the matters set out in this permit shall have convenient access to a copy of it kept at or near the place where those duties are carried out.

1.2 Energy efficiency

1.2.1 The operator shall:

(a) take appropriate measures to ensure that energy is recovered with a high level of energy efficiency and energy is used efficiently in the activities;

(b) take appropriate measures to ensure the efficiency of energy generation at the permitted installation is maximised;

(c) review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities; and

(d) take any further appropriate measures identified by a review.

1.3 Efficient use of raw materials

1.3.1 The operator shall:

(a) take appropriate measures to ensure that raw materials and water are used efficiently in the activities;

(b) maintain records of raw materials and water used in the activities;

(c) review and record at least every four years whether there are suitable alternative materials that could reduce environmental impact or opportunities to improve the efficiency of raw material and water use; and

(d) take any further appropriate measures identified by a review.

1.4 Avoidance, recovery and disposal of wastes produced by the activities

1.4.1 The operator shall take appropriate measures to ensure that:

(a) the waste hierarchy referred to in Article 4 of the Waste Framework Directive is applied to the generation of waste by the activities;

(b) any waste generated by the activities is treated in accordance with the waste hierarchy referred to in Article 4 of the Waste Framework Directive; and

(c) where disposal is necessary, this is undertaken in a manner which minimises its impact on the environment.

1.4.2 The operator shall review and record at least every four years whether changes to those measures should be made and take any further appropriate measures identified by a review.

1.5 Multiple operator installations

1.5.1 Where the operator notifies the Environment Agency under condition 4.3.1 (a) or 4.3.1 (c), the operator shall also notify without delay the other operator(s) of the installation of the same information.

2 Operations

2.1 Permitted activities

2.1.1 The operator is only authorised to carry out the activities specified in schedule 1 table S1.1 (the "activities").

2.2 The site

2.2.1 The activities shall not extend beyond the site, being the land shown edged in green on the site plan (drawing 2), which is within the areas highlighted on the site plan (drawing 1), at schedule 7 to this permit that represents the extent of the installation covered by this permit and that/those of the other operators of the installation.

2.3 Operating techniques

2.3.1 The activities shall, subject to the conditions of this permit, be operated using the techniques and in the manner described in the documentation specified in schedule 1, table S1.2, unless otherwise agreed in writing by the Environment Agency.

2.3.2 For the following activities referenced in schedule 1, table S1.1: LCP 117 and LCP 408. Without prejudice to condition 2.3.1, the activities shall be operated in accordance with the "Electricity Supply Industry IED Compliance Protocol for Utility Boilers and Gas Turbines" revision 1 dated February 2015 or any later version unless otherwise agreed in writing by the Environment Agency.

2.3.3 If notified by the Environment Agency that the activities are giving rise to pollution, the operator shall submit to the Environment Agency for approval within the period specified, a revision of any plan or other documentation ("plan") specified in schedule 1, table S1.2 or otherwise required under this permit which identifies and minimises the risks of pollution relevant to that plan , and shall implement the approved revised plan in place of the original from the date of approval, unless otherwise agreed in writing by the Environment Agency.

2.3.4 Emergency generators/alarms/sirens/relief valves shall only be tested between the hours of 09.00 to 17.00hrs Monday to Friday and not on any Public Holiday.

2.3.5 The operator shall give at least two working days notice of any planned testing or operation of any plant described in condition 2.3.4 or any others which are likely to cause annoyance. If an emergency situation results in the operation of such equipment and is likely to cause annoyance, the operator shall inform the Agency without delay of the reasons for the emergency and the expected duration.

2.3.6 Any raw materials or fuels listed in schedule 2 table S2.1 shall conform to the specifications set out in that table.

2.3.7 Activities referenced in schedule 1, table S1.1: LCP 408 (Package boilers); the standby fuel, distillate fuel oil, may be used for periods of up to 10 days during times of interruption to the gas supply.

2.3.8 Activities referenced in schedule 1, table S1.1: LCP 117 (GT 1A, GT 1B) shall not operate in open cycle mode for more than 500 hours per year.

2.3.9 Activities referenced in schedule 1, table S1.1: LCP 117 and LCP 408 shall conform to the specifications set out in Schedule 1, tables S1.2 and S1.4 for the end of the start-up period and the start of the shut-down period.

2.3.10 Activities referenced in schedule 1, table S1.1: LCP 117 (GT 1A, GT 1B); the effective Dry Low NOx threshold shall conform to the specifications set out in Schedule 1, tables S1.2 and S1.5.

2.3.11 The operator shall ensure that where waste produced by the activities is sent to a relevant waste operation, that operation is provided with the following information, prior to the receipt of the waste:

(a) the nature of the process producing the waste;

(b) the composition of the waste;

(c) the handling requirements of the waste;

(d) the hazardous property associated with the waste, if applicable; and

(e) the waste code of the waste.

2.3.12 The operator shall ensure that where waste produced by the activities is sent to a landfill site, it meets the waste acceptance criteria for that landfill.

2.4 Improvement programme

2.4.1 The operator shall complete the improvements specified in schedule 1 table S1.3 by the date specified in that table unless otherwise agreed in writing by the Environment Agency.

2.4.2 Except in the case of an improvement which consists only of a submission to the Environment Agency, the operator shall notify the Environment Agency within 14 days of completion of each improvement.

2.5 Pre-operational conditions

2.5.1 The activities shall not be brought into operation until the measures specified in schedule 1 table S1.6 have been completed.

3 Emissions and monitoring

3.1 Emissions to water, air or land

3.1.1 There shall be no point source emissions to water, air or land except from the sources and emission points listed in schedule 3 tables S3.1a(i), S3.1a(ii), S3.1b, S3.1c, S3.1d,S3.1e, S3.1f(i), S3.1f(ii), S3.2 and S3.3.

3.1.2 The limits given in schedule 3 shall not be exceeded.

3.1.3 Total annual emissions from the LCP and Carbon Capture Plant emission points set out in schedule 3 tables S3.1a(i), S3.1b, S3.1c, S3.1d, S3.1f(i) and S3.1f(ii) of a substance listed in schedule 3 table S3.4 shall not exceed the relevant limit in table S3.4.

3.1.4 Periodic monitoring shall be carried out at least once every 5 years for groundwater and 10 years for soil, unless such monitoring is based on a systematic appraisal of the risk of contamination.

3.2 Emissions of substances not controlled by emission limits

3.2.1 Emissions of substances not controlled by emission limits (excluding odour) shall not cause pollution. The operator shall not be taken to have breached this condition if appropriate measures, including, but not limited to, those specified in any approved emissions management plan, have been taken to prevent or where that is not practicable, to minimise, those emissions.

3.2.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution, submit to the Environment Agency for approval within the period specified, an emissions management plan which identifies and minimises the risks of pollution from emissions of substances not controlled by emission limits;

(b) implement the approved emissions management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.2.3 All liquids in containers, whose emission to water or land could cause pollution, shall be provided with secondary containment, unless the operator has used other appropriate measures to prevent or where that is not practicable, to minimise, leakage and spillage from the primary container.

3.3 Odour

3.3.1 Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable to minimise the odour.

3.3.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution outside the site due to odour, submit to the Environment Agency for approval within the period specified, an odour management plan which identifies and minimises the risks of pollution from odour;

(b) implement the approved odour management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.4 Noise and vibration

3.4.1 Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved noise and vibration management plan to prevent or where that is not practicable to minimise the noise and vibration.

3.4.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution outside the site due to noise and vibration, submit to the Environment Agency for approval within the period specified, a noise and vibration management plan which identifies and minimises the risks of pollution from noise and vibration;

(b) implement the approved noise and vibration management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.5 Monitoring

3.5.1 The operator shall, unless otherwise agreed in writing by the Environment Agency, undertake the monitoring specified in the following tables in schedule 3 to this permit:

(a) point source emissions specified in tables S3.1a(i), S3.1a(ii), S3.1b, S3.1c, S3.1d, S3.1f(i), S3.1f(ii), S3.2 and S3.3.

(b) process monitoring as specified in table S3.5

3.5.2 The operator shall maintain records of all monitoring required by this permit including records of the taking and analysis of samples, instrument measurements (periodic and continuous), calibrations, examinations, tests and surveys and any assessment or evaluation made on the basis of such data.

3.5.3 Monitoring equipment, techniques, personnel and organisations employed for the emissions monitoring programme and the environmental or other monitoring specified in condition 3.5.1 shall have either MCERTS certification or MCERTS accreditation (as appropriate), where available, unless otherwise agreed in writing by the Environment Agency.

3.5.4 Permanent means of access shall be provided to enable sampling/monitoring to be carried out in relation to the emission points specified in schedule 3 tables S3.1a(i), S3.1a(ii), S3.1b, S3.1c, S3.1d, S3.1f(i), S3.1f(ii) and S3.2 unless otherwise agreed in writing by the Environment Agency.

3.6 Monitoring for Large Combustion Plant

3.6.1 All monitoring required by this permit shall be carried out in accordance with the provisions of Annex V of the Industrial Emissions Directive and the Large Combustion Plant Best Available Techniques Conclusions.

3.6.2 If the monitoring results for more than 10 days a year are invalidated within the meaning set out in condition 3.6.7, the operator shall:

(a) within 28 days of becoming aware of this fact, review the causes of the invalidations and submit to the Environment Agency for approval, proposals for measures to improve the reliability of the continuous measurement systems, including a timetable for the implementation of those measures; and

(b) implement the approved proposals.

3.6.3 Continuous measurement systems on emission points from the LCP`s shall be subject to quality control by means of parallel measurements with reference methods at least once every calendar year.

3.6.4 Unless otherwise agreed in writing by the Environment Agency in accordance with condition 3.6.5 below, the operator shall carry out the methods, including the reference measurement methods, to use and calibrate continuous measurement systems in accordance with the appropriate CEN standards.

3.6.5 If CEN standards are not available, ISO standards, national or international standards which will ensure the provision of data of an equivalent scientific quality shall be used, as agreed in writing with the Environment Agency.

3.6.6 Where required by a condition of this permit to check the measurement equipment, the operator shall submit a report to the Environment Agency in writing, within 28 days of the completion of the check.

3.6.7 Where Continuous Emission Monitors are installed to comply with the monitoring requirements in schedule 3, S3.1a(i), S3.1a(ii), S3.1b, S3.1c, S3.1d(ii); the Continuous Emission Monitors shall be used such that:

(a) for the continuous measurement systems fitted to the LCP release points defined in Tables S3.1a(i), S3.1a(ii), S3.1b, S3.1c, S3.1d(ii), the validated hourly, monthly and daily averages shall be determined from the measured valid hourly average values after having subtracted the value of the 95% confidence interval;

(b) the 95% confidence interval for nitrogen oxides and sulphur dioxide of a single measured result shall be taken to be 20%;

(c) the 95% confidence interval for dust releases of a single measured result shall be taken to be 30%;

(d) the 95% confidence interval for carbon monoxide releases of a single measured result shall be taken to be 10%;

(e) an invalid hourly average means an hourly average period invalidated due to malfunction of, or maintenance work being carried out on, the continuous measurement system. However, to allow some discretion for zero and span gas checking, or cleaning (by flushing), an hourly average period will count as valid as long as data has been accumulated for at least two thirds of the period (40 minutes). Such discretionary periods are not to exceed more than 5 in any one 24-hour period unless agreed in writing. Where plant may be operating for less than the 24-hour period, such discretionary periods are not to exceed more than one quarter of the overall valid hourly average periods unless agreed in writing; and

(f) any day, in which more than three hourly average values are invalid shall be invalidated.

4 Information

4.1 Records

4.1.1 All records required to be made by this permit shall:

(a) be legible;

(b) be made as soon as reasonably practicable;

(c) if amended, be amended in such a way that the original and any subsequent amendments remain legible, or are capable of retrieval; and

(d) be retained, unless otherwise agreed in writing by the Environment Agency, for at least 6 years from the date when the records were made, or in the case of the following records until permit surrender:

(i) off-site environmental effects; and

(ii) matters which affect the condition of the land and groundwater.

4.1.2 The operator shall keep on site all records, plans and the management system required to be maintained by this permit, unless otherwise agreed in writing by the Environment Agency.

4.2 Reporting

4.2.1 The operator shall send all reports and notifications required by the permit to the Environment Agency using the contact details supplied in writing by the Environment Agency.

4.2.2 A report or reports on the performance of the activities over the previous year shall be submitted to the Environment Agency by 31 January (or other date agreed in writing by the Environment Agency) each year. The report(s) shall include as a minimum:

(a) a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data;

(b) the resource efficiency metrics set out in schedule 4 table S4.2;

(c) the performance parameters set out in schedule 4 table S4.3 using the forms specified in table S4.4 of that schedule.

(d) where condition 2.3.8 applies the hours of operation in any year; and

(e) where condition 2.3.7 applies, the start date and time, and the days and hours of operation for each period of standby fuel operation.

(f) the functioning and monitoring of the carbon capture plant in a format agreed with the Environment Agency. The report shall, as a minimum requirement give an account of the running of the process (including a summary of records of process monitoring requirements of table S3.5), the emissions into air compared with the emission limits in Tables S3.1f(i) and S3.1f(ii), and details of the waste generated.

4.2.3 Within 28 days of the end of the reporting period the operator shall, unless otherwise agreed in writing by the Environment Agency, submit reports of the monitoring and assessment carried out in accordance with the conditions of this permit, as follows:

(a) in respect of the parameters and emission points specified in schedule 4 table S4.1;

(b) for the reporting periods specified in schedule 4 table S4.1 and using the forms specified in schedule 4 table S4.4; and

(c) giving the information from such results and assessments as may be required by the forms specified in those tables.

4.2.4 The operator shall, unless notice under this condition has been served within the preceding four years, submit to the Environment Agency, within six months of receipt of a written notice, a report assessing whether there are other appropriate measures that could be taken to prevent, or where that is not practicable, to minimise pollution.

4.2.5 For the following activities referenced in schedule 1, table S1.1: LCP 117 and LCP 408. Unless otherwise agreed in writing with the Environment Agency, within 1 month of the end of each quarter, the operator shall submit to the Environment Agency using the form IED RTA1, listed in table S4.4, the information specified on the form relating to the site's mass emissions.

4.3 Notifications

4.3.1 In the event:

(a) that the operation of the activities gives rise to an incident or accident which significantly affects or may significantly affect the environment, the operator must immediately—

(i) inform the Environment Agency,

(ii) take the measures necessary to limit the environmental consequences of such an incident or accident, and

(iii) take the measures necessary to prevent further possible incidents or accidents;

(b) of a breach of any permit condition the operator must immediately—

(i) inform the Environment Agency, and

(ii) take the measures necessary to ensure that compliance is restored within the shortest possible time;

(c) of a breach of permit condition which poses an immediate danger to human health or threatens to cause an immediate significant adverse effect on the environment, the operator must immediately suspend the operation of the activities or the relevant part of it until compliance with the permit conditions has been restored.

4.3.2 Any information provided under condition 4.3. shall be confirmed by sending the information listed in schedule 5 to this permit within the time period specified in that schedule.

4.3.3 Where the Environment Agency has requested in writing that it shall be notified when the operator is to undertake monitoring and/or spot sampling, the operator shall inform the Environment Agency when the relevant monitoring and/or spot sampling is to take place. The operator shall provide this information to the Environment Agency at least 14 days before the date the monitoring is to be undertaken.

4.3.4 The Environment Agency shall be notified within 14 days of the occurrence of the following matters, except where such disclosure is prohibited by Stock Exchange rules:

Where the operator is a registered company:

(a) any change in the operator's trading name, registered name or registered office address; and

(b) any steps taken with a view to the operator going into administration, entering into a company voluntary arrangement or being wound up.

Where the operator is a corporate body other than a registered company:

(c) any change in the operator's name or address; and

(d) any steps taken with a view to the dissolution of the operator.

4.3.5 Where the operator proposes to make a change in the nature or functioning, or an extension of the activities, which may have consequences for the environment and the change is not otherwise the subject of an application for approval under the Regulations or this permit:

(a) the Environment Agency shall be notified at least 14 days before making the change; and

(b) the notification shall contain a description of the proposed change in operation.

4.3.6 The Environment Agency shall be given at least 14 days notice before implementation of any part of the site closure plan.

4.3.7 Where the operator has entered into a climate change agreement with the Government, the Environment Agency shall be notified within one month of:

(a) a decision by the Secretary of State not to re-certify the agreement;

(b) a decision by either the operator or the Secretary of State to terminate the agreement; and

(c) any subsequent decision by the Secretary of State to re-certify such an agreement.

4.3.8 The operator shall inform the Environment Agency in writing of the closure of any LCP within 28 days of the date of closure.

4.4 Interpretation

4.4.1 In this permit the expressions listed in schedule 6 shall have the meaning given in that schedule.

4.4.2 In this permit references to reports and notifications mean written reports and notifications, except where reference is made to notification being made “immediately” or “without delay” in which case it may be provided by telephone.

Schedule 1 – Operations

Table S1.1 activities			
Activity reference	**Activity listed in Schedule 1 of the EP Regulations**	**Description of specified activity**	**Limits of specified activity**
AR1	Section 1.1 Part A(1)(a): Burning any fuel in an appliance with a rated thermal input of 50 megawatts or more.	LCP 117 – combined cycle gas turbine (CCGT) Operation of a natural gas fired combined heat and power (CHP) plant for production of steam and electricity. The CHP comprises two gas turbines (GT), each equipped with a heat recovery steam generator (HRSG) arranged as two parallel CCGT trains. GT 1A,HRSG 1A (139.42 MWth, 171.01 MWth) GT 1B,HRSG 1B (139.42 MWth, 171.01 MWth) In normal operation only one train is operational with the other unit off and on stand-by. The steam generated is passed through a 16.4 MWth single steam turbine. This limits the net thermal input of the LCP to < 540 MWth. LCP 117 – open cycle gas turbine (OCGT) Operation of natural gas fired, gas turbine GT1 A or GT 1B in open cycle for <500 hours/year, for production of electricity. Any surplus power feeds into the National Grid in both CCGT and OCGT operational modes. LCP 117 – HRSG fresh air firing (FAF) Operation of FAF HRSGs, HRSG 1A and HRSG 1B for production of steam and electricity. It is not BAT to operate a HRSG in auxiliary FAF mode other than in an emergency and where there is a credible plan for recovery of the gas turbine. LCP 408 Emergency back-up operation of three natural gas fired boilers for production of steam. Comprising package boilers D, E and F (289.2 MWth, each at 96.4 MWth). Low sulphur distillate gas oil is authorised as a back-up fuel in the event of a gas supply interruption. Emergency back-up operation only for <240 hours/year.	From receipt of natural gas or low sulphur distillate gas oil to discharge of exhaust gases and wastes, and the generation of electricity and steam for use in the HRSGs, steam turbine and for export.

Table S1.1 activities			
Activity reference	**Activity listed in Schedule 1 of the EP Regulations**	**Description of specified activity**	**Limits of specified activity**
	Directly Associated Activity		
AR2	Directly associated activity	Operation of a diesel generator (emission point A8), diesel fire pump (emission point A9) and two diesel engine gas turbine starters (emission point A10). All individually <1MWth.	From receipt of gas oil to discharge of exhaust gases and wastes.
AR3	Directly associated activity	Surface water drainage	Handling and storage of site drainage until discharge to the site surface water system.
AR4	Directly associated activity	Water treatment	From receipt of raw materials to dispatch to chemical effluent and dirty water system.
AR5	Directly associated activity	Carbon Capture and Utilisation Plant	From receipt of exhaust gases from the CHP plant, import or capture of Carbon Dioxide to discharge of exhaust gases and wastes and storage of raw materials and export of carbon dioxide.

Table S1.2 Operating techniques		
Description	**Parts**	**Date Received**
Application SP3130BU	Sections 1.2, 1.4, 1.6 and 1.8 of the application document in response to section 3a – technical standards, Part B of the application form.	31/08/05
Additional information supplied	Items 1- 10	12/12/05
Response to Schedule 4 Notice	Item 1	20/01/06
Application EPR/EP3337NY/V002	Part C3 of the application Section 3 all parts	17/04/14
Response to regulation 60(1) Notice – request for information dated 09/12/14	Compliance route and operating techniques identified in response to questions: 2 (compliance routes), 4 (configuration), 5 (net thermal input), 6 (MSUL/MSDL), 9ii (plant efficiency), 10 (monitoring derogation), 11 (monitoring). Excluding compliance route ELV and limited running for LCP 117 and LCP 408, and related operating techniques.	31/03/15
Receipt of additional information to the regulation 60(1) Notice. requested by letter dated 03/06/15	Compliance route(s) and operating techniques identified in response to questions: 5 (net thermal input), 6 (MSUL/MSDL), 9ii (plant efficiency), and 11 (monitoring)	03/07/15
Receipt of additional information to the regulation 60(1) Notice	Confirmation of the compliance routes chosen for LCP117 and LCP408 and thermal input of diesel generators.	06/11/15
Response to regulation 61(1) Notice (including appendices) – request for information dated 01/05/18 EPR/EP3337NY/V004	Compliance and operating techniques identified in response to the BAT Conclusions for large combustion plant published on 17 August 2017.	17/04/19 30/04/19
Procedure to be submitted in accordance with IC 11 in table S1.3 of this permit	Approved ‘other than normal operating controls’ (OTNOC) procedure for fresh air firing (FAF) of heat recovery steam generators (HRSGs).	15/10/19
Application EPR/EP3337NY/V005	Sections 1.15, 3 and 6 of the application document in response to section 3a – technical standards, Part C3 (LVOC BRef BAT assessment for the abatement of monoethanolamine (MEA))	12/11/19

Table S1.2 Operating techniques		
Description	**Parts**	**Date Received**
Response to Schedule 5 Notice 2 dated 19th May 2020	• Appraisal assessment for thermal solvent reclamation choice – response to Q3 of the Schedule 5 notice • Details of absorber column packing – response to Q5 of the Schedule 5 notice • Water wash and demister choice for air abatement justification – response to Q6 of the Schedule 5 notice • Flue gas recirculation clarification – response to Q7 of the Schedule 5 notice • Materials of construction confirmation of Carbon Capture Plant – response to Q8 of the Schedule 5 notice • Justification of solvent (MEA) choice – response to Q9 of the Schedule 5 notice • Capture efficiency explanation – response to Q11 of the Schedule 5 notice • Operating procedures of Carbon Capture Plant **–** response to Q12 of the Schedule 5 notice	19/06/20
Response to Schedule 5 Notice 2 further information requests dated 12th & 26th August 2020	• Energy (electrical and thermal), gas and water flow diagram (Sankey Diagram replacement) of Carbon Capture Plant – response to Q2 of the further information request • Details of SCR pollution prevention measures – response to Q4 of the further information request	11/09/20
Response to Schedule 5 Notice 3 dated 13th October 2020	• Confirmation of MEA purity likely to be used – response to Q2 of the Schedule 5 Notice • Details of the operation of the solvent reclamation system – response to Q3 of the Schedule 5 notice • Confirmation of the fate of the absorber stack scrubber liquor – response to Q4 of the Schedule 5 notice • Details of the energy efficiency of the carbon capture plant – response to Q5 of the Schedule 5 notice	03/11/20
Response to further information request (via email) dated 12th November 2020	Responses to questions surrounding: • the use of acid as the absorber scrubber liquor; • the inclusion of absorber stack flue gas heating; and • a monitoring regime for the quality of the MEA intended for re-use	27/11/20

Table S1.2 Operating techniques		
Description	**Parts**	**Date Received**
Response to further information request (via email) dated 18th December 2020	Responses to questions surrounding: • absorber tower scrubber monitoring clarification; • trigger concentration for MEA 'top-up'; • details of dissolved trace metals and monitoring regime; and • confirmation of whether the Carbon Capture Plant will operate during CHP start-up and shut-down.	29/01/21
Response to further information request (via email) dated 23rd February 2021	Responses to questions surrounding the absorber tower flue gas scrubber operation and monitoring possibilities.	24/02/21
Response to further information request (via email) dated 26th February 2021	Response to questions surrounding point source emissions to water and a revised drainage, point source emissions and site plan	09/03/21

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Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
IC 1a	Prepare a formal structured accident management plan in line with the Agency's Combustion Sector Guidance Note with particular regard to Section 2.8. This shall include appropriate discussion with the other operators of the Winnington Sodium Carbonate manufacturing site in order to identify and address any hazards which have an impact on accidents occurring across permit boundaries. Prepare an action plan for any proposed improvements. Submit a report describing the methodology used, any actions arising and proposed timescales to the Agency.	Complete
IC 1b	The operator shall implement the accident management plan and the action plan of proposed improvements.	Complete
IC 2a	Complete a waste minimisation audit in line with the Agency's Combustion Sector Guidance Note with particular regard to Section 2.4.2. This shall include, but shall not be limited to, appropriate discussion with the other operators of the Winnington Sodium Carbonate manufacturing site in order to identify and address any opportunities for waste minimisation across permit boundaries. Prepare an action plan for any proposed improvements. Submit a report describing the methodology used and proposed timescales to the Agency.	Complete
IC 2b	The operator shall implement the action plan of proposed improvements.	Complete

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
IC 3a	Complete a water minimisation audit in line with the Agency's Combustion Sector Guidance Note with particular regard to Section 2.4.3. This shall include, but shall not be limited to, appropriate discussion with the other operators of the Winnington Sodium Carbonate manufacturing site in order to identify and address any opportunities for water minimisation across permit boundaries. Prepare an action plan for any proposed improvements. Submit a report describing the methodology used and proposed timescales to the Agency.	Complete
IC 3b	The operator shall implement the action plan of proposed improvements.	Complete
IC 4	A representative analytical survey of the effluents discharged via emission points W1 and W2 shall be carried out. This shall determine the typical ranges of levels of contaminants including ammonia, mercury, cadmium, available chlorine, suspended solids and oils. A report shall be submitted to the Agency to include the results of this survey.	Complete
IC 5a	Provide appropriate information to demonstrate whether the emission limit value for NO_x ($300mg/m^3$) in Table 2.2.2 for emission points A5, A6 and A7 can be achieved from January 2008. Otherwise include a proposal for actions to enable the plant to meet this limit. A report shall be submitted to the Agency.	Complete
IC 5b	The operator shall implement the action plan of proposed improvements (if a plan is proposed).	Complete
IC 6a	Develop a noise management plan in line with the Agency's Horizontal Guidance for Noise Part 2 Noise Assessment and Control with particular regard to Section 3.3.4 and Appendix 4. This shall include, but shall not be limited to, appropriate discussion with other operators of the Winnington Sodium Carbonate manufacturing site in order to identify and address any opportunities for improved control of noise across permit boundaries and to minimise the overall noise levels emitted by the Installation. In particular, noisy operations at start-up, shutdown and abnormal operation including venting of steam shall be reviewed. Proposals for appropriate noise surveys, with reference shall also be included. Prepare an action plan for any proposed improvements. Submit a report describing the noise management plan and any proposed timescales to the Agency.	Complete
IC 6b	The operator shall implement the noise management plan and the action plan of proposed improvements.	Complete
IC 7a	The operator shall review the requirements for compliance with the Agency's MCERTS monitoring certification system as described in Condition 2.10.4(Permit: EPR/EP337NY, transferred 30-08-13). The operator shall submit proposals to the Agency for achieving compliance with these standards for all monitoring required by this permit. This shall include equipment, procedures, operator training and maintenance of equipment amongst others.	Complete
IC 7b	The operator shall implement the proposals for achieving compliance with MCERTS.	Complete

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
IC 8	The operator shall submit to the Environment Agency justification for the circumstances under which it may be BAT to operate a combined cycle gas turbine (CCGTs) in open cycle mode in the balancing market or other operating regimes for over 500 hours. Parameters to consider should include: ▪ Emissions to air and impact on human health ▪ Energy efficiency ▪ Cost benefit assessment comparing alternative technologies The Environment Agency will use this information along with information from other industry and National Grid to determine generic BAT conditions for the open cycle operation of CCGTs in competition with closed cycle plants. The operator should have regard to the requirements of the balancing market (e.g. start-up time requirements) and define a maximum run time beyond which the service should be provided by high efficiency plant.	Complete
IC 9	The operator shall submit a report on the feasibility of carrying out emissions monitoring during open cycle operation. The report shall include results from any monitoring that has been carried out during open cycle operation and how the results would relate to possible emission limit values.	Complete
IC 10	For LCPD LCP 169 (now LCP 117 and 408 under IED). Annual emissions of dust, sulphur dioxide and oxides of nitrogen including energy usage for the year 01/01/2015 to 31/12/2015 shall be submitted to the Environment Agency using form AAE1 via the NERP Registry. If the LPCD LCP was a NERP plant the final quarter submissions shall be provided on the RTA 1 form to the NERP Registry.	Complete
IC 11	The operator shall submit a procedure to the Environment Agency for approval which covers the operation of fresh air firing (FAF) of the heat recovery steam generators (HRSGs) under 'other than normal operating controls' (OTNOC). The procedure shall include the process and systems in place at the installation to control this mode of operation. The procedure shall be implemented in accordance with the written approval from the Environment Agency.	Complete

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
IC 12	**Commissioning plan - Report** The Operator shall submit a written report to the Environment Agency on the commissioning of the installation. The report shall summarise the environmental performance of the plant described in AR5 of Table S1.1, as installed against the established operational envelope and associated process controls including appropriate parameters as set out in the Application and the commissioning plan required by pre-operational condition PO2. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions and confirm that the Environmental Management System (EMS) has been updated accordingly.	3 months after the activity AR5 in table S1.1 is successfully commissioned.
IC13	**Using the process to control solvent degradation and hence emissions to air of ammonia - Review & Report** The operator shall submit a written report to the Environment Agency for technical assessment and approval. The report must contain the results of a review of the effectiveness of using the process to control solvent degradation and hence emissions to air of ammonia, using the data acquired from the emissions to air monitoring of ammonia concentrations from emission point A11 (as listed in table S3.1f(i) & (ii)). If the results show that process controls alone are not sufficient to keep ammonia evolution below compliance limits then the report shall contain a plan which includes proposals for further control or abatement of ammonia, including an emissions and process monitoring plan, reporting proposals and implementation dates. The report must contain dates for the implementation of any individual measures. The notification requirements of condition 2.4.2 will be deemed to have been complied with on submission of the report (and plan). You must implement any plan as approved, and from the date stipulated by the Environment Agency.	3 months after the activity AR5 in table S1.1 is successfully commissioned.
IC 14	**Intensive monitoring exercise 1 - Report** The operator shall submit a written report to the Environment Agency. The report must contain details of the outcome of the intensive period of monitoring carried out as a result of the plan agreed in pre-operating condition PO 01. In particular it will include details of the emission concentrations of Total Amines, MEA, MDEA, DEA, EA, DMA, MOR, PZ, MMA, ammonia acetaldehyde, speciated nitrosamines and total nitrosamines and nitramines (as per tables S3.1f(i) & (ii) emission point A11, or otherwise agreed in writing with the Environment Agency) and the consistency of these emission concentrations. The notification requirements of condition 2.4.2 will be deemed to have been complied with on submission of the report.	3 months after the activity AR5 in table S1.1 is successfully commissioned.

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
IC 15	**<u>Intensive monitoring exercise 2 – Plan</u>** Following the completion of IC14, submit a written long term monitoring plan, for Total Amines, MEA, MDEA, DEA, EA, DMA, MOR, PZ, MMA, ammonia acetaldehyde, speciated nitrosamines and total nitrosamines and nitramines (as per tables S3.1f(i) & (ii) emission point A11, or as otherwise agreed in writing with the Environment Agency), to the Environment Agency for technical assessment and agreement. The plan must include a review of the level of emissions and their variability and propose a suitable monitoring regime. The plan must contain dates for implementation. The notification requirements of condition 2.4.2 will be deemed to have been complied with on submission of the plan. You must implement the plan as agreed, and from the date stipulated by the Environment Agency.	Plan submission within 3 months of the completion of IC 14.
IC 16	**<u>Intensive monitoring exercise 2 – Report</u>** The operator shall submit a written report to the Environment Agency for technical assessment and approval. The report must contain an emissions to air risk assessment in line with our guidance which is based on sampled and monitored emissions data from emission point A11 in table S3.1f(i) & (ii). Parameters to be included are as follows (or otherwise agreed in writing with the Environment Agency): • Ammonia (NH_3) • Acetaldehyde • Total Amines (expressed as MEA) • 2-ethanolamine (Monoethanolamine – MEA) • Methyl diethanolamine (MDEA) • Diethanoamine (DEA) • Ethylamine (EA) • Dimethylamine (DMA) • Morpholine (MOR) • Piperazine (PZ) • Monomethylamine (MMA) • Total Nitrosamines (as NDMA) • N-nitrosodiethanolamine (NDELA) • N-nitrosodimethylamine (NDMA) • N-nitrosomorpholine • N-nitrosomethylethylamine • N-nitrosodiethylamine • N-nitrosodiisopropylamine • N-nitrosodiisobutylamine • N-nitrosodipropylamine • N-nitrosodibutylamine • N-nitrosopiperdine • N-nitrosopyrrolidine • N-nitrosodibenzylamine • N-(2-hydroxyethyl)ethylenediamine) (HEEDA) • N-nitrosomorpholine (NSMO) • N-nitrosopiperazine (MNPZ) • Formaldehyde	15 months after the completion of IC 15.

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	Emissions monitoring data obtained during the first year of operation shall be used to compare the actual emissions with those assumed in the impact assessment submitted with the application for variation EPR/E3337NY/V005 (where available). For those parameters not included in the original impact assessment, or those showing to be at concentrations higher than those assumed, in the impact assessment submitted in the application, an assessment shall be made of the impact to human health and habitats of each parameter using the 'Air emissions risk assessment for your environmental permit' guidance. Where Environmental Assessment Levels (EALs) for emitted substances are not available on the current published EAL list on gov.uk then a substance that most closely represents the substance of interest should be used. In the absence of a suitable candidate parameter from the published list, then the hierarchy for the derivation of new Environmental Assessment Levels (EALs) to air document should be used. The notification requirements of condition 2.4.2 will be deemed to have been complied with on submission of the report.	
IC 17	**Black Start Condition for OCGT LCP** A written report shall be submitted to the Environment Agency for approval. The report shall contain an impact assessment demonstrating that there is no significant environmental risk associated with black start operations and propose a methodology for minimisation of environmental impact during such a period of operation and for reporting instances of black start operation. The plant can be operated as set out in condition 2.3.11 of the permit once the report has been approved by the Environment Agency. The methodology for operation and reporting set out in the report shall be implemented by the Operator from the date of approval by the Environment Agency.	30/6/2022
IC 18	**Monitoring location validation – A11** During commissioning, the operator shall carry out tests to assess whether the air monitoring location A11 meets the requirements of BS EN 15259 and supporting Method Implementation Document (MID). A written report shall be submitted for approval setting out the results and conclusions of the assessment including where necessary proposals for improvements to meet the requirements. Where notified in writing by the Environment Agency that the requirements are not met, the operator shall submit proposals or further proposals for rectifying this in accordance with the time scale in the notification. The proposals shall be implemented in accordance with the Environment Agency's written approval.	Before the activity AR5 in table S1.1 is successfully commissioned.

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
IC 19	**Validation of the maximum cooling demand of the CCU plant on the River Weaver cooling water** The operator shall submit a written report to the Environment Agency. The report must contain details of the outcome of monitoring and calculation of the thermal load/cooling demand of the CCU plant on the River Weaver cooling water, and must establish the maximum recorded value. The notification requirements of condition 2.4.2 will be deemed to have been complied with on submission of the report.	3 months after the activity AR5 in table S1.1 is successfully commissioned.

Table S1.4 Start-up and Shut-down thresholds		
Emission Point and Unit Reference	**"Minimum Start-Up Load" (MSUL)** **Load in MW and as percent of rated power output (%)** **or steam flow rate in tonnes/hour and as percent of rated thermal output (%)**	**"Minimum Shut-Down Load" (MSDL)** **Load in MW and as percent of rated power output (%)** **or steam flow rate in tonnes/hour and as percent of rated thermal output (%)**
A1 LCP 117 (GT 1A & HRSG 1A)	28 MW; 70% of GT load	28MW; 70% of GT load
A2 LCP 117 (GT 1B & HRSG 1B)	28 MW; 70% of GT load	28 MW; 70% of GT load
A3 LCP 117 (GT 1A – open cycle)	28 MW; 70% of GT load	28 MW; 70% of GT load
A4 LCP 117 (GT 1B- open cycle)	28 MW; 70% of GT load	28 MW; 70% of GT load
A5 LCP 408 (Package boiler D)	78 tonnes/hour; 65%	78 tonnes/hour; 65%
A6 LCP 408 (Package boiler E)	78 tonnes/hour; 65%	78 tonnes/hour; 65%
A7 LCP 408 (Package boiler F)	78 tonnes/hour; 65%	78 tonnes/hour; 65%

Table S1.5 Dry Low NOx effective definition	
Emission Point and Unit Reference	**Definition** **Load in MW and as percent of rated power output (%) or when two of the criteria listed below for the LCP or unit have been met, whichever is soonest**
A1 LCP 117 (GT 1A & HRSG 1A)	28 MW; 70% of GT load
A2 LCP 117 (GT 1B & HRSG 1B)	28 MW; 70% of GT load
A3 LCP 117 (GT 1A – open cycle)	28 MW; 70% of GT load
A4 LCP 117 (GT 1B- open cycle)	28 MW; 70% of GT load

Table S1.6 Pre-operational measures	
Reference	**Pre-operational measures**
PO 01	**Intensive monitoring exercise 1 - Plan** At least 2 weeks before operation of activity AR5 in table S1.1, the Operator shall

Table S1.6 Pre-operational measures	
Reference	**Pre-operational measures**
	submit a written plan to the Environment Agency for technical assessment and approval, setting out proposals for a period of intensive isokinetic sampling and monitoring of emission point A11, which will be carried out to establish the emission concentrations of Total Amines, MEA, MDEA, DEA, EA, DMA, MOR, PZ, MMA, ammonia acetaldehyde, speciated nitrosamines and total nitrosamines and nitramines (as per table S3.1f(i)). The length of this period and number of samples required will be dependent on how consistent the emissions are, and should be sufficient to provide confidence in the results and their consistency. The proposals shall include details of the monitoring programme including the MCERTS site specific protocol for the Environment Agency to agree, or other agreed site specific protocol where MCERTS is not available.
PO 02	**Commissioning – Plan** At least 2 weeks before operation of activity AR5 in table S1.1, the Operator shall submit a written report to the Environment Agency, setting out the details of the commissioning plan for the Post-combustion Carbon Capture Plant. The commissioning plan shall include the established operational envelope and associated process controls including appropriate parameters. The report shall include details of the commissioning stages and dates of implementation for the Environment Agency to agree.
PO 03	**Establishing Baseline Reference Data** At least 2 weeks before operation of activity AR5 in table S1.1, the operator shall submit a written report which defines the baseline quality for the site as described in section 8 of the Site Condition Report submitted with application V005. The report shall include the borehole locations and relevant parameters to be tested as agreed with the Environment Agency.

Schedule 2 – Waste types, raw materials and fuels

Table S2.1 Raw materials and fuels	
Raw materials and fuel description	**Specification**
Natural gas	-
Distillate gas oil	Not exceeding 0.1% w/w sulphur content
MEA	Diethanolamine (DEA) not exceeding 0.2% content (unless otherwise agreed in writing with the Environment Agency

Schedule 3 – Emissions and monitoring

Table S3.1a(i) Point source emissions to air from CCGT (LCP 117 fired on natural gas)-shall apply until 16 August 2021						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**LCP 117** CCGT fired on natural gas	60 mg/m^3 Note 2	Monthly mean of validated hourly averages	Continuous	BS EN 14181
			66 mg/m^3 Note 2	Daily mean of validated hourly averages	Continuous	BS EN 14181
			120 mg/m^3 Note 2	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Carbon monoxide	**LCP 117** CCGT fired on natural gas	100 mg/m^3 Note 2	Monthly mean of validated hourly averages	Continuous	BS EN 14181
			110 mg/m^3 Note 2	Daily mean of validated hourly averages	Continuous	BS EN 14181
			200 mg/m^3 Note 2	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Sulphur dioxide	**LCP 117** CCGT fired on natural gas	-	-	At least every six months	Concentration by calculation, as agreed in writing with the Environment Agency
A1 GT1A & HRSG1A **A2** GT1B & HRSG1B	Oxygen	**LCP 117** CCGT fired on natural gas	-	-	Continuous As appropriate to reference	BS EN 14181
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Water vapour	**LCP 117** CCGT fired on natural gas	-	-	Continuous As appropriate to reference	BS EN 14181

Table S3.1a(i) Point source emissions to air from CCGT (LCP 117 fired on natural gas)-shall apply until 16 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Stack gas temperature	**LCP 117** CCGT fired on natural gas	-	-	Continuous As appropriate to reference	Traceable to national standards
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Stack gas pressure	**LCP 117** CCGT fired on natural gas	-	-	Continuous As appropriate to reference	Traceable to national standards
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Stack gas volume flow	**LCP 117** CCGT fired on natural gas	-	-	Continuous	BS EN 16911 & TGN M2
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	As required by the Method Implementation Document for BS EN 15259	**LCP 117** CCGT fired on natural gas	-	-	Pre-operation and when there is a significant operational change	BS EN 15259
Note 1: Points A1 and A2 on Drawing 2 in Schedule 7 of this permit. Note 2: Limits shall apply from MSUL/MSDL to base load, as defined in table S1.4 of this permit.						

Table S3.1a(ii) Point source emissions to air from CCGT (LCP 117 fired on natural gas)-shall apply from 17 August 2021						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)** Note 2	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**LCP 117** CCGT fired on natural gas	55 mg/m^3 Note 2	Yearly average	Continuous	BS EN 14181
			60 mg/m^3 Note 2	Monthly mean of validated hourly averages	Continuous	BS EN 14181
			66 mg/m^3 Note 2	Daily mean of validated hourly averages	Continuous	BS EN 14181
			66 mg/m^3 Note 3			
			120 mg/m^3 Note 2	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Carbon monoxide	**LCP 117** CCGT fired on natural gas	50 mg/m^3 Note 2	Yearly average	Continuous	BS EN 14181
			100 mg/m^3 Note 2	Monthly mean of validated hourly averages	Continuous	BS EN 14181
			110 mg/m^3 Note 2	Daily mean of validated hourly averages	Continuous	BS EN 14181
			110 mg/m^3 Note 3			
			200 mg/m^3 Note 2	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Sulphur dioxide	**LCP 117** CCGT fired on natural gas	-	-	At least every six months	Concentration by calculation, as agreed in writing with the Environment Agency

Table S3.1a(ii) Point source emissions to air from CCGT (LCP 117 fired on natural gas)-shall apply from 17 August 2021						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)** Note 2	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Oxygen	**LCP 117** CCGT fired on natural gas	-	-	Continuous As appropriate to reference	BS EN 14181
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Water vapour	**LCP 117** CCGT fired on natural gas	-	-	Continuous As appropriate to reference	BS EN 14181
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Stack gas temperature	**LCP 117** CCGT fired on natural gas	-	-	Continuous As appropriate to reference	Traceable to national standards
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Stack gas pressure	**LCP 117** CCGT fired on natural gas	-	-	Continuous As appropriate to reference	Traceable to national standards
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	Stack gas volume flow	**LCP 117** Gas turbine fired on natural gas	-	-	Continuous	BS EN 16911 & TGN M2
A1 GT 1A & HRSG 1A **A2** GT 1B & HRSG 1B	As required by the Method Implementation Document for BS EN 15259	**LCP 117** CCGT fired on natural gas	-	-	Pre-operation and when there is a significant operational change	BS EN 15259

Table S3.1a(ii) Point source emissions to air from CCGT (LCP 117 fired on natural gas)-shall apply from 17 August 2021						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)** Note 2	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
Note 1: Points A1 and A2 on Drawing 2 in Schedule 7 of this permit.						
Note 2: Limits shall apply when DLN is effective to base load, as defined in table S1.5 of this permit.						
Note 3: Limits shall apply from MSUL/MSDL to base load, as defined in table S1.4 of this permit.						

Table S3.1b Point source emissions to air from natural gas fired Heat Recovery Steam Generators (HRSGs) (LCP 117 FAF) Notes 2 and 3						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)-these limits do not apply during start up or shut down.**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A1 HRSG 1A **A2** HRSG 1B	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**LCP 117** HRSG fired on natural gas	120 mg/m^3	Calendar monthly mean	Continuous	BS EN 14181
			132 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
			240 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
A1 HRSG 1A **A2** HRSG 1B	Carbon monoxide	**LCP 117** HRSG fired on natural gas	100 mg/m^3	Calendar monthly mean	Continuous	BS EN 14181
			110 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
			200 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
A1 HRSG 1A **A2** HRSG 1B	Sulphur dioxide	**LCP 117** HRSG fired on natural gas	35 mg/m^3	-	At least every 6 months	Concentration by calculation, as agreed in writing with the Environment Agency

Table S3.1b Point source emissions to air from natural gas fired Heat Recovery Steam Generators (HRSGs) (LCP 117 FAF) Notes 2 and 3						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)-these limits do not apply during start up or shut down.**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A1 HRSG 1A **A2** HRSG 1B	Dust	**LCP 117** HRSG fired on natural gas	5 mg/m^3	-	At least every 6 months	Concentration by calculation, as agreed in writing with the Environment Agency
A1 HRSG 1A **A2** HRSG 1B	Oxygen	**LCP 117** HRSG fired on natural gas	-	-	Continuous As appropriate to reference	BS EN 14181
A1 HRSG 1A **A2** HRSG 1B	Water vapour	**LCP 117** HRSG fired on natural gas	-	-	Continuous As appropriate to reference	BS EN 14181
A1 HRSG 1A **A2** HRSG 1B	Stack gas temperature	**LCP 117** HRSG fired on natural gas	-	-	Continuous As appropriate to reference	Traceable to national standards
A1 HRSG 1A **A2** HRSG 1B	Stack gas pressure	**LCP 117** HRSG fired on natural gas	-	-	Continuous As appropriate to reference	Traceable to national standards
A1 HRSG 1A **A2** HRSG 1B	Stack gas volume flow	**LCP 117** HRSG fired on natural gas	-	-	Continuous	BS EN 16911 & TGN M2

Table S3.1b Point source emissions to air from natural gas fired Heat Recovery Steam Generators (HRSGs) (LCP 117 FAF) Notes 2 and 3						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)-these limits do not apply during start up or shut down.**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A1 HRSG 1A **A2** HRSG 1B	As required by the Method Implementation Document for BS EN 15259	**LCP 117** HRSG fired on natural gas	-	-	Pre-operation and when there is a significant operational change	BS EN 15259
A1 HRSG 1A **A2** HRSG 1B	Operating hours	**LCP 117** HRSG fired on natural gas	-	-	Continuous	As agreed in writing with the Environment Agency

Note 1: Points A1 and A2 on Drawing 2 in Schedule 7 of this permit.

Note 2: It is not BAT to operate a HRSG in auxiliary fresh air firing (FAF) mode other than in an emergency. Under emergency (abnormal) conditions, where the GT is taken off-line and where the operator has a credible plan to recover operation of the GT, the Regulator will permit the operation of the HRSG in auxiliary mode at 15% oxygen reference conditions.

Note 3: FAF operation shall be in accordance with the operating procedure provided under IC 11 in table S1.3 of this permit.

Table S3.1c Point source emissions to air from OCGT (LCP 117 operating for <500 hours/year in open cycle)						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)-these limits do not apply during start up or shut down.**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
A3 (GT 1A) **A4** (GT 1B)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**LCP 117** Gas turbine fired on natural gas	-	-	Concentration by calculation, every 2 years.	Agreed in writing with the Environment Agency
A3 (GT 1A) **A4** (GT 1B)	Sulphur dioxide	**LCP 117** Gas turbine fired on natural gas	-	-	Concentration by calculation, every 2 years.	Agreed in writing with the Environment Agency
A3 (GT A) **A4 (**GT 1B)	Carbon monoxide	**LCP 117** Gas turbine fired on natural gas	-	-	Concentration by calculation, every 2 years.	Agreed in writing with the Environment Agency
Note 1: By-pass stacks, emission point A3 on Drawing 2 in Schedule 7 of this permit.						

Table S3.1d Point source emissions to air from natural gas fired Package boilers (LCP 408).						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)-these limits do not apply during start up or shut down.** Note 2	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A5 (Package Boiler D)	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	**LCP 408** Boiler plant fired on natural gas	100 mg/m^3	Calendar monthly mean	Continuous	BS EN 14181
A6 (Package Boiler E)			110 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
A7 (Package Boiler F)			200 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181

Table S3.1d Point source emissions to air from natural gas fired Package boilers (LCP 408).						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)-these limits do not apply during start up or shut down.** Note 2	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	Carbon monoxide	**LCP 408** Boiler plant fired on natural gas	100 mg/m^3	Calendar monthly mean	Continuous	BS EN 14181
			110 mg/m^3	Daily mean of validated hourly averages	Continuous	BS EN 14181
			200 mg/m^3	95% of validated hourly averages within a calendar year	Continuous	BS EN 14181
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	Sulphur dioxide	**LCP 408** Boiler plant fired on natural gas	35 mg/m^3	-	At least every 6 months	Concentration by calculation, as agreed in writing with the Environment Agency
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	Dust	**LCP 408** Boiler plant fired on natural gas	5 mg/m^3	-	At least every 6 months	Concentration by calculation, as agreed in writing with the Environment Agency
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	Oxygen	**LCP 408** Boiler plant fired on natural gas	-	-	Continuous As appropriate to reference	BS EN 14181
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	Water vapour	**LCP 408** Boiler plant fired on natural gas	-	-	Continuous As appropriate to reference	BS EN 14181

Table S3.1d Point source emissions to air from natural gas fired Package boilers (LCP 408).						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit)-these limits do not apply during start up or shut down.** Note 2	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	Stack gas temperature	**LCP 408** Boiler plant fired on natural gas	-	-	Continuous As appropriate to reference	Traceable to national standards
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	Stack gas pressure	**LCP 408** Boiler plant fired on natural gas	-	-	Continuous As appropriate to reference	Traceable to national standards
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	Stack gas volume flow	**LCP 408** Boiler plant fired on natural gas	-	-	Continuous	BS EN 16911 & TGN M2
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	As required by the Method Implementation Document for BS EN 15259	**LCP 408** Boiler plant fired on natural gas	-	-	Pre-operation and when there is a significant operational change	BS EN 15259
A5 (Package Boiler D) **A6** (Package Boiler E) **A7** (Package Boiler F)	Operating hours	**LCP 408** Boiler plant fired on natural gas	-	-	Continuous	As agreed in writing with the Environment Agency
Note 1: Package boiler stacks, emission points A4, A5 and A6 on Drawing 2 in Schedule 7 of this permit. Note 2: Limits shall apply from MSUL/MSDL to base load, as defined in table S1.4 of this permit.						

Table S3.1e Point source emissions to air from directly associated activity AR2 in table S1.1 of this permit						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A8	-	Diesel generator	-	-	-	-
A9	-	Diesel fire pump	-	-	-	-
A10	-	Two gas turbine starters	-	-	-	-

Table S3.1f(i) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply until 16 August 2021						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11 (A1 & A2 by proxy)	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Carbon Capture Absorber Tower (CHP main stack by proxy)	60 mg/m^3 Note 2	Monthly mean of validated hourly averages	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
			66 mg/m^3 Note 2	Daily mean of validated hourly averages	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
			120 mg/m^3 Note 2	95% of validated hourly averages within a calendar year	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
A11 (A1 & A2 by proxy)	Carbon monoxide	Carbon Capture Absorber Tower (CHP main stack by proxy)	100 mg/m^3 Note 2	Monthly mean of validated hourly averages	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
			110 mg/m^3 Note 2	Daily mean of validated hourly averages	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)

Table S3.1f(i) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply until 16 August 2021						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
			200 mg/m^3 Note 2	95% of validated hourly averages within a calendar year	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
A11 (A1 & A2 by proxy)	Sulphur dioxide	Carbon Capture Absorber Tower (CHP main stack by proxy)	-	-	At least every six months	Concentration by calculation, as agreed in writing with the Environment Agency
A11	Oxygen	Carbon Capture Absorber Tower	-	-	Periodic as appropriate to reference	BS EN 14789
A11	Water vapour	Carbon Capture Absorber Tower	-	-	Periodic as appropriate to reference	BS EN 14790
A11	Stack gas temperature	Carbon Capture Absorber Tower	-	-	Periodic as appropriate to reference	Traceable to national standards
A11	Stack gas pressure	Carbon Capture Absorber Tower		-	Periodic as appropriate to reference	Traceable to national standards
A11	Ammonia (NH_3)	Carbon Capture Absorber Tower	23 mg/Nm^3	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic EN ISO 21877 or CEN TS 17337

Table S3.1f(i) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply until 16 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	Acetaldehyde	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, as agreed with the Environment Agency	Isokinetic sampling US EPA M316 (DI water or change to DNPH), or as agreed in writing with the Environment Agency
A11	Total Amines (expressed as MEA)	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling US EPA M316 (DI water or change to DNPH) and CEN TS 13649 monitoring, or as agreed in writing with the Environment Agency
A11	2-ethanolamine (Monoethanolamine - MEA) PRIMARY AMINE	Carbon Capture Absorber Tower	20 mg/Nm^3	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Methyl diethanolamine (MDEA) TERTIARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(i) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply until 16 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	Diethanolamine (DEA) SECONDARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Ethylamine (EA) PRIMARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Dimethylamine (DMA) SECONDARY AMINE	Carbon Capture Absorber Tower	2 mg/Nm^3	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Morpholine (MOR) SECONDARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(i) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply until 16 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	Piperazine (PZ) SECONDARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Monomethylamine (MMA) PRIMARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Total Nitrosamines and Nitramines (as NDMA)	Carbon Capture Absorber Tower	0.05 mg/Nm^3	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then every 3 months	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodiethanolamine (NDELA)	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(i) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply until 16 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	N-nitrosodimethylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosomorpholine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosomethylethylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodiethylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(i) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply until 16 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	N-nitrosodiisopropylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodiisobutylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodipropylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodibutylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(i) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply until 16 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	N-nitrosopiperdine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosopyrolidine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodibenzylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-(2-hydroxyethyl)ethylenediamine (HEEDA)	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(i) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply until 16 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	N-nitrosomorpholine (NSMO)	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosopiperazine (MNPZ)	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Formaldehyde	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	US EPA Method 316 or CEN TS 13649, or as agreed in writing with the Environment Agency
A11	As required by the Method Implementation Document for BS EN 15259 (Homogeneity test)	Carbon Capture Absorber Tower	-	-	Pre-operation and when there is a significant operational change	BS EN 15259
A12	-	Dehydrator purge	-	-	-	-
Note 1: Emission points on Drawing 2 in Schedule 7 of this permit. Note 2: Limits shall apply from MSUL/MSDL to base load, as defined in table S1.4 of this permit.						

Table S3.1f(ii) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply from 17 August 2021						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11 (A1 & A2 by proxy)	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Carbon Capture Absorber Tower (CHP main stack by proxy)	55 mg/m^3 Note 2	Yearly average	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
			60 mg/m^3 Note 2	Monthly mean of validated hourly averages	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
			66 mg/m^3 Note 2	Daily mean of validated hourly averages	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
			120 mg/m^3 Note 2	95% of validated hourly averages within a calendar year	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
A11 (A1 & A2 by proxy)	Carbon monoxide	Carbon Capture Absorber Tower (CHP main stack by proxy)	50 mg/m^3 Note 2	Yearly average	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
			100 mg/m^3 Note 2	Monthly mean of validated hourly averages	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
			110 mg/m^3 Note 2	Daily mean of validated hourly averages	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)

Table S3.1f(ii) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply from 17 August 2021						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
			200 mg/m^3 Note 2	95% of validated hourly averages within a calendar year	Continuous	As per monitoring required for the CHP main stack (A1 & A2), table S3.1a(i) & (ii)
A11 (A1 & A2 by proxy)	Sulphur dioxide	Carbon Capture Absorber Tower (CHP main stack by proxy)	-	-	At least every six months	Concentration by calculation, as agreed in writing with the Environment Agency
A11	Oxygen	Carbon Capture Absorber Tower	-	-	Periodic as appropriate to reference	BS EN 14789
A11	Water vapour	Carbon Capture Absorber Tower	-	-	Periodic as appropriate to reference	BS EN 14790
A11	Stack gas temperature	Carbon Capture Absorber Tower	-	-	Periodic as appropriate to reference	Traceable to national standards
A11	Stack gas pressure	Carbon Capture Absorber Tower		-	Periodic as appropriate to reference	Traceable to national standards
A11	Ammonia (NH_3)	Carbon Capture Absorber Tower	23 mg/Nm^3	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic EN ISO 21877 or CEN TS 17337

Table S3.1f(ii) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply from 17 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	Acetaldehyde	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling US EPA M316 (DI water or change to DNPH), or as agreed in writing with the Environment Agency
A11	Total Amines (expressed as MEA)	Carbon Capture Absorber Tower	No limit set,	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling US EPA M316 (DI water or change to DNPH) and CEN TS 13649 monitoring, or as agreed in writing with the Environment Agency.
A11	2-ethanolamine (Monoethanolamine - MEA) PRIMARY AMINE	Carbon Capture Absorber Tower	20 mg/Nm^3	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Methyl diethanolamine (MDEA) TERTIARY AMINE	Carbon Capture Absorber Tower	No limit set,	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(ii) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply from 17 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	Diethanolamine (DEA) SECONDARY AMINE	Carbon Capture Absorber Tower	No limit set,	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Ethylamine (EA) PRIMARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Dimethylamine (DMA) SECONDARY AMINE	Carbon Capture Absorber Tower	2 mg/Nm^3	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Morpholine (MOR) SECONDARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(ii) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply from 17 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	Piperazine (PZ) SECONDARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Monomethylamine (MMA) PRIMARY AMINE	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Total Nitrosamines and Nitramines (as NDMA)	Carbon Capture Absorber Tower	0.05 mg/Nm^3	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then every 3 months	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodiethanolamine (NDELA)	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(ii) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply from 17 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	N-nitrosodimethylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosomorpholine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosomethylethylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodiethylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(ii) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply from 17 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	N-nitrosodiisopropylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodiisobutylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodipropylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodibutylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(ii) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply from 17 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	N-nitrosopiperdine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosopyrolidine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosodibenzylamine	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-(2-hydroxyethyl)ethylenediamine (HEEDA)	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency

Table S3.1f(ii) Point source emissions to air from directly associated activity AR5 in table S1.1 of this permit – shall apply from 17 August 2021						
Emission point ref. & location [Note 1]	**Parameter**	**Source**	**Limit (including unit**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A11	N-nitrosomorpholine (NSMO)	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	N-nitrosopiperazine (MNPZ)	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	Isokinetic sampling EN 13284-1 and CEN TS 17337 monitoring, or as agreed in writing with the Environment Agency
A11	Formaldehyde	Carbon Capture Absorber Tower	No limit set	Periodic average over the sampling period	Monthly until the requirements of IC15 have been agreed, then as agreed with the Environment Agency	US EPA Method 316 or CEN TS 13649, or as agreed in writing with the Environment Agency
A11	As required by the Method Implementation Document for BS EN 15259 (Homogeneity test)	Carbon Capture Absorber Tower	-	-	Pre-operation and when there is a significant operational change	BS EN 15259
A12	-	Dehydrator purge	-	-	-	-
Note 1: Emission points on Drawing 2 in Schedule 7 of this permit. Note 2: Limits shall apply from MSUL/MSDL to base load, as defined in table S1.4 of this permit.						

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (incl. unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
W1 Via outfall 5 to River Weaver Navigation	pH	Combined process effluent from the Combined Heat and Power (CHP) plant and contaminated drains	5 – 9.5 Note 2	-	Continuous	As described in the Application
W1 Via outfall 5 to River Weaver Navigation	Temperature	Combined process effluent from the Combined Heat and Power (CHP) plant and contaminated drains	40^0 C Note 3	-	Continuous	As described in the Application
W2 Via outfall 11 to River Weaver Flood Course	pH	Combined process effluent from the Combined Heat and Power (CHP) plant and contaminated drains	5 – 9.5 Note 2	-	Continuous	As described in the Application

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements						
Emission point ref. & location **Note 1**	**Parameter**	**Source**	**Limit (incl. unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
W2 Via outfall 11 to River Weaver Flood Course	Temperature	Combined process effluent from the Combined Heat and Power (CHP) plant and contaminated drains	40˚C Note 3		Continuous	As described in the Application
W4Note 4 Via outfall 11 to River Weaver Flood Course	Temperature	Water from the Carbon Capture and Utilisation (CCU) plant cooling and compression system	Maximum 35°C incremental increase (ΔT) (to River Weaver input water ambient temperature)		Continuous	As described in the application

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (incl. unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
W4 Via outfall 11 to the River Weaver	Flow	Water from the Carbon Capture and Utilisation (CCU) plant cooling and compression system (when the CHP cooling water is also diverted to Outfall 11)	-		Continuous	Determined by difference based on a flow totaliser
	Temperature		TBD dependent on calculations using environmental conditions as agreed in the variation application EPR/EP3337NY/V005 and ensuring the uplift of the River Weaver ambient temperature is <3°C.	Daily averages (when in use)	Continuous (when in use)	Increase to the ambient temperature of the receiving water course from the CCU and CHP discharge to be calculated using case by case environmental conditions: • Ambient river temperature • Q95 / flow gauge data for the River Weaver Flood Course upstream of the discharge • Cooling water exit temperatures • Cooling water flow rates • Thermal load of plant on cooling water; as agreed in the variation application EPR/EP3337NY/V005.

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements						
Emission point ref. & location Note 1	**Parameter**	**Source**	**Limit (incl. unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
Note 1: On Drawing 2 & 3 in Schedule 7 of this permit.						
Note 2: The emission shall comply if the measured pH is no more than 0.5 units outside the limit range for no longer than one hour.						
Note 3: The emission limit shall comply if the measured temperature is no more than 5^0 C above the limit for no longer than one hour.						
Note 4: The emission limits apply to a plant which has a maximum thermal load / cooling demand of 13 MW on the River Weaver cooling water						

Table S3.3 Point source emissions to sewer, effluent treatment plant or other transfers off-site– emission limits and monitoring requirements						
Emission point ref. & location	**Parameter**	**Source**	**Limit (incl. Unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
S1 (S1 Foul sewer on Drawing 2 in Schedule 7 of this permit) to United Utilities plc	-	Domestic Effluent	-	-	-	-

Table S3.4 Annual limits (excluding start up and shut down except where otherwise stated).			
Substance	**Medium**	**Limit (including unit)**	**Emission Points**
Oxides of nitrogen	Air	10 tonnes per year	**LCP 408** Winnington package boilers Emission points A5, A6, A7
Total Amines (primary, secondary, tertiary and nitrosamines as agreed in table S3.1f (i/ii))	Air	13 tonnes per year	**A11** Post-combustion Carbon Capture Plant

Table S3.5 Process monitoring requirements				
Emission point reference or source or description of point of measurement	**Parameter**	**Monitoring frequency**	**Monitoring standard or method**	**Other specifications**
LCP 117	Net total fuel utilisation	After each modification which that could significantly affect these parameters	EN Standards or equivalent	-
Absorber solvent quality, activity AR5 in table S1.1	Percent active solvent (MEA)	1-2 per day, or otherwise agreed in writing with the Environment Agency	Method 1 as per document QMFU387, Operation & Maintenance Manual, version 0.12 submitted in the application, or otherwise agreed in writing with the Environment Agency	-
Absorber solvent quality, activity AR5 in table S1.1	Carbon dioxide loading (rich amine)	Every 2 days, or otherwise agreed in writing with the Environment Agency	Method 2 as per document QMFU387, Operation & Maintenance Manual, version 0.12 submitted in the application, or otherwise agreed in writing with the Environment Agency	-

Table S3.5 Process monitoring requirements				
Emission point reference or source or description of point of measurement	**Parameter**	**Monitoring frequency**	**Monitoring standard or method**	**Other specifications**
Absorber solvent quality, activity AR5 in table S1.1	Heat stable salts	Every day during the first month of operation then 1 per week, or otherwise agreed in writing with the Environment Agency	Method 3 as per document QMFU387, Operation & Maintenance Manual, version 0.12 submitted in the application, or otherwise agreed in writing with the Environment Agency	-
Absorber solvent quality, activity AR5 in table S1.1	Soluble iron concentration – Rich Solvent	Every day during the first month of operation then 1 per week, or otherwise agreed in writing with the Environment Agency	Method 4 as per document QMFU387, Operation & Maintenance Manual, version 0.12 submitted in the application, or otherwise agreed in writing with the Environment Agency	-
Absorber solvent quality, activity AR5 in table S1.1	Colour	Daily, or otherwise agreed in writing with the Environment Agency	Visual	The MEA solution should be clear (i.e. free from suspended solids)
Absorber solvent quality, activity AR5 in table S1.1	Soluble iron concentration - Lean solvent after carbon bed	Once per week, or otherwise agreed in writing with the Environment Agency	Method 4 as per document QMFU387, Operation & Maintenance Manual, version 0.12 submitted in the application, or otherwise agreed in writing with the Environment Agency	
Absorber solvent quality, activity AR5 in table S1.1	Carbon dioxide loading (Rich solvent)	Every 2 days, or otherwise agreed in writing with the Environment Agency	Method 2 as per document QMFU387, Operation & Maintenance Manual, version 0.12 submitted in the application, or otherwise agreed in writing with the Environment Agency	

Table S3.5 Process monitoring requirements				
Emission point reference or source or description of point of measurement	**Parameter**	**Monitoring frequency**	**Monitoring standard or method**	**Other specifications**
Absorber solvent quality, activity AR5 in table S1.1	Degradation products – including but not limited to amines, nitrosamines, nitramines (in absorber solvent prior to reclaiming)	Monthly, or otherwise agreed in writing with the Environment Agency	BS EN ISO 10695, or otherwise agreed in writing with the Environment Agency	
Cooling water ambient temperature (incoming), activity AR5 in table S1.1	Temperature	Daily average	As agreed in the application	Monitoring point NGR: SJ 64706 74668

Schedule 4 – Reporting

Parameters, for which reports shall be made, in accordance with conditions of this permit, are listed below.

Table S4.1 Reporting of monitoring data			
Parameter	**Emission or monitoring point/reference**	**Reporting period**	**Period begins**
Emissions to air Parameters as required by condition 3.5.1	A1, A2, A3, A4, A5, A6, A7, A11	Every 3 months for continuous monitoring	1 January, 1 April, 1 July, 1 October
		Every 6 months for periodic monitoring	1 January, 1 July
		Every year where there is an annual average	1 January
		Every 2 years for < 500 hours OCGT plant	1 January
Emissions to Water Parameters as required by condition 3.5.1	W1, W2, W4	Every 6 months	1 January, 1 July
Operating hours HRSG 1A and 1B in auxiliary fresh air firing (FAF) mode	A1, A2	Every 6 months	1 January, 1 July
Operating hours OCGT	A3, A4	Every 6 months	1 January, 1 July
Operating hours Package boilers D, E, F	A5, A6, A7	Every 6 months	1 January, 1 July

Table S4.2 Resource Efficiency Metrics	
Parameter	**Units**
Electricity Exported	GWhr
Heat Exported	GWhr
Mechanical Power Provided	GWhr
Fossil Fuel Energy Consumption	GWhr
Non-Fossil Fuel Energy Consumption	GWhr
Annual Operating Hours	hour
Water Abstracted from Fresh Water Source	m^3
Water Abstracted from Borehole Source	m^3
Water Abstracted from Estuarine Water Source	m^3
Water Abstracted from Sea Water Source	m^3
Water Abstracted from Mains Water Source	m^3

Table S4.2 Resource Efficiency Metrics	
Parameter	**Units**
Gross Total Water Used	m^3
Net Water Used	m^3
Hazardous Waste Transferred for Disposal at another installation	tonnes
Hazardous Waste Transferred for Recovery at another installation	tonnes
Non-Hazardous Waste Transferred for Disposal at another installation	tonnes
Non-Hazardous Waste Transferred for Recovery at another installation	tonnes
Waste recovered to Quality Protocol Specification and transferred off-site	tonnes
Waste transferred directly off-site for use under an exemption / position statement	tonnes
Efficiency of Carbon Dioxide Capture (Carbon Capture Plant)	%
Total (thermal and electrical) Energy use per tonne of Carbon Dioxide captured (Carbon Capture Plant)	kW/tonne CO_2

Table S4.3 Large combustion plant Performance parameters for reporting to DEFRA		
Parameter	**Frequency of assessment**	**Units**
Thermal Input Capacity for each LCP	Annually	MW
Annual Fuel Usage for each LCP	Annually	TJ
Total Emissions to Air of NO_x for each LCP	Annually	tonnes
Total Emissions to Air of SO_2 for each LCP	Annually	tonnes
Total Emissions to Air of Dust for each LCP	Annually	tonnes
Operating Hours for each LCP	Annually	hour

Table S4.4 Reporting forms				
Media/ parameter	**Reporting format**	**Starting Point**	**Agency recipient**	**Date of form**
Air & Energy	Form IED AR1 – SO_2, NO_x and dust mass emission and energy	01/01/16	National	31/12/15
Air	Form Air 1 - Carbon Capture plant emissions	21/06/21	Area Office	21/06/21
LCP	Form IED HR1 – operating hours	01/01/16	National	31/12/15
Air	Form IED CON 1 – continuous monitoring.	01/01/16	Area Office	2019
Air	Form IED CON 2 – continuous monitoring	01/01/16	Area Office	2019
CEMs	Form IED CEM – Invalidation Log	01/01/16	Area Office	2019
Air	Form IED PM1 - discontinuous monitoring and load.	01/01/16	Area Office	2019

Table S4.4 Reporting forms				
Media/ parameter	**Reporting format**	**Starting Point**	**Agency recipient**	**Date of form**
Resource Efficiency	Form REM1 – resource efficiency annual report	01/01/16	National	31/12/15
Water	Form water 1 or other form as agreed in writing by the Environment Agency	01/01/16	Area Office	2019

Schedule 5 – Notification

These pages outline the information that the operator must provide.

Units of measurement used in information supplied under Part A and B requirements shall be appropriate to the circumstances of the emission. Where appropriate, a comparison should be made of actual emissions and authorised emission limits.

If any information is considered commercially confidential, it should be separated from non-confidential information, supplied on a separate sheet and accompanied by an application for commercial confidentiality under the provisions of the EP Regulations.

Part A

Permit Number	
Name of operator	
Location of Facility	
Time and date of the detection	

(a) Notification requirements for any malfunction, breakdown or failure of equipment or techniques, accident, or emission of a substance not controlled by an emission limit which has caused, is causing or may cause significant pollution	
To be notified within 24 hours of detection	
Date and time of the event	
Reference or description of the location of the event	
Description of where any release into the environment took place	
Substances(s) potentially released	
Best estimate of the quantity or rate of release of substances	
Measures taken, or intended to be taken, to stop any emission	
Description of the failure or accident.	

(b) Notification requirements for the breach of a limit	
To be notified within 24 hours of detection unless otherwise specified below	
Emission point reference/ source	
Parameter(s)	
Limit	
Measured value and uncertainty	
Date and time of monitoring	
Measures taken, or intended to be taken, to stop the emission	

Time periods for notification following detection of a breach of a limit	
Parameter	Notification period

(c) Notification requirements for the breach of permit conditions not related to limits	
To be notified within 24 hours of detection	
Condition breached	
Date, time and duration of breach	
Details of the permit breach i.e. what happened including impacts observed.	
Measures taken, or intended to be taken, to restore permit compliance.	

(d) Notification requirements for the detection of any significant adverse environmental effect	
To be notified within 24 hours of detection	
Description of where the effect on the environment was detected	
Substances(s) detected	
Concentrations of substances detected	
Date of monitoring/sampling	

Part B – to be submitted as soon as practicable

Any more accurate information on the matters for notification under Part A.	
Measures taken, or intended to be taken, to prevent a recurrence of the incident	
Measures taken, or intended to be taken, to rectify, limit or prevent any pollution of the environment which has been or may be caused by the emission	
The dates of any unauthorised emissions from the facility in the preceding 24 months.	

Name*	
Post	
Signature	
Date	

* authorised to sign on behalf of the operator

Schedule 6 – Interpretation

“accident” means an accident that may result in pollution.

“Air Quality Risk Assessment” has the meaning given in Annex D of IED Compliance Protocol for Utility Boilers and Gas Turbines.

“application” means the application for this permit, together with any additional information supplied by the operator as part of the application and any response to a notice served under Schedule 5 to the EP Regulations.

“authorised officer” means any person authorised by the Environment Agency under section 108(1) of The Environment Act 1995 to exercise, in accordance with the terms of any such authorisation, any power specified in section 108(4) of that Act.

“average over the sampling period” means the average value of three consecutive measurements of at least 30 minutes each [or as agreed in writing with the Environment Agency].

“average of samples obtained during one year” means the average of the values obtained during one year of the periodic measurements taken with the monitoring frequency set for each parameter.

“background concentration” means such concentration of that substance as is present in:

for emissions to surface water, the surface water quality up-gradient of the site; or

for emissions to sewer, the surface water quality up-gradient of the sewage treatment works discharge.

“biomass” means:

(a) vegetable matter from agriculture and forestry;

(b) vegetable waste from the food processing industry, if the heat generated is recovered;

(c) fibrous vegetable waste from virgin pulp production and from production of paper from pulp, if it is co-incinerated at the place of production and the heat generated is recovered;

(d) cork waste; and

(e) wood waste with the exception of wood waste which may contain halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or coating, and which includes in particular such wood waste originating from construction and demolition waste.

“base load” means: (i) as a mode of operation, operating for >4000hrs pa; and (ii) as a load, the maximum load under ISO conditions that can be sustained continuously, i.e. maximum continuous rating.

“Black Start” means the procedure to recover from a total or partial shutdown of the UK Transmission System which has caused an extensive loss of supplies. This entails isolated power stations being started individually and gradually being reconnected to other power stations and substations in order to form an interconnected system again.

“calendar monthly mean” means the value across a calendar month of all validated hourly means.

“CCU” means Carbon Capture and Usage/Utilisation Plant

“CEN” means Commité Européen de Normalisation.

“Combustion Technical Guidance Note” means IPPC Sector Guidance Note Combustion Activities, version 2.03 dated 27th July 2005 published by Environment Agency.

“Commissioning” means testing of a new activity that involves any operation of the activity as referenced in schedule 1, table S1.1 or as agreed with the Environment Agency

“daily average” means the average over a period of 24 hours of validated hourly averages obtained by continuous measurements.

“DEA” mean Diethanolamine

“disposal”. Means any of the operations provided for in Annex I to Directive 2008/98/EC of the European Parliament and of the Council on waste.

“DLN” means dry, low NO_x burners.

“DMA” means Dimethylamine

“dynamic emission limit value” (DELV) means an emission limit that varies in accordance with Article 40 of the Industrial Emissions Directive.

“EA” means Ethylamine

“emissions to land” includes emissions to groundwater.

“Energy efficiency” the annual net plant energy efficiency means the value calculated from the operational data collected over the year.

“EP Regulations” means The Environmental Permitting (England and Wales) Regulations SI 2016 No.1154 and words and expressions used in this permit which are also used in the Regulations have the same meanings as in those Regulations.

“emissions of substances not controlled by emission limits” means emissions of substances to air, water or land from the activities, either from the emission points specified in schedule 3 or from other localised or diffuse sources, which are not controlled by an emission or background concentration limit.

“groundwater” means all water, which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.

“HEEDA” means N-(2-hydroxyethyl)ethylenediamine)

“Industrial Emissions Directive” means DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 November 2010 on industrial emissions, as read in accordance with Schedule 1A to the Environmental Permitting (England and Wales) Regulations 2016.

“large combustion plant” or “LCP” is a combustion plant or group of combustion plants discharging waste gases through a common windshield or stack, where the total thermal input is 50 MW or more, based on net calorific value. The calculation of thermal input, excludes individual combustion plants with a rated thermal input below 15MW.

“low polluting fuels” means biomass or coal with an average as-received sulphur content of less than 0.4% by mass as described in the ESI IED Compliance Protocol for Utility Boilers and Gas Turbines.

“Mid-merit” means combustion plant operating between 1,500 and 4,000 hrs/yr.

“MCERTS” means the Environment Agency’s Monitoring Certification Scheme.

“MCR” means maximum continuous rating.

“MDEA” means Methyl diethanolamine

“MEA” means Monoethanolamine

“MMA” means Monomethylamine

“MNPZ” means N-nitrosopiperazine

“MOR” means Morpholine

“MSDL” means minimum shut-down load as defined in Implementing Decision 2012/249/EU.

“MSUL” means minimum start-up load as defined in Implementing Decision 2012/249/EU.

“Natural gas” means naturally occurring methane with no more than 20% by volume of inert or other constituents.

“ncv” means net calorific value.

“NDELA” means N-nitrosodiethanolamine

“NDMA” means N-nitrosodimethylamine

“Net total fuel utilisation” means the ratio between the net produced energy minus the imported electrical and/or thermal energy and the fuel/feedstock energy input at the combustion unit boundary over a given period of time.

“NSMO” means N-nitrosomorpholine

“operational hours” are whole hours commencing from the first unit ending start up and ending when the last unit commences shut down.

Pests” means Birds, Vermin and Insects.

“PZ” means Piperazine

“quarter” means a calendar year quarter commencing on 1 January, 1 April, 1 July or 1 October.

“recovery” means any of the operations provided for in Annex II to Directive 2008/98/EC of the European Parliament and of the Council on waste.

“SI” means site inspector.

“Standby fuel” means alternative liquid fuels that are used in emergency situations when the gas fuel which is normally used, is not available.

“Successfully commissioned” The carbon capture plant will be considered to be “successfully commissioned” once the Environment Agency deems that it is capable of commercial operation.

This will normally be the point at which the operator has taken over operation of the plant from the Engineering, Procurement and Construction (EPC) contractor and the certificate for acceptance (or equivalent) has been issued, but may be earlier if the plant is capable of commercial operation before this point.

The Environment Agency will normally regard a plant to be capable of commercial operation if the following criteria is met:

- The plant has begun to capture, and store CO2 consistently at or near the design rate and quality (EIGA standard);

Where a minimum limit is set for any emission parameter, for example pH, reference to exceeding the limit shall mean that the parameter shall not be less than that limit.

Unless otherwise stated, any references in this permit to concentrations of substances in emissions into air means:

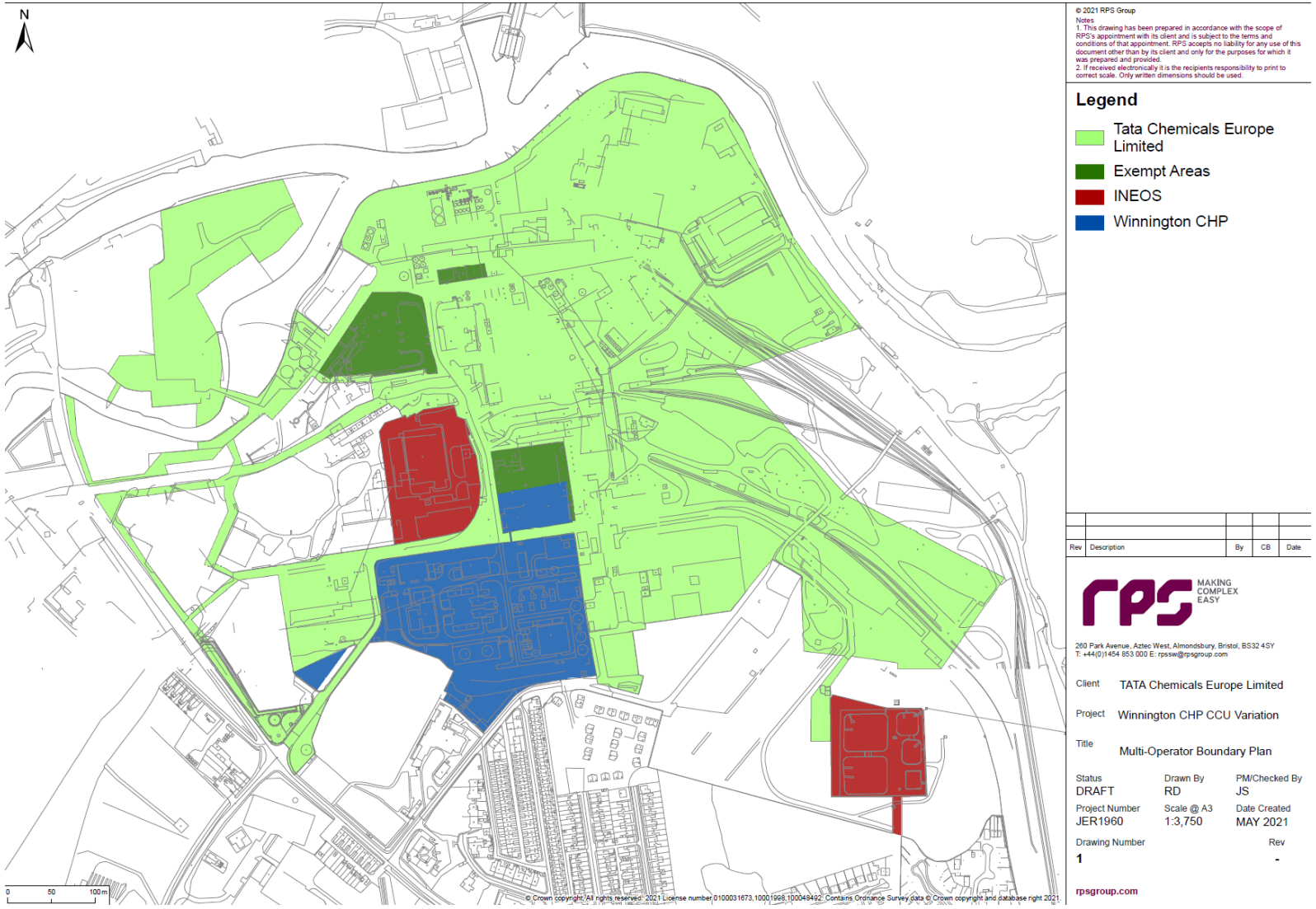
- in relation to emissions from combustion processes, the concentration in dry air at a temperature of 273K, at a pressure of 101.3 kPa and with an oxygen content of 3% dry for liquid and gaseous fuels, 6% dry for solid fuels; and/or
- in relation to emissions from gas turbine or compression ignition engine combustion processes, the concentration in dry air at a temperature of 273K, at a pressure of 101.3kPa and with an oxygen content of 15% dry for liquid and gaseous fuels; and/or
- in relation to emissions from combustion processes comprising a gas turbine with a waste heat boiler, the concentration in dry air at a temperature of 273K, at a pressure of 101.3kPa and with an oxygen content of 15% dry, unless the waste heat boiler is operating alone, in which case, with an oxygen content of 3% dry for liquid and gaseous fuels; and/or
- in relation to emissions from non-combustion sources, the concentration at a temperature of 273K and at a pressure of 101.3 kPa, with no correction for water vapour content.

“year” means calendar year ending 31 December.

“yearly average” means the average over a period of one year of validated hourly averages obtained by continuous measuremen

Schedule 7 – Site plan

Drawing 1 Multi Operator Installation site plan



Notes
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Legend

- Tata Chemicals Europe Limited
- Exempt Areas
- INEOS
- Winnington CHP

Rev	Description	By	CB	Date

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Client	TATA Chemicals Europe Limited
Project	Winnington CHP CCU Variation
Title	Multi-Operator Boundary Plan

Status	Drawn By	PM/Checked By
DRAFT	RD	JS
Project Number	**Scale @ A3**	**Date Created**
JER1960	1:3,750	MAY 2021
Drawing Number		**Rev**
1		-

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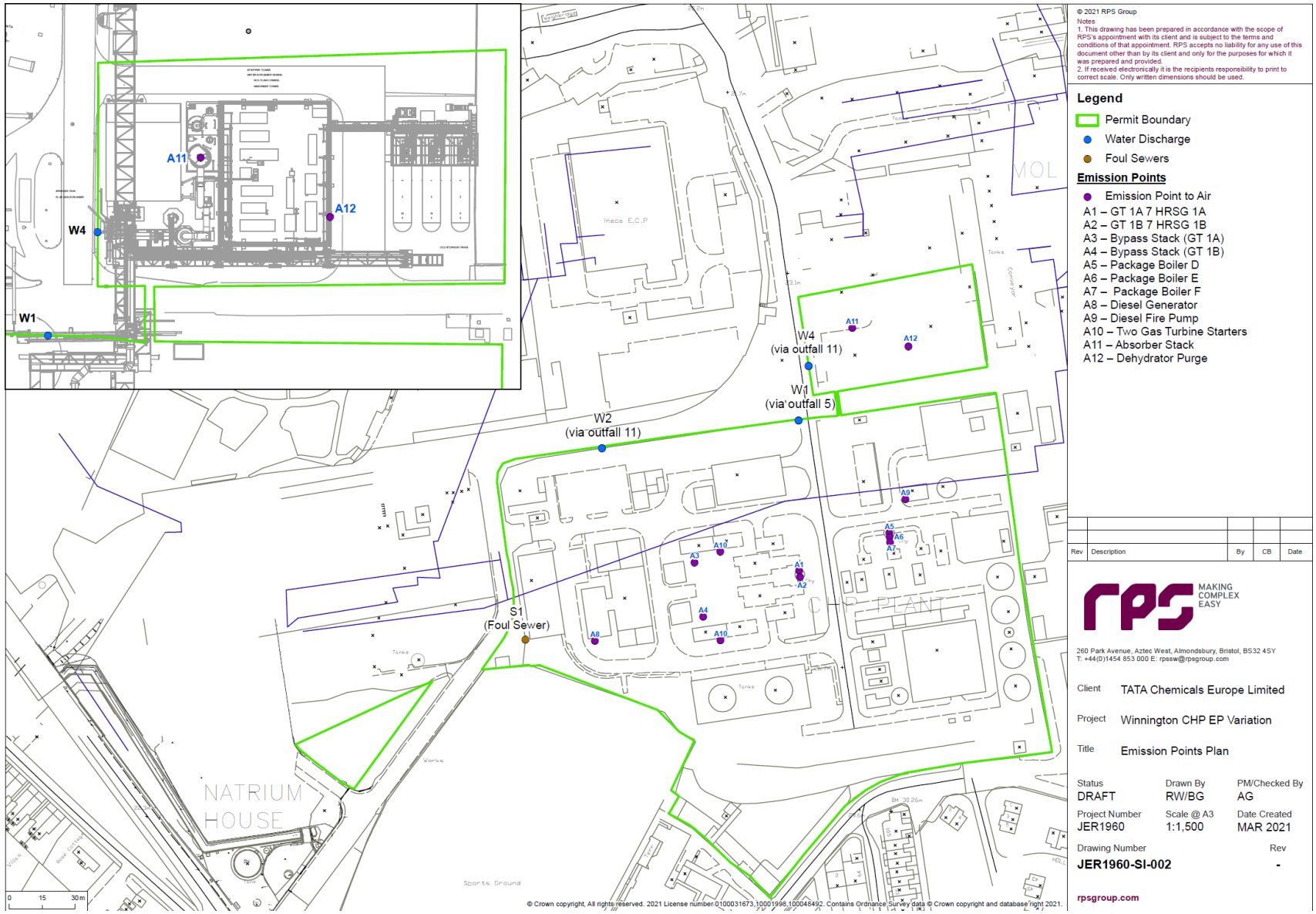
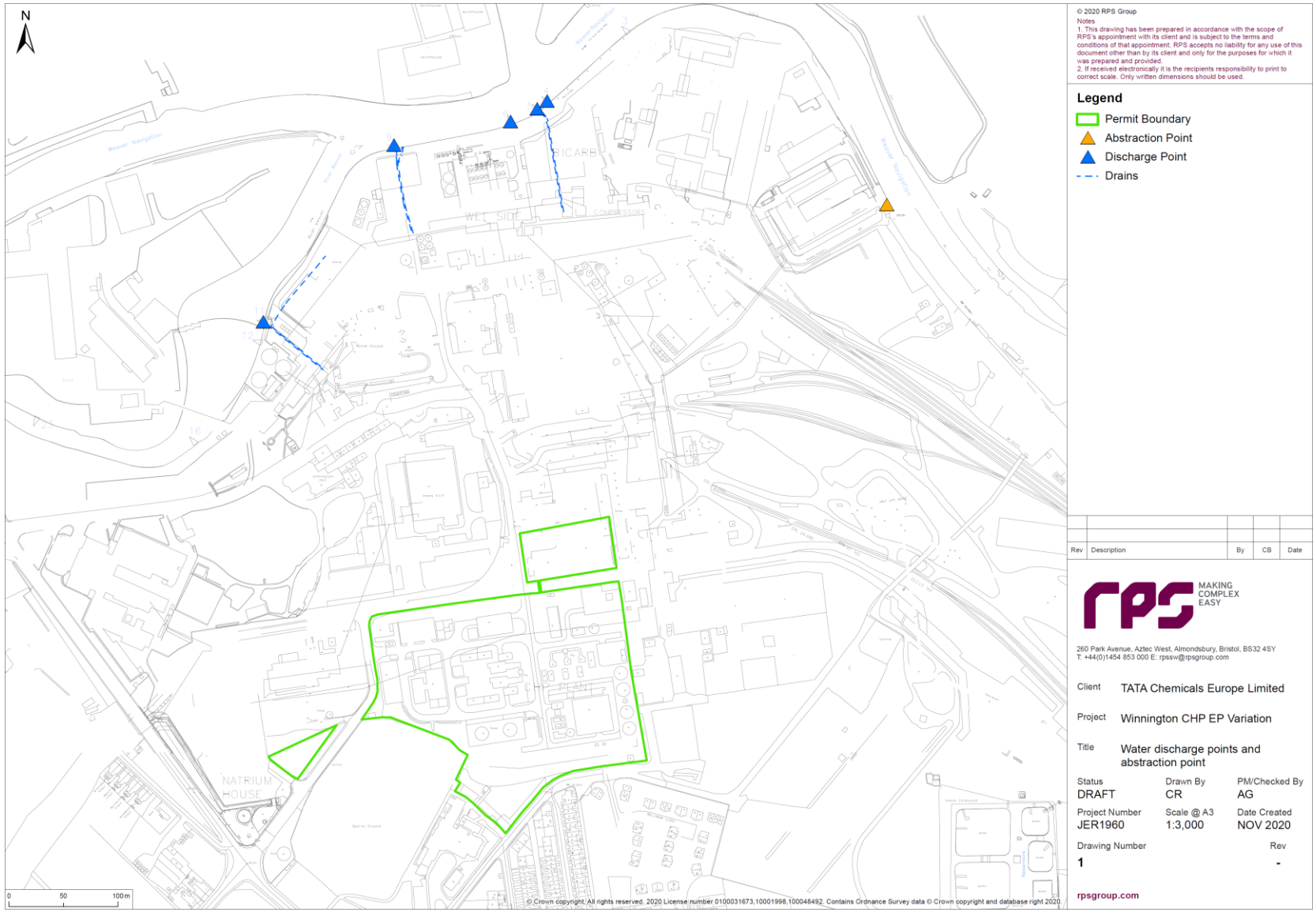
Drawing 2 – Site Layout



Drawing 3 – Locations of Outfall 5 & 11



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