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The project delivery specialists

Our Reference: IE0310150.04.160

14 November 2013

Administration
Environmental Licensing Programme
Office of Climate, Licensing & Resource Use
Environmental Protection Agency
Headquarters
PO Box 3000
Johnstown Castle Estate
Co. Wexford

Re: W0282-01 Clarifications to Licence Application Details

Dear Mr. McEntagart,

Further to your site visit, we wish to submit further clarifications to a number of details contained in the current licence application (ref. W0282-01) on behalf of Glanpower Ltd., with specific reference to the following:

1. Ceramic Filter & Filter Residue
2. Air Dispersion Model & Modelling Results
3. Abatement / Treatment Control for Emissions to Air (Table F.1)

Further details on each of these three items are included hereunder.

1 Ceramic Filter & Filter Residue

The ceramic fine filter is a final syngas purification/conditioning step, to be installed for the removal of fine particles (<150-210µm) and remaining condensate vapour from the syngas stream. These filters are included (pre-engine) to reduce the risk of engine contamination as a result of fine particulate or condensate in the gas train that could reach engine cylinders.

Regarding filter residue, it is confirmed that detached solid matter will fall to the bottom of the hopper section of the filter unit, where it will be discharged directly to a collection drum. This (carbon char) residue will be reprocessed within the secondary cyclonic convertor.

The cleaning of the ceramic filter elements of accumulated particle matter will be carried out periodically by reverse pulse cleaning. Condensate build-up will be drained via siphon/condensate separator and directed to the water treatment system.

The above description of residue handling from the ceramic filter is as described in the original licence application (Section D.2.10, Attachment D.2) and repeated here for clarification purposes.

2 Air Dispersion Model & Modelling Results

The results of the air dispersion model for the proposed facility were reported in the Air Dispersion Modelling Report (report no. IE0310150-22-RP-0008 Issue A) as part of the Article 14(2)(b)(ii) response dated 10 July 2013 (received by the Agency on 11 July 2013). This report updated the results of the dispersion model contained in the original Environmental Impact Statement, in response to Item 10 of the Article 12 compliance requirements advised by the EPA notice of 18 April 2013. A number of clarifications are included below with respect to (i) modelling results for

dioxins and furans; (ii) background concentrations for dioxins; (iii) modelling results for odour; and (iv) modelling results for heavy metals.

2.1 Modelling Results for Dioxins and Furans

As reported in the latest air dispersion modelling report (report no. IE0310150-22-RP-0008 Issue A), the modelling of dioxins and furans resulted in a maximum ground level concentration (both hourly and annual) of zero (0µg/m^3).

The above figure is the rounded result output of the air dispersion modelling software (i.e. 0.0000µg/m^3 value for the annual average). In order to determine the precise concentration to the next decimal place, the model has been reviewed by multiplying the input concentration in the model by 1,000,000 and then dividing the result by 1,000,000 to determine to the precise figure. The AERMOD software model behaves such that if you increase the input by a certain factor then the output is increased by the same factor.

Accordingly the results of dioxin analysis in terms of the maximum annual predicted concentration are provided in Table 1.

Table 1: Dioxin Results for all Met Years (Max Annual Results in µg/m3)

Year	Max Annual (µgm^{-3})	Max Annual Receptor
2004	**1.19E-09**	**602044.10, 5899080.90**
2005	9.5E-10	602044.10, 5899080.90
2006	9.2E-10	602044.10, 5899080.90
2007	1.13E-09	602044.10, 5899080.90
2008	1.12E-09	602044.10, 5899080.90

2.2 Background Concentrations for Dioxins

Background concentrations for dioxins for an area similar to Derryclure (location of the proposed Glanpower site) are available from the Indaver Ireland, Carranstown Waste Management Facility Environmental Impact Statement and Waste Licence application documentation.

Concentrations of dioxins from the baseline monitoring programme carried out for that facility were 0.046pg/m^3 and 0.028pg/m^3, which are well below the standard of 3 x 10^{-7}µg/m^3 outlined in the most recent Air Dispersion Modelling Report for Glanpower (report no. IE0310150-22-RP-0008 Issue A). It is considered likely that background concentrations in the Derryclure area will be similar to those referenced above, given the similar nature of the environment in both areas i.e. more rural in nature.

2.3 Modelling of Odour

The Article 14(2)(b)(ii) notice of 18th April 2013 issued by the Agency requested revised contour plots for the most up to date air dispersion model, including odour units (99.8%ile hourly).

This was submitted as part of the updated Air Dispersion Modelling Report (report no. IE0310150-22-RP-0008 Issue A) described previously.

The 98th percentile values for each meteorological year for odour have also been extracted from this completed model. The maximum result from the model is 0.24OU/m^3, which is below the stated standard of 1.5OU/m^3. This maximum occurred in the 2007 meteorological year. The contour plot for the 2007

meteorological year is included as Appendix A (nearest sensitive receptor is denoted by the red circle to the north west of the site).

2.4 Modelling Results for Heavy Metals

Within the results of the latest air dispersion modelling report (report no. IE0310150-22-RP-0008 Issue A), it is found that the predicted maximum annual average for Heavy Metals (Annual others) increased compared to the previous dispersion model (contained in the EIS). A review of these differing results follows below.

As can be seen from the Table 11.4 of the project Environmental Impact Statement (IE0310150-22-RP-0001 Issue A) and Table 3.1 of the latest Air Dispersion Modelling report (IE0310150-22-RP-0008 Issue A), on the whole the short term (1-hour) average predicted concentrations reduced, while the long term (annual) average predicted concentrations increased. It is noted that it is not only the annual average results for Heavy Metals (Annual others) that increased, but also annual average results for SO_2, PM, VOCs, Cadmium and Thallium and Mercury.

From the results and the inputs to the updated model, it is concluded that the reduced volumetric flow rates (arising from the updated facility design), and in turn mass emissions have had a positive impact on the short term average predicted concentrations. However, due to the lower volumetric flow rate, exit gas velocity has reduced. It is concluded that this reduction in exit gas velocity may have led to the increased annual average predicted concentrations overall.

This increase, as mentioned above, has been shown in all parameters with the exception of NO_2. This would be due to the fact that NO_2 mass emissions decreased significantly from that previously modelled in the EIS. Furthermore, the long term maxima occurred in different meteorological years when compared to the project EIS modelling which can lead to different results.

Support from Trinity Consultants also noted that the AERMOD executable used in the project EIS model was executable version 07026, while for the latest modelling analysis executable version 12060 was used. This is due to updates in the modelling software installed since the running of the project EIS. This may also lead to differing results.

3 Abatement / Treatment Control for Emissions to Air

Further details of the proposed process controls with respect to the abatement and treatment of emissions to air are included in Attachment 1 to this letter (Table F.1 completed for each major emission point).

I trust the above and enclosed details are in order.

As the designated applicant contact in the licence application previously submitted, please continue to direct all related correspondence to Mr. Raphael McEvoy, Managing Director, Glanpower Ltd., 19 High Street, Tullamore, Co. Offaly.

Yours faithfully,

Tim O'Shea
Environmental Consultant

on behalf of Glanpower Ltd.

cc - Mr. Raphael McEvoy (Managing Director, Glanpower Ltd.)

Appendix A

98%ile Hourly Average Ground Level Concentration for Odour (2007 Met Year)

(1 page)

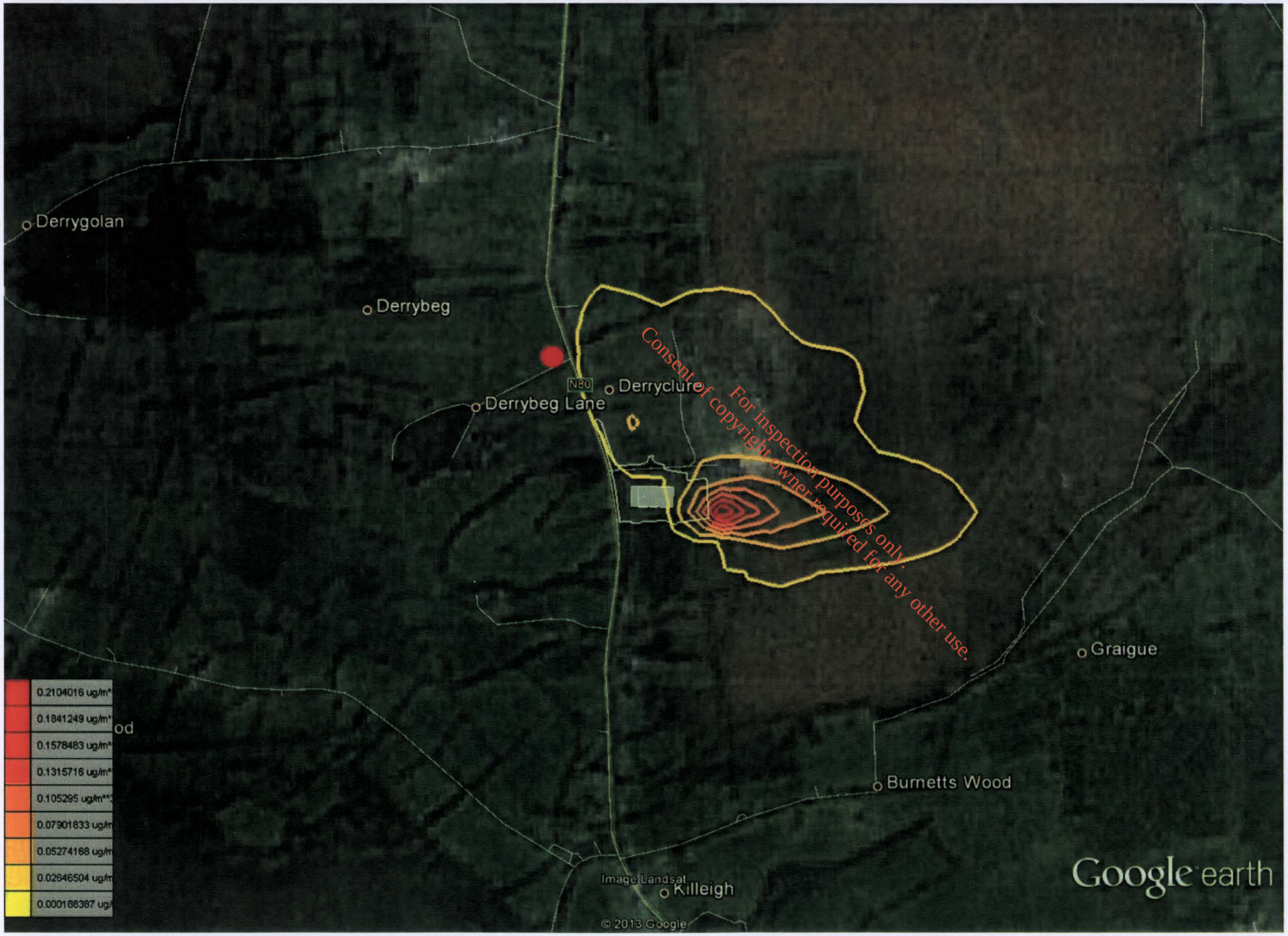

Figure A.1: 98%ile Hourly Average Ground Level Concentration for Odour (2007 Met Year)

Attachment 1
Control of Emissions to Air
(Tables F.1 for Emissions to Air)

(4 no. tables, 8 no. pages)

TABLE F.1 (A2-1): ABATEMENT / TREATMENT CONTROL

Emission point reference number : A2-1 (Primary Stack)

Control[1] parameter	Equipment[2]	Equipment maintenance	Equipment calibration	Equipment back-up	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
MONITORING OF FUEL FEED (SRF)							
SRF Input	Compactor hopper	As per supplier recommendation and licence requirement	As per supplier recommendation and licence requirement	Twin pyrolysis lines. Single line can operate independently.	Feedstock level	Level indicators	As per supplier recommendation and licence requirement
SRF Input	Piston	As above	As above	As above	Piston pressure	Pressure monitors	As above
SRF Input	Piston	As above	As above	As above	Piston stroke length	Linear transducers	As above
SRF Input	Infeed hopper	As above	As above	As above	Feedstock level	Level indicators	As above
SRF Input	Water jacket	As above	As above	As above	Water jacket flow and temperature	Thermal dispersion flow sensors	As above
MONITORING OF CHAR GENERATION, CHAR FEED & CHAR COMBUSTION							
Char Feed	Char hopper	As above	As above	As above	Char hopper level	Paddle level switches	As above
Combustion	Secondary cyclonic convertors	As above	As above	As above	Combustion chamber temperature	Thermocouples	As above
Combustion	Secondary cyclonic Convertors	As above	As above	As above	Combustion chamber pressure	Pressure monitors	As above
Combustion	FD fan	As above	As above	As above	Combustion air flow	FD duct mass air flow meter and FD fan speed	As above

Control[1] parameter	Equipment[2]	Equipment maintenance	Equipment calibration	Equipment back-up	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Combustion	Flue gas monitoring system	As per supplier recommendation and licence requirement	As per supplier recommendation and licence requirement	Spare parts as per supplier recommendation	Flue gas O_2 content	O_2 analysers	As above
Exhaust Gas	Secondary cyclonic convertors	As above	As above	As above	Exhaust gas pressure	Pressure monitors	As above
MONITORING OF ENERGY RECOVERY (Residual pyrolysis exhaust heat utilised in Heat Recovery Steam Generator. Steam directed to Steam Turbine)							
Energy Recovery	Heat recovery steam generator and steam turbine	As above	As above	Spare parts as per supplier recommendation	Steam flow, condenser control, turbine control	Flow meter, temperature and pressure analysers	As above
Boiler Outlet Gas	Heat recovery steam generator	As above	As above	As above	Pressure	Pressure monitor	As above
Boiler Outlet Gas	Heat recovery steam generator	As above	As above	As above	Temperature	Thermocouple	As above
Feed Water Supply	Heat recovery steam generator	As above	As above	As above	Water rate and level	Flow meter and level switches	As above
FLUE GAS CLEANING							
Reagent Addition	Selective Non Catalytic Reduction (SNCR)	As above	As above	Spare parts as per supplier recommendation	Ammonia dosage rate	Flow meter	As above
Reagent Addition	SNCR	As above	As above	As above	Ammonia storage	Low level alarm	As above
Reagent Addition	SNCR	As above	As above	As above	Rotary atomiser	Weekly cleaning	As above
Reagent Addition	SNCR	As above	As above	As above	Outlet temperature	Thermocouple	As above
Reagent Recirculation	SCR	As above	As above	As above	Re-circulated flue gas cleaning residues supply hopper	Low and high level alarms	As per supplier recommendation and licence requirement

Control[1] parameter	Equipment[2]	Equipment maintenance	Equipment calibration	Equipment back-up	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Flue gas	Ceramic filter	As per supplier recommendation and licence requirement	As per supplier recommendation and licence requirement	Spare parts as per supplier recommendation	Pressure differential across filters	Pressure sensors	As above
Flue Gas Discharge	Continuous Environmental Monitoring System (CEMS)	As above	As above	As above	HCl and SO_2 concentration	Inline flue gas analyser	As above
Flue Gas Discharge	ID Fan	As above	As above	As above	Flue gas pressure	Pressure sensors at inlet	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.1 (A2-2, A2-3, A2-4, A2-5): ABATEMENT / TREATMENT CONTROL

Emission point reference number : A2-2, A2-3, A2-4, A2-5 (Engine Stacks)

This table is applicable to each of the four syngas engine stacks (A2-2, A2-3, A2-4 and A2-5).

Control[1] parameter	Equipment[2]	Equipment maintenance	Equipment calibration	Equipment back-up	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
MONITORING OF SYNGAS GENERATION (PYROLYSIS)							
Syngas Quality	Retort	As per supplier recommendation and licence requirement	As per supplier recommendation and licence requirement	Twin pyrolysis lines. Single line can operate independently.	Retort temperature	IR sensors (and expansion length)	As per supplier recommendation and licence requirement
Pyrolysis	Pyrolysis chambers	As above	As above	As above	Pressure in retort	Pressure monitors	As above
Pyrolysis	Secondary cyclonic convertors	As above	As above	As above	Secondary cyclonic convertor exhaust gas temperature	Thermocouple	As above
MONITORING OF SYNGAS CLEANING & CONDITIONING							
Syngas Cleaning	Quench vessels	As above	As above	As above	Syngas temperature	Thermocouple at inlet of quench vessel	As above
Syngas Cleaning	Syngas Wash Chambers	As above	As above	As above	Syngas temperature	Thermocouple at top of gas wash chambers	As per supplier recommendation and licence requirement
Syngas Cleaning	Syngas Wash Chambers	As above	As above	As above	Flow	Flow switches and low level alarm	As above

Control[1] parameter	Equipment[2]	Equipment maintenance	Equipment calibration	Equipment back-up	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Syngas Cleaning	Syngas Wash Chambers / Scrubber Towers	As per supplier recommendation and licence requirement	As per supplier recommendation and licence requirement	Twin pyrolysis lines. Single line can operate independently.	Differential pressure	Pressure monitors (between syngas wash and exit of second scrubber tower) with alarm	As above
Syngas Cleaning	Scrubber Towers	As above	As above	As above	Water level	Level switch with high level alarm	As above
Syngas Conditioning	Activated carbon filters	As above	As above	As above	Activated carbon dosing	Dosage rate meter and dosing bin weight	As above
Syngas Conditioning	Ceramic filters	As above	As above	As above	Pressure differential across filters	Pressure sensors	As above
MONITORING OF ENERGY RECOVERY	**(i) Syngas combustion (ii) Residual engine exhaust heat utilised in Heat Recovery Steam Generator. Steam directed to Steam Turbine**						
Syngas Combustion	Syngas engines	As above	As above	Four no. gas engines in parallel	Temperature	Thermocouples	As above
Syngas Combustion	Syngas engines	As above	As above	As above	Pressure	Pressure monitors	As above
Syngas Combustion	Syngas engines	As above	As above	Four no. gas engines in parallel	% O_2 in syngas	O_2 analyser before engines	As per supplier recommendation and licence requirement
Energy Recovery (HRSG)	Heat recovery steam generator and steam turbine	As above	As above	Spare parts as per supplier recommendation	Steam flow, condenser control, turbine control	Flow meter, temperature and pressure analysers	As above
Boiler Outlet Gas	Heat recovery steam generator	As above	As above	As above	Pressure	Pressure sensors	As above

Control[1] parameter	Equipment[2]	Equipment maintenance	Equipment calibration	Equipment back-up	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Boiler Outlet Gas	Heat recovery steam generator	As per supplier recommendation and licence requirement	As per supplier recommendation and licence requirement	Spare parts as per supplier recommendation	Temperature	Thermocouple	As above
Feed Water Supply	Heat recovery steam generator	As above	As above	As above	Water rate and level	Flow meter and level switches	As above
Energy Recovery (Syngas engines)	Syngas engines	As above	As above	Four no. gas engines in parallel	Syngas flow, condenser control, engine control	Gas meter, temperature and pressure analysers	As above
FLUE GAS CLEANING							
Reagent Addition	Selective Catalytic Reduction (SCR)	As above	As above	Spare parts as per supplier recommendation	Urea dosage rate	Flow meter	As above
Reagent Addition	SCR	As above	As above	As above	Urea storage	Low level alarm	As above
Reagent Addition	SCR	As above	As above	As above	Rotary atomiser	Weekly cleaning	As above
Reagent Addition	SCR	As above	As above	As above	Outlet temperature	Thermocouple	As above
Reagent Recirculation	SCR	As above	As above	As above	Re-circulated flue gas cleaning residues supply hopper	Low and high level alarms	As above
Flue Gas Discharge	Flue gas booster fan	As above	As above	Four no. gas engines in parallel with separate stacks for each engine.	Flue gas pressure	Pressure sensors at inlet	As per supplier recommendation and licence requirement

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.1 (A2-6): ABATEMENT / TREATMENT CONTROL

Emission point reference number : A2-6 (Dryers Stack)

Control[1] parameter	Equipment[2]	Equipment maintenance	Equipment calibration	Equipment back-up	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
MONITORING OF PRE-TREATMENT							
Moisture Content	Dryers	As per supplier recommendation and licence requirement	As per supplier recommendation and licence requirement	Spare parts as per supplier recommendation	Dryer outlet temperature	Thermocouple	As per supplier recommendation and licence requirement
FLUE GAS CLEANING							
Dryer Stack Discharge	Air discharge system	As above	As above	As above	Flue gas temperature	Thermocouple	As above
Dryer Stack Discharge	Air discharge system	As above	As above	As above	Flue gas pressure	Pressure transmitters	As above
Dryer Stack Discharge	Activated carbon filter	As above	As above	As above	Activated carbon filter status	Manual monitoring and sampling, sampling data added to PLC software	As above
Dryer Stack Discharge	Baghouse filters	As above	As above	As above	Pressure differential across filters	Differential pressure indicator	As above
Dryer Stack Discharge	Baghouse filters	As above	As above	As above	Temperature of discharge hopper	Thermocouple	As above
Dryer Stack Discharge	Baghouse filters	As above	As above	As above	Level	Level alarm	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.1 (A2-7): ABATEMENT / TREATMENT CONTROL

Emission point reference number : A2-7 (Emergency Generator)

Control[1] parameter	Equipment[2]	Equipment maintenance	Equipment calibration	Equipment back-up	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
NO_X	Combustion control system	As per supplier recommendation and licence requirement	As per supplier recommendation and licence requirement	Spare parts as per supplier recommendation	Emissions monitoring once during commissioning phase. Weekly generator testing.	Flue gas analyser. Sampling and analysis by accredited laboratory.	Independent laboratory procedures
CO	As above	As above	As above	As above	As above	Flue gas analyser / datalogger (by accredited laboratory).	As above
TOC	As above	As above	As above	As above	As above	Flame ionisation (by accredited laboratory).	As above
Particulates	As above	As above	As above	As above	As above	Isokinetic / gravimetric (by accredited laboratory).	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.