



**SELBY WHEAT PROCESSING FACILITY**  
**DENISON ROAD, SELBY, NORTH YORKSHIRE**

**SECTION 6 – Environmental Risk Assessment**

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**Issue 1**

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## 1.0 INTRODUCTION

### 1.1 Background

An Environmental Risk Assessment of potential impacts associated with Sedalcol Wheat Processing Facility at Denison Road, Selby, North Yorkshire was undertaken in support of an Environmental Permit Variation Application. This addresses the proposed addition of a new Gas Turbine (GT3) at the site.

It is proposed to install a new Solar Taurus 70 (GT3) with a nominal power rating of 7.1MW. The existing installation will remain with a few alterations to the energy production activities as detailed within Section 5 of this Environmental Permit Variation Application.

In the context of the proposed extension, a new Solar-GT3 is proposed to replace the existing Centrax GT, which is undersized for the present and future site demands over than being an old engineered machine. It is proposed that the new Solar-GT3 would be installed on the eastern side of the existent Solar-GT2 and Boiler 9, and would provide waste heat to the new Boiler 10. The exhaust gases from the new Solar-GT3 will provide heat to the new Boiler 10 and exhaust via stack A41. In emergency conditions the GT3 exhaust will be sent to a new dedicated exhaust stack (A40 - GT3 Bypass Stack). An additional UPS diesel generator will be installed to supply energy for the new GT3+B10 facility in case of emergency condition/grid failure (A42 emission point). The dedicated air outlet from the Wetmill Flour scale suction A43 will be located at the southern façade of the Wet Mill building. The additional Bran Loading chute emission point A44 will be located at the western side of the existent one (A23). A new dedicated air outlet will be located on the western side of the Dry Mill building, linked to the installation of a new bagging machine (A45 emission point).

The Environmental Permit Variation Application requires additional information which is summarised in the supporting documents. This document comprises the Environmental Risk Assessment. The Environment Agency (EA) "Guidance Risk assessments for your environmental permit" <sup>1</sup> outlines the following steps to follow in order to complete an Environmental Risk Assessment:

- Identify risks;
- Assess risks;
- Justify appropriate measures (if needed); and,
- Present your assessment.

It also states that for Environmental Permit Applications for installations, reference should also be made to the following Annexes:

- Annex A: Amenity and accidents;
- Annex D: Surface water (basic);
- Annex F: Air;
- Annex G: Site waste;
- Annex H: Global warming potential;
- Annex J: Groundwater; and,
- Annex K: Justifying and cost and benefit analysis of control measures (if needed).

The following Sections detail the Environmental Risk Assessment for the proposed installation with reference to the above guidance documents.

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<sup>1</sup>Horizontal Guidance Note H1 Overview Document, Environment Agency, 2011 now replaced by "Guidance Risk assessments for your environmental permit"

It should be noted that cost benefit analysis has not been undertaken as it is not proposed to employ anything other than the suggested Best Available Technique (BAT) at the installation. As such, Annex K has not been utilised. Reference should be to Section 7 of the Environmental Permit Application for the Statement of BAT Compliance.

## 1.2 Risks Not Assessed

EA Guidance H1 identifies a number of considerations for inclusion in the Environmental Risk Assessment. However, a number of hazards are not relevant to the combined heat and power (CHP) Plant. These are summarised in Table 1.

**Table 1 Omitted Environmental Hazards**

Annex	Hazard	Reason for Omission
Annex: A	Odour	The proposed changes in operation do not result in odorous emissions
	Noise and Vibration	It is unlikely that the proposed change in site activities would give rise to significant variations in noise and vibration emissions
	Pests	The proposed changes in operation are not considered likely to attract pests to the site
	Accidents	Environmental Risk Identification and Management Procedures are in place and approved by the EA. These will not be affected by the proposed variations
Annex: D	Water emissions	The proposed changes in operation do not create any significant aqueous effluent
Annex G	Waste	Waste streams associated with the operation of the site will not change as a result of the proposed variations
Annex: J	Ground water pollution	There are no planned and managed releases of substances to ground or groundwater from the installation

## 2.0 ANNEX: F - AIR EMISSIONS

In order to assess atmospheric emissions from the installation, reference has been made to EA Guidance H1 Annex F - Air Emissions. This indicated an assessment utilising the accompanying spreadsheet should be undertaken. As the result of changes in the energy generating activities the following operational stages have been considered:

The anticipated operational hours of the energy generating units are as follows:

<ul style="list-style-type: none"> <li>• <b>Normal conditions</b></li> </ul>	Existing CHP (GT2 plus Boiler 9) emitting to atmosphere via stack A27 and new GT3+B10 emitting to atmosphere via stack A41; Boiler 7 as back up.
<ul style="list-style-type: none"> <li>• <b>Failure of the GT2 (Abnormal)</b></li> </ul>	Boiler 9 emitting via stack A27; GT3+B10 emitting to atmosphere via stack A41. (max 150-hours/year)
<ul style="list-style-type: none"> <li>• <b>Failure of the GT3 (Abnormal)</b></li> </ul>	Boiler 10 emitting via stack A41; GT2+B9 emitting to atmosphere via stack A27. (max 150-hours/year)
<ul style="list-style-type: none"> <li>• <b>Failure of GT2, GT3 and Grid (Emergency)</b></li> </ul>	The 4 x 196.6kW generators power the UPS and the privileged loads. (max 10-hours per year/each).
<ul style="list-style-type: none"> <li>• <b>Boiler 9 emergency stop (Emergency)</b></li> </ul>	The GT2 emitting to atmosphere via stack A37 (max 10-hours/year) and GT3+B10 emitting to atmosphere via stack A41.
<ul style="list-style-type: none"> <li>• <b>Boiler 10 emergency stop (Emergency)</b></li> </ul>	The GT3 emitting to atmosphere via stack A40 (max 10-hours/year) and GT2+B9 emitting to atmosphere via stack A27.
<ul style="list-style-type: none"> <li>• <b>Boiler 9 pressure Inspection (Abnormal)</b></li> </ul>	GT3 +B10 emitting to atmosphere via stack A41 and Boiler 7 emitting to atmosphere via stack A1 (max 160-hours/year)
<ul style="list-style-type: none"> <li>• <b>Boiler 10 pressure Inspection (Abnormal)</b></li> </ul>	GT2+B9 emitting to atmosphere via stack A27 and Boiler 7 emitting to atmosphere via stack A1 (max 160-hours/year)
<ul style="list-style-type: none"> <li>• <b>Boiler 10 fresh air mode (commissioning and developing phase)</b></li> </ul>	<p>Following the commissioning of the GT3+B10 CHP plant, due to not yet increased site's energy demand, GT3 will be left stopped and B10 at a first step used in fresh air mode (max 4600 hours/year).</p> <p>In a second step, according to the increased energy site's demand the GT3+B10 will be run continuously with B10 in recovery mode on GT3 exhausts.</p>

Impacts associated with the following emissions were assessed:

- Oxides of nitrogen (NO<sub>x</sub>)
- Nitrogen dioxide (NO<sub>2</sub>);
- Particulate matter with an aerodynamic diameter of less than 10µm (PM<sub>10</sub>);
- Particulate matter with an aerodynamic diameter of less than 2.5µm (PM<sub>2.5</sub>); and,
- Carbon monoxide (CO).

CO and NO<sub>x</sub> emissions for present operational stage were determined based on pollutant concentrations recorded during annual compliance monitoring on Solar GT2 and Boiler 9 and anticipated operating periods. This has provided suitable inputs to describe likely impacts and allow a comparison between present and future impacts to be made.

The installation of the new more efficient Boiler 10 allows the decommissioning of the old Boiler 8. Considering the temporary stop of GT3 in order to use B10 as warm back up for Boiler 9 keeping a good chemistry of the water contained inside, is required to run B10 periodically in fresh air mode. When the site steam demand will be sufficiently increased, the GT3+B10 system will be put in fully operation and B10 used in recovery mode on GT3 exhausts. (stack A41)

During the B10 fresh air mode usage, the NO<sub>x</sub> emission's concentration at the same stack (A41), being to be considered as a gas fired boiler alone (used in fresh air mode and not in recovery mode on Gas turbine exhaust) will be consequently higher in this period compared to the GT3+B10 system at normal full capacity. However CO<sub>2</sub> emissions are lower in this operating mode.

Until the completion of GT3 commissioning, is required to have Boiler 10 able to run in fresh air mode, keeping in consideration that the emission concentration for a gas fired boiler is normally higher than a gas fired CHP system (GT3+B10). The amount of hours for B10 fresh air mode required for this phase of development is 4600/year.

When compared over the year the overall predicated emission over the year are lower (see table on page 9 in section 5 for details).

The Section 8 Dispersion Model covers the final stage of development with the GT2+B9 and GT3+B10 running.

For future operating scenarios, the new Solar GT3 emissions were calculated utilising the specifications of the Solar GT, obtained from the technology provider, and the Emission Limit Values (ELVs) prescribed by the EA's Sector Guidance Note for Combustion Activities (EPR 1.01)<sup>2</sup>. Emission rates for each scenario are summarised in Table 2.

**Table 2 H1 Inputs - Energy Generating Activities**

Source	Unit	Operational Hours per Annum	Pollutant Concentration (mg/m <sup>3</sup> )		Emission Rate (g/s)		Efflux Velocity (m/s)	Exhaust Gas Flow Rate (m <sup>3</sup> /hr)	notes
			NO <sub>x</sub>	CO	NO <sub>x</sub>	CO			
A41	New Solar GT3 plus Boiler 10	8590	26	39	0.55	0.83	17.6	89499	From 2015 survey on GT2+B9

\*from technical datasheet 96228 kg/h,STP dry density 1.30 kg/m<sup>3</sup>, temp 491 C

Changes in the energy generating activities do not result in increased particulate matter (PM) emissions. As such, the assessment only considered potential impacts associated with the additional minor point source related to the wetmill flour scale (A43), the bran loading chute (A44), the 1-tonne bagging station (A45) ,in relation to both PM<sub>10</sub> and PM<sub>2.5</sub>.

It should be noted that for the purpose of this assessment it has been assumed that emissions of PM consist entirely of PM<sub>10</sub> or PM<sub>2.5</sub> where relevant. Predicted concentrations are therefore considered to be robust. Emission rates from the additional minor point source related to the wetmill flour scale (A43), the bran loading chute (A44), the 1-tonne bagging station (A45) are summarised in Table 3.

**Table 3 H1 Inputs –Wetmill Flour Scale Suction**

Stage	Source	Unit	Operational Hours per Annum	Pollutant Concentration (mg/m <sup>3</sup> )		Emission Rate (g/s)		Efflux Velocity (m/s)	Exhaust Gas Flow Rate (m <sup>3</sup> /hr)
				PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>		
New Source	A43	Wetmill Flour Scale Suction	8760	5.00	5.00	0.0002	0.0002	3.85	157
New Source	A44	Bran loading chute	1050	5.00	5.00	0.0014	0.0014	10.91	1008
New Source	A45	Bagging plant local exhaust ventilation	3120	5.00	5.00	0.0008	0.0008	14.68	597.6

EA Horizontal Guidance Note H1 Annex F - Air Emissions states that:

"process contributions (PCs) can be considered insignificant if:

- the long term process contribution is <1% of the long term environmental standard; and,
- the short term process contribution is <10% of the short term environmental standard."

For the purpose of this assessment the environmental standards were taken as the Environmental Assessment Levels (EALs) contained within the H1 database.

The results of the H1 Assessment are summarised in Table 4. These were obtained from the dispersion modelling assessment, provided as Section 8 of this Variation Application.

**Table 4 H1 Results**

	Predicted NO <sub>2</sub> PC				Predicted CO PC			
	Long Term		Short Term		Long Term		Short Term	
	PC (µg/m <sup>3</sup> )	% PC of EAL (%)	PC (µg/m <sup>3</sup> )	% PC of EAL (%)	PC (µg/m <sup>3</sup> )	% PC of EAL (%)	PC (µg/m <sup>3</sup> )	% PC of EAL (%)
New operating scenario	4.87	12.2	103	51.7	-	-	442	4.43

As indicated in Table 4, the CO PC is less than the relevant criteria for long and short term averaging periods. As such, CO emissions are considered insignificant in accordance with the EA criteria.

As indicated in Table 4, the NO<sub>2</sub> PC is above the long-term criteria for the future scenarios. Due to the values on the model being above the 1% and 10% EAL limits further modeling was deemed necessary and the results form section 8 – Dispersion Model Assessment (C-09906-C) by Hydrock. The model looked at particulates, nitrogen dioxide and carbon monoxide.

The conclusion of the report found the following.

“The permit variation application covers the installation of a new 7.1MWe Solar Gas Turbine (GT3 + Boiler 10) to supply the site's increased power demand and the inclusion of additional 4 minor point sources relating to the production of wheat or gluten-based products.

A detailed Air Quality Assessment has been undertaken using air dispersion model ADMS 5.2 to predict ground level pollutant concentration at local receptors before and after the proposed variation.

All process contributions at sensitive receptors are predicted to be well below their relevant AQS. Furthermore, the increase in concentration due to the variation is not predicted to be greater than 1% or 10% of any long term or short term air quality standards respectively.

As a result of the variation and undertaking a methodology that has used conservative assumptions throughout the Predicated Environmental Concentration of all pollutants is unlikely to any cause any exceedances of any relevant AQS.”



### 3.0 ANNEX: H - GLOBAL WARMING POTENTIAL

In order to assess the Global Warming Potential (GWP) of the installation, reference has been to EA Guidance H1 Annex H - Global Warming potential. The guidance states that three steps should be completed for this process:

- Identify greenhouse gas emissions;
- Calculate the global warming potential of emissions; and,
- Calculate the total global warming potential for each option.

The only greenhouse gas emissions generated by the installation are associated with natural gas and light fuel oil used by the permitted activities. Carbon dioxide (CO<sub>2</sub>) emissions are calculated in Table 6 using the methodology provided in the EA guidance.

**Table 6 Global Warming Potential**

Source	Annual Consumption (MWh/year)	Delivered to Primary Conversion Factor	CO <sub>2</sub> Emission Factor (t/MWh)	CO <sub>2</sub> Emissions (tonne/year)
Natural Gas Usage (direct release)	427948.5*	1.0	0.19	81310
Light Fuel Oil Usage (direct release)	19.70	1.0	0.25	5
Total	427968.2	-	-	81315

Note: Fuel oil energy content 11.8kWh/kg

\*considering the foreseen expansion

As indicated in Table 6, the anticipated natural gas and light fuel oil consumption associated with the permitted processes will result in CO<sub>2</sub> emissions of 81315 tonne/year.



