

GM/00592 Greatham Replacement Boilers

Environmental Permit Variation – Non-technical Summary

Background

Greatham Site is a top tier COMAH installation, manufacturing titanium dioxide pigment and titanium tetrachloride via the chloride route. The site has an Environmental Permit, TP3532PK; previous permit applications have summarised the existing regulated facility including the operation of the current boilers. The name plate capacity of the Site is 150,000 tonnes titanium dioxide/annum and up to 12,000 tonnes titanium tetrachloride/annum which is exported to some Venator Sulphate Sites.

Steam at an operating pressure of 24barg and operating temperature 245-275°C is raised on site using three fire tube and one water tube boilers with a total nameplate capacity of 98tph. They have a net rated thermal input of 81MW.

Boiler dosing chemicals are added to the boiler feed water in accordance with BS2486:1997 and the common stack discharges the combined gaseous combustion products via the consented emission point, permit reference A250. Boiler blowdown is approximately 1% of the steam raised and is discharged to the Site effluent drains forming a small part of the overall site effluent.

The steam boilers are old assets (1971 and 1980) and do not meet the NO_x limits imposed by the Industrial Emissions Directive. The plant is currently in the Transition National Plan under reference LCP354. Remedial work on the existing boilers is considered uneconomic due to their age and the downrate necessary when re-burnered and modified to meet the IED. Greatham Plant uses approximately 500,000 tonnes per annum steam for 140ktpa titanium dioxide production with instantaneous values up to 94tph steam.

Description of the Project

The project aims to replace the existing boiler plant with a modern, energy efficient boiler plant; the existing boiler plant will be decommissioned. The remainder of the regulated facility will be unchanged except where the new boiler plant is connected to the facility.

Four new fire tube boilers have been ordered with a total capacity of 108tph steam at 255-275°C and 24barg. They have a net rated thermal input of 81.6MW. The increase in the lower operating temperature threshold is to take account of the greater distance from the users and the increase in steam raising name plate capacity (from 98tph to 108tph) will help prevent production interference during boiler maintenance. The new facility must be operating before 30th June 2020 in order to meet the Industrial Emissions Directive deadline.

The boilers are supplied by Cochran and designed to BS2790. The burners are supplied by Dunphy and designed to BS676. The Safety Instrumented System will comply with IEC61508 and 61511.

A new stack (proposed permit ref A251) will be erected, with a single flue, connected to the four boilers. CEMS will monitor the NO_x and CO with a manual sampling facility available for periodic monitoring.

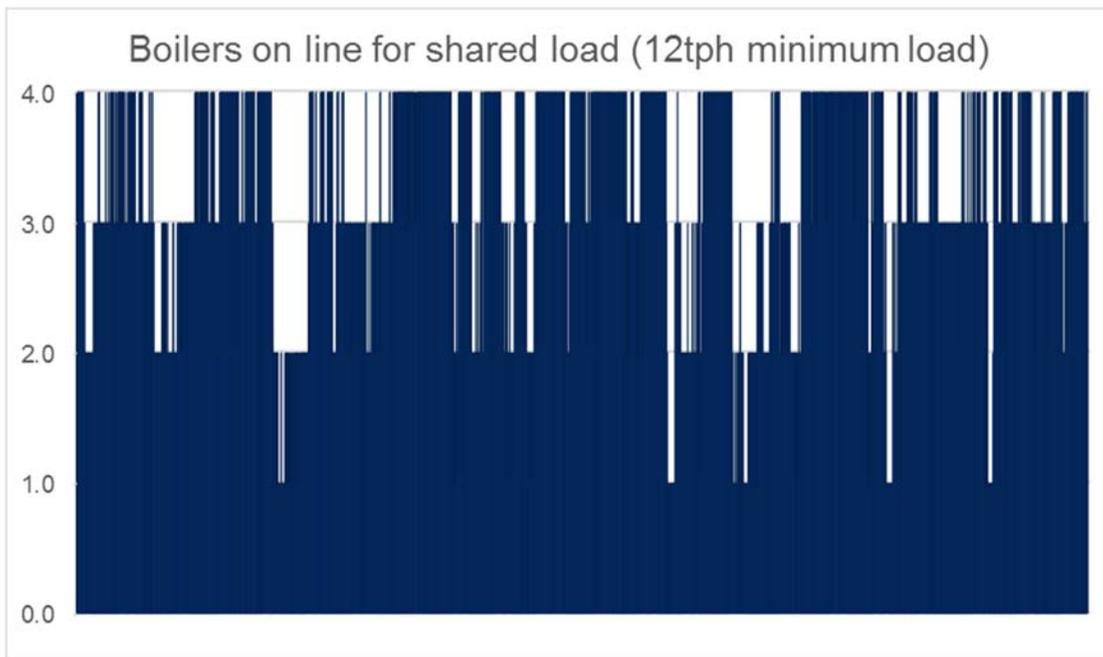
Each boiler will have its own temperature-controlled blowdown drum, accepting automatic and manually invoked blowdown of boiler water to control cycles of concentration. Each blowdown vessel will have an atmospheric vent and will discharge liquid to the Site effluent drainage system. The blowdown quantity is approximately 1% of the steam raised and insignificant (up to 14 m³/day) compared to the overall Site effluent quantity which is consented for 12,000 m³/day. There will be no change to the boiler feed water chemical dosing system and no material change to the blowdown quantity or frequency resulting from the new boilers installation. In that respect, this aspect may be regarded as a like for like replacement.

The intended location of the new boiler plant is east of the current Stream 3 building (Grid reference NZ 516 265). The site was formerly occupied by the 'Black End' plant which was decommissioned in 2002 with above ground demolition being carried out in 2006/7. However, underground foundations, piles and drainage remained in place.

Control measures and operation

The new boiler plant is designed for seventy-two hours unmanned operation and is a standard Cochran/Dunphy offering with a standard control system that will not be connected to the Site DCS. The Boiler Equipment Building (BEB), located to the south of the boilers, will house the electrical equipment, the instrument equipment and the individual boiler control panels. A load scheduler PLC will receive key information from the steam main and instruct the boilers to increase/decrease firing to maintain operating conditions.

The intention is to share the total steam demand across all available boilers (normally four) to prevent any adverse influence from load changes. When the steam load is less than that which can be supported by the on-line boilers, then a boiler must be idled to the hot standby position or shut down. The actual steam load for a four-month period in 2018 is shown in the diagram below. The period is representative of current and future production levels based on a minimum load for two, three and four boilers of 24, 36 and 48tph respectively.



The data shows that one boiler alone will operate for 5% of the time, two for 17%, three for 33% and four for 45%. The maximum gas fired steam demand for this period was 85.5tph.

The BEB is not designed to be an occupied building and the field Services Technician will continue to be based in the adjacent Stream 3 building to the west. The load scheduler PLC control panel will be repeated in the Phoenix Control Room which acts as a twenty-four hour manned control room for the White End and Services section. The Phoenix Control Room Technician (CRT) will receive alarms from the boiler plant and alert the Field Technician by radio, telephone or tannoy to attend the BEB for further investigation. The boilers however will have a safety instrumented system and are designed to fail safe. Emergency stops for the boilers will be located in the Phoenix Control Room and locally at the boiler plant. All measured variables, valve positions, setpoints etc will be transmitted to the Factory Information System (FIS) in the same way as the rest of the Site processes and this will enable full history trends of all key boiler parameters.

Boiler start up is carried out without flue gas recycle (FGR) employed and should not lead to NO_x and CO above normal operating levels. Steam will be discharged to atmosphere via a silenced vent at the operating pressure of 24barg at start up until the required superheat is established. This is expected to be at 8 or 9 tonnes/hour and the vent is sized for 10 tonnes/hour. Due to this superheat requirement, it is not anticipated that we will operate any boiler into the steam main below 9 tonnes/hour, effectively making the boilers 3:1 turndown. During the Start-up and Shutdown processes, The Boiler Plant will be classified as being on-line when all of the criteria listed below have been met for at least one boiler unit:

- Steam pressure > 23barg
- Steam temperature > 255°C
- Steam flowrate > 10tph

When two of these three parameters are not met for all boilers, then the boiler plant is classed as shut down

Impact on the environment

The impact of the project on the environment is covered in more detail in the Environmental Risk Assessment and Habitats Risk Assessment which form part of this Application.

The overall conclusion, taken from the Environmental risk assessment, is that

“there will be no negative environmental impact from the installation of the new Boiler Plant on the local receptors. The potential for impact on the Teesmouth and Cleveland SPA and Greenabella Marsh was assessed in the Habitats Risk Assessment with particular focus on migratory birds.

Improvements are anticipated in terms of reduced NO_x emissions to air, the energy efficiency of the new plant and the visual appearance of the site from the A178 road, when compared to the existing boiler plant. The improvement in energy efficiency will also result in a reduction in CO₂ emissions when comparing the new and existing boilers plants operating at the same throughput.

No changes to the existing Venator site are expected in terms of the impact from odour, water emissions, waste management or traffic.

Whilst no impact from environmental noise is expected, surveys will be carried out during construction and once beneficial operation is achieved to confirm this assessment.”