

Permitting decisions

Variation

We have decided to grant the variation for Warrington Silicas Installation operated by PQ Silicas UK Limited.

The variation number is EPR/RP3233GW/V007.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

Purpose of this document

This decision document provides a record of the decision making process. It:

- highlights [key issues](#) in the determination
- summarises the decision making process in the [decision checklist](#) to show how all relevant factors have been taken into account
- shows how we have considered the [consultation responses](#)

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Read the permitting decisions in conjunction with the environmental permit and the variation notice. The introductory note summarises what the variation covers.

Key issues of the decision

PQ Silicas UK Limited produces a range of silicate-based chemicals at their site in Warrington.

This application for a substantial variation has been made in order for the operator to be permitted to make the following changes:

- Replacement of three existing 27.7 MWth boilers with two new 16.5 MWth boilers.
- Installation of a second gel plant 'ES2' to increase amorphous silica (gels) production capacity.
- Replacement of the Gasil washers, with an increase in production capacity.
- Replacement and relocation of a bulk sulphuric acid storage tank.

These changes will require additional land to be included in the installation site boundary and there will be three new emission points. The application includes a supporting information pack, which contains a non-technical summary, a description of the proposed changes, a process diagram, consideration of point source and fugitive emissions to air, water, sewer and land, a BAT assessment and details of raw materials, energy efficiency, waste management, noise and monitoring. There is also a detailed air dispersion modelling report.

In response to our request for additional information, the applicant also provided further detail on containment, the combustion plant, the ES2 gels plant, emissions to water and sewer, a site condition report, noise assessment, flood risk assessment and updated site plans.

The key controls and techniques are described in the following sections.

Boiler plant

The current plant has three 27.7 MWth gas-fired boilers, which are regulated as large combustion plant. The applicant proposes to replace these with a pair of new high-efficiency gas-fired boilers, of 16.5 MWth each. Detailed discussion on these boilers can be found in the section below: Key Issues for the combustion plant.

In response to our request for additional information, the applicant has confirmed that the old boiler house is now closed. It has been vented down, is at atmospheric pressure and the steam main connection has been physically severed and capped. The boilers are drained down, all the water tanks, chemical dosing tanks and sulphuric acid tank are empty. Process water has been disconnected, the gas main has been purged and the header has been severed and capped. Due to the infrastructure and services that run through the old boiler plant building it will not be demolished, although the operator does plan to remove the old boiler plant stack. We are satisfied that the old and new boiler plant cannot be run in combination. The site boundary will not be altered to remove the old boiler house under this variation – this would require a partial surrender.

ES2 Gels Plant

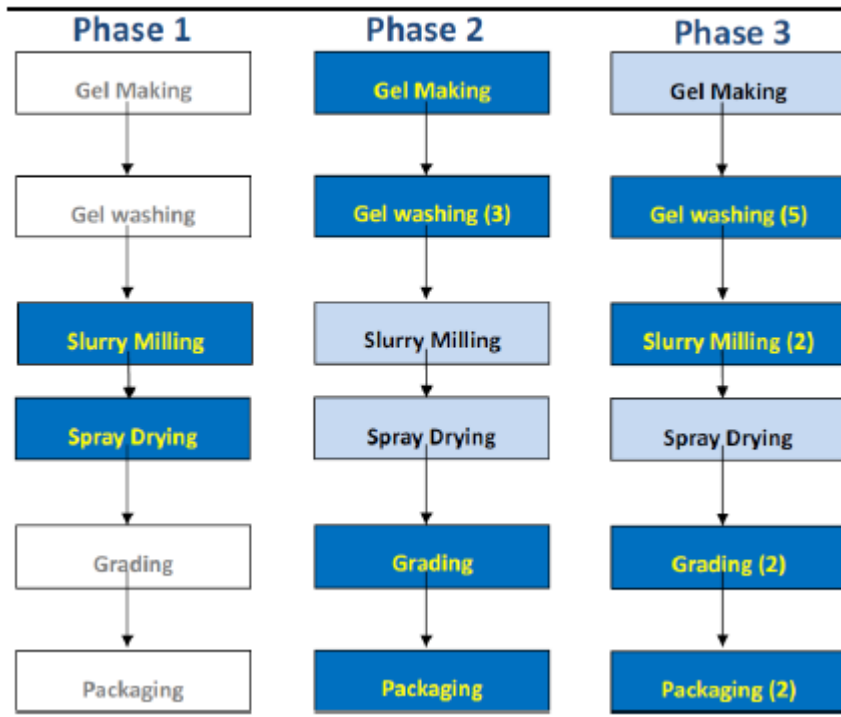
Silica gel is produced through the operation of gel-making conveyor belts and batch processes, where sulphuric acid is mixed with alkaline sodium silicate to neutralise and precipitate the silica gel. This falls under listed activity:

Section 4.2 Part A(1)(a)(v)

Producing inorganic chemicals such as non-metals, metal oxides, metal carbonyls or other inorganic compounds (for example calcium carbide, silicon, silicon carbide, titanium dioxide).

The existing 'ES1' gels plant has reached its production capacity, so the operator proposes to install a second gel plant 'ES2'. This will be commissioned in three stages, with an eventual doubling in the site's silica gels production capacity:

ES2 development phases



The plant will be housed in the shell of an existing building, on a parcel of land that will be brought into the installation site boundary. The ES2 process is identical to the existing ES1 process, with the gel making, washing and slurry milling taking place on the 'wet side' and the spray drying, grading and packaging taking place on the 'dry side'.

The spray dryer will be a new emission point to air (A37), which will be fitted with a cyclone unit and in-line bag filter to minimise the emissions of particulate matter. There is a continuous particulate monitor certified to MCERTS, with alarms to ensure the dryer feed is shut off if necessary. The impacts from these emissions have been included in the modelling assessment – see section 4 below.

The wet side of the plant inside the building is situated inside a bunded area, the volume of which significantly exceeds the 110% of the largest tank and 25% of total tank capacity volume requirement. Bunds will be made of concrete with lining to protect against corrosion by potential leaks. The bund for the sulphuric acid tanks will be separate from the bund for silicate, ammonia and EDTA tanks. Bunds will be fitted with pumps to pump spillage or rainwater to the gels plant effluent treatment plant.

During Phase 1, cooling water will be sent to the sewer via a new emission point S7 (along with plant washings). From Phase 2 onwards, the cooling water will be reused as wash water. This will then be sent to the existing gels effluent treatment plant, prior to discharge via W2. The volumes, temperature, pollutants and concentrations will still be well within the permitted limits. The variation includes an improvement condition to ensure that the operator investigates the potential for reuse of the cleaner wash water from later in the gel washing cycle in the more concentrated part of the wash cycle. This would reduce both water usage and effluent disposal.

Gasil washers

The existing gasil washers have reached the end of their serviceable life, so are being replaced with washers that will enhance process flexibility and increase production capacity. The only potential environmental impact is a slight increase in the process effluent to W2 but the volumes, pollutants and concentrations will still be well within the permitted limits.

The tanks associated with the gasil washers are located inside a building and contained within two bunded areas which are designed to contain 110% of the maximum storage capacity. One bund serves the sulphuric acid tank and the other the ammonium hydroxide and sodium hydroxide. Both bunds are of concrete construction with chemical resistant coating. Tanks are fitted with level indicators displayed on the plant digital control systems (DCS), and with high level alarms. Tanks will also be fitted with separate high-high level detection instruments which alarm and automatically stop tank filling. Each bund contains high sump level detection which alarms to DCS and automatically stops tank filling.

Sulphuric acid tank

The existing 170 cubic metre 77% sulphuric acid tank requires replacement. Its location at the site boundary (next to the railway, public walkway and river) is not ideal. As such, a new 108 cubic metre 97% sulphuric acid tank has been installed in an area of less activity, further from the site boundary. There is a new base and bund wall (designed to contain 110% of the maximum volume of the tank, with a high sump level alarm and automatic stops on tank filling and acid transfer), level indicators and high level alarms, which will further reduce the potential for offsite pollution if any loss of containment occurs. This also standardises the concentration of acid delivered to site. The road tanker off-loading station is also bunded, using acid-resistant concrete.

Containment

The application confirms that there are no point source emissions to land or groundwater.

The applicant recognises that fugitive emissions to land or groundwater can arise from surface run off from process areas, spills and leaks. As such, the application goes on to explain that:

- The site has no process areas that are open to the weather, save where these areas are bunded.
- The bunds themselves, pumps, pipework, flanges and process equipment are all subject to a maintenance programme which comprises regular inspection of plant items based on the risk posed by the failure of those items.
- The bunds are all lined or sealed so that they are impervious to water and the material that they are bunding.
- The site is principally hard standing, though there are some areas that are gravelled.
- Gravelled areas are not within a close enough proximity to operational areas to be at significant risk of contamination.
- No area of surface water collection or flow is permeable.

Due to the above measures, the site should not have any fugitive emissions to land or groundwater.

Further to this, the applicant has provided a standalone document on Containment, which includes details of the proposed storage and containment for the four aspects of the variation. There is a general assessment of the proposed activities against the requirements of the Emissions from Storage BREF and confirmation that storage and containment design takes place in accordance with CIRIA guidance.

Each of the plant areas that will change under the variation has its own local emergency file which contains details of spillage procedures, isolation procedures, material safety data sheets, specific hazards, plant drawings and emergency contacts.

There are tables for each activity with an inventory of materials and details of the pollution prevention measures in place:

- i. Raw material and product storage areas (including an inventory of all storage tanks and details of their capacity and construction);
- ii. Bunding (including construction design/materials and the capacity relative to the tank(s) it serves);
- iii. Surfacing and drainage;
- iv. Loading/unloading areas;

- v. Waste storage areas;
- vi. Containment of materials being transferred via pipelines;
- vii. High level alarms, leak detection;
- viii. Delivery and loading/unloading procedures and controls;
- ix. Maintenance and inspection regime and accident management procedures

Where any final design has not yet been confirmed, such as for the later phases of ES2, the submission of this information will be required as part of an improvement condition in the variation.

Emissions to water and to sewer

The proposed changes at site result in some new or increased emissions to water and/or sewer. Some of these receive treatment prior to disposal but have historically not been permitted as listed activities. Where this is the case, we will need to update the permit to include these as: Section 5.4 Part A(1)(a) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day.

The applicant has provided further information on the emissions to water and sewer in order for us to update the relevant emissions tables in the permit.

Emission points to sewer – United Utilities, Warrington North		
Emission point reference	Source	Changes
S1	Silicate Plant tanker washing	None
S2	A24 plant process effluent	None
S3	Steam raising process effluent from boiler plant	Updated for higher volume of effluent from new boiler plant.
S4	Gels plant EP50 process effluent	Consent revoked – the process has shut down.
S5	FPA cooling coils and process effluent	None
S6	South bank surface water run off	Consent revoked – this was for the tanks around the old textile plant area, which have now been removed.
S7	ES2 Gels Plant	New emission point
S11	Wash down from aluminium trihydrate store	Consent revoked – the operator no longer has the store.

The variation results in an increase in the discharge of boiler plant effluent via S3 and a new emission point (S7) from the ES2 gels plant of cooling water and washings from silica manufacturing. Cooling water from ES2 will be reused as wash water from Phase 2, so emissions from ES2 to sewer will then be minimal. We are satisfied that these effluents are suitable for direct discharge to sewer and that this disposal route is BAT. No further assessment is required. Emission points S4, S6 and S11 will be removed from the permit.

Emission points to water – River Mersey		
Emission point reference	Source	Changes
W1	Precipitation effluent treatment plant	None

Emission points to water – River Mersey		
Emission point reference	Source	Changes
W2	Gels effluent treatment plant	Additional quantity of wash water from ES2 and slight increase from replacement gasil washers.
W3	Process & cooling water from Silicate Plant and A24 Plants	None
W4	Uncontaminated rainwater from Outfall 8	None
W5	Uncontaminated rainwater from Outfall 8	None
W6	Uncontaminated rainwater from Outfall 8	None
W7	Uncontaminated rainwater from Outfall 8	None

The permit currently contains emission limit values (ELVs) for the discharges from W1, W2 and W3. We set these limits following detailed assessment of the impacts on the River Mersey, in particular for the temperature of the effluent. These ELVs are set based on a maximum daily flow, which is also included as a limit. The applicant has confirmed that the additional wash water from ES2 will be subject to heat recovery, so will not cause the temperature limit of 60°C on W2 to be approached. The overall emissions from W2 following the changes are estimated to be below 4000 m³/day, which is well within the limit of 5300 m³/day.

We are satisfied that the emissions will be well within the existing permitted limits and that no further assessment is necessary.

The treatment currently provided onsite is as follows:

- W1 Precips effluent treatment plant - pH correction and settlement (in clarifier).
- W2 Gels effluent treatment plant - pH correction.
- W3 Silicate plant - no correction.
- W4 to W7 - direct discharges from pipe to river with no treatment.

Of these, the treatment provided at the Precips effluent treatment plant and the Gels effluent treatment plant are classed as physico-chemical and have a volume of greater than 50m³/day, so will be amended in the permit from directly associated activities, to full listed activities:

Section 5.4 Part A(1)(a)(ii)

Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment.

Noise

From the information in the application and our previous knowledge of the site, we consider that the activities carried out at the installation have the potential to cause noise, but that such noise is not likely to cause widespread annoyance beyond the site boundary and that the proposals in respect of noise and vibration control represent BAT. Noise sources within the new boiler house are contained - the combustion air fans are on rubber mounts within an acoustic cabinet.

We consider that use of the standard noise condition, enabling us to require the operator to submit and implement an approved noise and vibration management plan, is appropriate. In addition to this, due to the ongoing investigation into reports from a single complainant, we

have included an improvement condition to ensure that the noise impacts from the changes on site are reviewed once the construction noise has finished. This will ensure that, if necessary, any further noise management controls are identified and implemented.

Odour

From our previous knowledge of the operation of the installation, we consider that the activities carried out are inherently non-odorous. We are satisfied that use of the standard odour condition, enabling us to require the operator to submit and implement an approved odour management plan, is appropriate and sufficient.

Flood Risk

The applicant has provided a copy of the flood risk assessment (FRA), which was prepared to support the planning application for the construction the new boiler house. The site lies within Flood Zone 3 and is deemed as “less vulnerable” within the National Planning Policy Framework.

This FRA reviewed all sources of flood risk including; fluvial, tidal, pluvial, groundwater, sewers and flooding from artificial sources. The report indicates that the site is at risk from fluvial and groundwater flooding. This would be partially mitigated by the raising of Finished Floor Levels to 150mm above existing external levels.

Finished Floor Levels were therefore raised 150mm above the highest point on the car park. External levels within proximity fall away from the proposed buildings.

The site receives our flood warnings and has local flood procedures based around our Preparing for Flooding guidance. These are updated as needed after any events. Additionally, chemicals in both ES2 and the boiler plant are bunded or raised on spill protection, limiting the potential for any release from flood ingress. The ‘wet’ side of ES2 building is bunded.

Key Issues for the combustion plant

GLOSSARY

BAT	best available techniques
BREF	best available techniques reference document
ELV	emission limit value set out in either IED or LCPD
IED	Industrial Emissions Directive 2010/75/EC
LCP	large combustion plant – combustion plant subject to Chapter III of IED

1. Chapter III of the IED

Chapter III of the Industrial Emissions Directive applies to new and existing large combustion plants (LCPs) which have a total rated thermal input which is greater or equal to 50MW. Articles 28 and 29 explain exclusions to chapter III and aggregation rules respectively.

The aggregation rule is as follows:

- A LCP has a total rated thermal input $\geq 50\text{MW}$.
- Where waste gases from two or more separate combustion plant discharge through a common windshield, the combination formed by the plants are considered as a single large combustion plant.
- The size of the LCP is calculated by adding the capacities of the plant discharging through the common windshield disregarding any units $< 15\text{MWth}$.

A “common windshield” is frequently referred to as a common structure or windshield and may contain one or more flues.

Chapter III lays out special provisions for LCP and mandatory maximum ELVs are defined in part 2 of Annex V for new plant, however it is worth noting that BAT requirements may lead to

the application of lower ELVs than these mandatory values. Mandatory ELVs cannot be exceeded even if a site specific assessment can be used to justify emission levels higher than BAT.

Combustion plant on the installation that do not form part of an LCP and so do not come under Chapter III requirements, will still aggregate to be part of the Section 1.1 A(1)(a) activity listed in Schedule 1 of the Environmental Permitting regulations if they have a rated thermal input of 1MW thermal input or over.

2. Combustion Plant Description

The permit uses the DEFRA LCP reference numbers to identify each LCP. The LCP previously permitted at this site was LCP254.

The new boiler plant consists of 2 x 16.5 MWth net thermal input boilers which vent via multiple flues within a single windshield at emission point A38. They are not an LCP, although much of the application refers to LCP considerations because the operator had thought the two new boilers were 27 MWth input each (i.e. an LCP with a total rated thermal input ≥ 50 MW).

The new stack is 23 metres above ground level (the existing boiler stack is 61 metres above ground level). The units burn natural gas with no provision for standby fuels. Under normal operating conditions, a single boiler will operate and will exhaust via an economiser. The second boiler will be held on hot standby to supplement the steam output during short periods of peak demand.

The following table shows an inventory of all process combustion plant, which will aggregate to be part of the Section 1.1 A(1)(a) activity. In several cases, the rated thermal input is no longer recorded due to the age of the appliance. An estimate based on historic fuel calorific value with an uplift of 20% thermal capacity is included for these older appliances. All use natural gas as a fuel with the exception of the silicate furnace emergency diesel generator. Sub-one megawatt thermal plant are included in italics for information.

Combustion Plant Inventory (whole of site)

PQ department	Appliance	Emissions Point	Net thermal input / MWth	Derivation
Boilerhouse	Boiler 1	A38	16.5	Manufacturer
	Boiler 2	A38	16.5	Manufacturer
Silicate Plant	Furnace	A1	20	Estimate
	<i>Emergency Diesel Generator</i>	<i>None</i>	<i>0.4</i>	<i>Manufacturer</i>
Precips Plant	Ring Dryer	A4	11	Manufacturer
Gels Plant (ES1)	<i>Superheater</i>	<i>None</i>	<i>0.2</i>	<i>Estimate</i>
	Ring Dryer	A6	1.4	Estimate
	Rotary Dryer	A11	1.1	Estimate
	<i>Flash Dryer</i>	<i>A15</i>	<i>0.4</i>	<i>Estimate</i>
	Spray Dryer	A14	1.6	Estimate
Gels Plant (ES2)	Spray Dryer	A37	1.6	Expected specification, to match ES1
A24 Plant	Ring Dryer Plant is currently mothballed and considered unlikely to ever return to action	A2	13	Manufacturer

3. Start up and shut-down

The following thresholds are the operational parameters, which can be met at the end of start-up or start of shut-down.

- Steam pressure 14.7 bar;
- Oxygen 4%
- Flue gas temperature 200 °C pre-economiser

The operator has explained that the start up and shut down times of the steam raising boilers are very brief in comparison with power generation or CHP plant. One boiler is in continual operation with the other in permanent “hot standby” with short periods of simultaneous operation to meet peak demands. Start-up conditions only apply after a boiler is removed from service which under normal operations takes place once a year for boiler inspections and/or every three years during site-wide “steam shutdown” to allow maintenance of the steam pressure relief valves.

4. The Installation’s environmental impact

The next sections of this document explain how we have approached the critical issue of assessing the likely impact of the emissions to air from the Installation on human health and the environment.

4.1 Assessment Methodology

4.1.1 Use of Air Dispersion Modelling

For combustion plant applications, we normally require the applicant to submit a full air dispersion model as part of their application, for the key pollutants. Air dispersion modelling enables the process contribution (PC) to be predicted at any environmental receptor that might be impacted by the plant.

Once short-term and long-term PCs have been calculated in this way, they are compared with Air Quality Standards (AQS).

PCs are considered **Insignificant** if:

- the **long-term** process contribution is less than **1%** of the relevant AQS; and
- the **short-term** process contribution is less than **10%** of the relevant AQS.

The **long term** 1% process contribution insignificance threshold is based on the judgements that:

- It is unlikely that an emission at this level will make a significant contribution to air quality;
- The threshold provides a substantial safety margin to protect health and the environment.

The **short term** 10% process contribution insignificance threshold is based on the judgements that:

- spatial and temporal conditions mean that short term process contributions are transient and limited in comparison with long term process contributions;
- the threshold provides a substantial safety margin to protect health and the environment.

Where an emission is screened out in this way, we would normally consider the applicant’s proposals for the prevention and control of the emission to be BAT. That is because if the impact of the emission is already insignificant, it follows that any further reduction in this emission will also be insignificant.

However, where an emission cannot be screened out as insignificant, it does not mean it will necessarily be significant.

For those pollutants which do not screen out as insignificant, we determine whether exceedances of the relevant AQS are likely. This is done through detailed audit and review of the applicant’s air dispersion modelling taking background concentrations and modelling

uncertainties into account. Where an exceedance of an EU AQS is identified, we may require the applicant to go beyond what would normally be considered BAT for the Installation or we may refuse the application if the applicant is unable to provide suitable proposals. Whether or not exceedances are considered likely, the application is subject to the requirement to operate in accordance with BAT.

This is not the end of the risk assessment, because we also take into account local factors (for example, particularly sensitive receptors nearby such as a SSSIs, SACs or SPAs). These additional factors may also lead us to include more stringent conditions than BAT.

If, as a result of reviewing the risk assessment and taking account of any additional techniques that could be applied to limit emissions, we consider that emissions **would cause significant pollution**, we would refuse the application.

4.2 Assessment of Impact on Air Quality

The applicant's assessment of the impact of air quality is set out in their report: Detailed Air Dispersion Modelling – ES2 and new boilers. This makes predictions of the impacts on local air quality from NO_x and PM₁₀ emissions under two scenarios using ADMS 5.1 Air Dispersion Modelling Software. The scenarios are:

- Current operation: 5 emission points (A1, A2, A4, A6 and A14) plus the boiler plant that is being decommissioned.
- Proposed operation: 5 emission points (A1, A2, A4, A6 and A14) plus the proposed Catalyst Plant Spray Dryer and the new boilers.

Natural gas that meets the standard for acceptance into the National Transmission System, is considered to be sulphur free fuel. Hence, sulphur dioxide emissions from burning natural gas, were not considered to be significant and were not modelled by the applicant. We agree with this approach.

The applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon human health. The model used 5 years of meteorological data collected from the weather station at Manchester Airport between 2010 and 2014. The model uses the emission limit values (ELVs) for NO_x and PM₁₀ and where these have not been set, they have used the 95th percentile of the monitored emission concentrations. They assumed that the Installation operates continuously at the relevant long-term or short-term emission limit values, i.e. the maximum permitted emission rate

The main source of air pollution in Warrington is considered to be from road traffic emissions, with NO₂ being the principal pollutant of concern. Warrington Borough Council have declared an Air Quality Management Area (AQMA) for annual mean NO₂, which borders the installation. As such, large quantities of air quality baseline data are available for locations surrounding and immediately next to the installation. This local data has been used in preference to the Defra mapping data.

The applicant has modelled the concentration of key pollutants at a number of specified locations within the surrounding area.

The way in which the applicant used dispersion models, its selection of input data, use of background data and the assumptions it made have been reviewed by the Environment Agency's modelling specialists to establish the robustness of the applicant's air impact assessment. The output from the model has then been used to inform further assessment of health impacts and impact on habitats and conservation sites. Our review of the applicant's assessment led us to carrying out some sensitivity analysis around the model parameters where we considered that any inputs could be different (receptor locations, meteorological data, terrain, surface roughness, grid resolution, emission rates, ecological receptors). We do not find the same precise results but we agree with the applicant's overall conclusions, as our predictions are within the range of modelling uncertainty associated with the applicant's predictions (but see 4.2.1 (iv) below)

The applicant's modelling predictions are summarised in the following sections.

4.2.1 Assessment of Air Dispersion Modelling Outputs

The applicant's modelling predicted pollutant concentrations at discrete receptors. The table below shows the ground level concentrations at the most impacted receptor, WA85 Old Liverpool Road (DT21).

Pollutant	AQS $\mu\text{g}/\text{m}^3$	Baseline $\mu\text{g}/\text{m}^3$	PC Variation $\mu\text{g}/\text{m}^3$	PC Current $\mu\text{g}/\text{m}^3$	PC Increase with variation $\mu\text{g}/\text{m}^3$	Increase with variation / AQS	Variation PC/AQS	Current PC/AQS	PEC Variation $\mu\text{g}/\text{m}^3$	PEC/AQS Variation
Annual mean NO ₂	40	38.3	1.45	1.13	0.32	<1%	3.63%	2.83%	39.8	99%
1 hour max NO ₂	200	76.6	9.89	8.90	0.99	<1%	4.95%	4.45%	86.5	43%
Annual mean PM ₁₀	40	19.0	0.26	0.24	0.02	<1%	0.65%	0.60%	19.3	48%
24 hour mean PM ₁₀	50	38	1.07	0.98	0.09	<1%	2.68%	2.46%	39.1	78%

WA85 Old Liverpool Road (DT21) is the receptor at which the PC increase with the variation is the highest. Where the PC or PEC as a percentage of the AQS is higher at a different receptor, this has been considered when carrying out the following assessment.

(i) Screening out emissions which are insignificant

From the table above the following emissions can be screened out as insignificant in that the process contribution is < 1% of the long term AQS and <10% of the short term AQS. These are:

- 24 hour mean PM₁₀ (at all modelled receptors)
- 1 hour max NO₂ (at all modelled receptors)
- Annual mean PM₁₀ at WA85 Old Liverpool Road (DT21) is insignificant, however the PC is higher than 1% at some modelled receptors.

Therefore we consider the applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation (additionally see (iv) below).

(ii) Emissions unlikely to give rise to significant pollution

Also from the table above, the following emissions (which were not screened out as insignificant) have been assessed as being unlikely to give rise to significant pollution in that the predicted environmental concentration is less than 100% (taking expected modelling uncertainties into account) of both the long term and short term AQS:

- Annual mean PM₁₀ (at all modelled receptors)
- Annual mean NO₂ at WA85 Old Liverpool Road (DT21) is insignificant, however the PEC is higher than 100% at some modelled receptors.

(iii) Emissions requiring further assessment

Finally, the following emissions are considered to have the potential to give rise to pollution in that the Predicted Environmental Concentration exceeds 100% of the long term or short term AQS.

- Annual mean NO₂

For these emissions, the applicant has reasoned that the change in process contribution between the current and proposed scenarios is insignificant (at less than 1%). As part of our

detailed audit of the applicant's modelling assessment, we agree with the applicant's conclusions in this respect taking modelling uncertainties into account. We do not consider the proposed variation will have a significant impact (additionally see (iv) below)

The assessment presents the absolute worst-case scenario, with all site emissions operating continuously at the ELV under the worst dispersion characteristics.

The new boilers are smaller in thermal capacity than those that are currently permitted and have lower emissions of NO_x. It is the reduction in stack height and reduced exhaust release characteristics (efflux velocity, exit temperature, volumetric flow rate) that offset the improvement in emissions because the dispersion is reduced. This means that there is no reduction in the impact at local receptors, although we are satisfied that any increase is insignificant. There will be a reduction in the overall mass emission of NO_x.

(iv) Simultaneous operation of both boilers

The submitted modelling assumed operation of one 16.5MWth input boiler but the applicant subsequently foresees times when there will be a need to bring the hot standby boiler into operation to meet short periods of peak steam demand. This was not remodelled but calculations were separately submitted estimating that this would represent a rise in NO_x emissions rate from 8.5 g/s to 8.9 g/s, an increase of approximately 5%. We agree that a potential new worst case with both boilers operational would not lead to unacceptable short term impacts.

However, if the second boiler were to be run for extended periods the worst case long term NO_x impact would not be insignificant. This would not be acceptable as the background already exceeds the EQS. Nevertheless we accept that this assessment is very much a worst case and all the site emissions are unlikely to be operating all the time at maximum rate. We have therefore included the operator's commitment to peak demand use only for the standby boiler in Table S1.2 Operational Techniques with a condition in Table S4.3 Performance parameters to report annually the total number of hours of simultaneous boiler operation in each quarter of the previous year to monitor the use. There is also a note to the table that this monitoring must be performed monthly and reported quarterly for the first year.

4.3 Impact on Habitats sites, SSSIs and non-statutory conservation sites.

4.3.1 Sites Considered

The following Habitats sites (i.e. Special Areas of Conservation, Special Protection Areas and Ramsar) are located within 10km of the Installation:

- Mersey Estuary Special Protection Area (SPA) and Ramsar
- Rixton Clay Pits Special Area of Conservation (SAC)
- Manchester Mosses SAC

There are no Sites of Special Scientific Interest within 2km of the proposed Installation.

The following non-statutory local wildlife and conservation sites are located within 2 km of the Installation:

- Upper Mersey Estuary Local Wildlife Site (LWS)
- Moore Nature Reserve LWS
- Walton Locks LWS
- Bewsey Meadow LWS
- Latchford Railway Sidings LWS
- Twig Wood Ancient Woodland (AW)

4.3.2 Site Assessment

Impacts at ecological receptors have not been considered in the applicant's assessment. We have identified the above receptors under the screening criteria as outlined in our guidance, which we have undertaken sensitivity analysis to as part of our modelling checks.

Our checks indicate there is insufficient risk to request additional work from the applicant. We found that the process contributions (PCs) are all less than the screening criteria:

- For Habitats sites, the PCs are less than 1% of the AQS.
- For other sites, the PCs are below the critical levels or loads.

There will be no likely significant effect on the interest features of the protected sites.

5. Application of Best Available Techniques

Emission limit values

The existing boilers are subject to the ELVs from Chapter III of the IED (with the exception of NO_x at 150 mg/m³ for which they had a temporary relaxation under the transitional national plan). When installing replacement boiler plant, we would expect the emissions to be at least as low as those currently permitted, particularly in such close proximity to an AQMA. Indeed, the application notes the IED ELVs in the detailed air dispersion modelling and also includes a lower limit for NO_x of 100 mg/m³. As such, although the new smaller boilers are not LCP, we consider it appropriate to retain these ELVs (or tighter limits).

Chapter III of the IED specifies a set of maximum emission limit values. Although these limits are designed to be stringent, and to provide a high level of environmental protection, they do not necessarily reflect what can be achieved by new plant.

Even if the Chapter III limits are sufficient, operational controls complement the emission limits and should generally result in emissions below the maximum allowed; whilst the limits themselves provide headroom to allow for unavoidable process fluctuations. Actual emissions are therefore almost certain to be below emission limits in practice, because any operator who sought to operate its installation continually at the maximum permitted level would almost inevitably breach those limits regularly, simply by virtue of normal fluctuations in plant performance, resulting in enforcement action (including potentially prosecution) being taken. Assessments based on, say, Chapter III limits are therefore "worst-case" scenarios.

The applicant has confirmed that the boilers are fitted with low NO_x burners and that emissions are expected to be very consistent. Commissioning tests found results of under 100 mg/Nm³ but the manufacturer has been asked to examine and adjust the burners further to ensure that compliance is achieved, allowing for any uncertainty. Following this optimisation of the burners, the applicant states that no further NO_x reduction measures are considered necessary.

We are satisfied that emissions at the permitted limits would ensure a high level of protection for human health and the environment in any event. We consider that the emission limits included in the installation permit reflect the BAT for the combustion plant.

Emissions to water or sewer

There will be a slight increase in the volume of boiler house effluent due to the replacement of the existing demineralisation system with a new softening and reverse osmosis plant. This will be directed to sewer via the existing emission point S3. We are satisfied that this disposal of boiler plant effluent to sewer is still appropriate, with no further assessment required.

Energy efficiency

Having considered the information submitted in the application, we are satisfied that appropriate measures will be in place to ensure that energy is used efficiently within the Installation.

The new boiler plant are considered some of the most energy efficient currently available, with a guaranteed gas energy efficiency of 89.1%.

Choice of Cooling System

There is no cooling of the boiler plant other than heat exchange of flue gases through a two-stage economiser. As much waste heat as possible is reused by design and the expected energy efficiency is over 90%.

Compliance with Article 14(5) of the Energy Efficiency Directive

The operator has referred to the Environment Agency guidance “Cost Benefit Assessment for Combustion Installations” and followed the assessment process contained in the guidance as follows:

The new boiler house is not an exempt installation under Table 2 of the guidance. The new boiler house is considered an Installation type 14,5(c) - a “New industrial installation with a total aggregated net thermal input of more than 20 MW generating waste heat at a useful temperature level, or an existing such installation where the combustion unit is to be substantially refurbished (e.g. cement kiln, steel works, factory)”.

The scope required for an installation of reference type 14,5(c) is to undertake a “CBA of utilising the waste heat to satisfy economically justified demand by connection of that installation to a district heating and/or cooling network, or CBA of supplying the installation’s needs with a cogeneration plant” as per Diagram 2 in the guidance.

However, in the section “What is waste heat?”, the guidance further clarifies that for “...14,5(c) installations, heat is considered to be waste heat at the point at which it is finally rejected from the process... Where all the available waste heat is already being recovered for use within the installation, no CBA is required”.

There is limited condensate return from the steam raising process at the installation, as there are a large number of different consumers of steam and condensate return is not practicable. As such there are very limited opportunities for energy recovery from steam sent to the process, which was also confirmed as part of the ESOS audit. Any recovered condensate from the boiler house itself goes back into the system at around 85 °C and pre-heats the boiler water feed. The boiler feed water is further heated using energy recovered from the boiler flue gases. A condensing economiser cools the flue gases from around 270°C to around 60°C. The condensing economiser also preheats the boiler combustion air.

The only waste heat from the boiler house is therefore the flue gases, which at 60°C are too cool to do any more useful work, noting the definition of a useful temperature of hot waste water in the guidance is greater than 65°C. Cooling the emissions any further would also worsen dispersion of the flue gases in the ambient air.

As such the operator believes all of the available waste heat from the boiler house is being recovered and no CBA is required. We agree with this assessment.

Permit conditions concerning energy efficiency

The operator is required to report energy usage under condition 4.2 and table S4.3 in Schedule 4. This will enable the Environment Agency to monitor energy efficiency at the Installation and take action if at any stage the energy efficiency is less than proposed.

There are no site-specific considerations that require the imposition of standards beyond indicative BAT, and so we accept that the applicant’s proposals represent BAT for this Installation.

6. Emission limits, monitoring and reporting

The operator has proposed to operate at limits in line with part 2 Annex V of the IED. As discussed in section 6 above, emissions at these limits will not cause significant pollution. Consequently we have accepted the proposed limits and incorporated them into table S3.1 of the permit.

Parameter	Existing mg/m³	Annex V mg/m³	New Permit limit mg/m³
NO _x	150 ^{Note 1}	110	100 ^{Note 1&3}
CO	110 ^{Note 1}	110	110 ^{Note 1}
Dust	5 ^{Note 2}	5	5 ^{Note 2}
Sulphur Dioxide	35 ^{Note 2}	35	35 ^{Note 2}

Note 1: Hourly average

Note 2: Monitoring by calculation

Note 3: As used in the air dispersion modelling. This is tighter than the Annex V limit but the applicant has stated that they can meet this limit and there is a nearby AQMA for NO₂, so we consider it appropriate.

The application notes that monitoring of the boiler emissions will be carried out on a six monthly frequency by MCERTS-accredited personnel. The new sample point for A38 has been designed to provide safe and permanent access over two sampling axes at right angles.

Sulphur dioxide emissions from natural gas firing of gas turbines and boilers will be reported as six monthly concentrations on the basis of the fuel sulphur content without continuous or periodic monitoring since only trace quantities of sulphur are present in UK natural gas. Dust emissions for natural gas fired boilers will, likewise, be reported on the basis of emission factors without continuous or periodic monitoring.

Reporting is required every 6 months, to match the monitoring frequency. Annual reporting is also required for a number of performance parameters. The reporting forms are specified in Table S4.4.

Decision checklist

Aspect considered	Decision
Receipt of application	
Confidential information	A claim for commercial or industrial confidentiality has not been made.
Identifying confidential information	We have not identified information provided as part of the application that we consider to be confidential.
Consultation	
Consultation	<p>The consultation requirements were identified in accordance with the Environmental Permitting Regulations and our public participation statement.</p> <p>The application was publicised on the GOV.UK website.</p> <p>We consulted the following organisations:</p> <ul style="list-style-type: none"> • Warrington Borough Council (Planning and Environmental Health) • Health and Safety Executive • Public Health England • United Utilities (sewerage undertaker) <p>The comments and our responses are summarised in the consultation section.</p>
The site	
Extent of the site of the facility	The operator has provided a plan which we consider is satisfactory, showing the extent of the site of the facility. The plan is included in the permit.
Site condition report	<p>The operator has provided a description of the condition of the site, which we consider is not satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial Emissions Directive.</p> <p>We have advised the operator what measures they need to take to improve the site condition report. This involves improvement conditions to:</p> <ul style="list-style-type: none"> - establish baseline conditions for soil and groundwater at the new land added to the installation boundary (18).

Aspect considered	Decision
	<ul style="list-style-type: none"> - update the Site Condition Report (SCR) for the entire expanded installation (19). - undertake an integrity survey of the below ground drains (20).
Biodiversity, heritage, landscape and nature conservation	<p>The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat.</p> <p>We have assessed the application and its potential to affect all known sites of nature conservation, landscape and heritage and/or protected species or habitats identified in the nature conservation screening report as part of the permitting process.</p> <p>We consider that the variation will not significantly alter the impact on any sites of nature conservation, landscape and heritage, and/or protected species or habitats identified. Emission limits remain in place on the discharges to water in order to protect the species and habitats in the River Mersey. The impacts of emissions to air are addressed in the Key Issues section.</p> <p>We have not consulted Natural England on the application. The decision was taken in accordance with our guidance.</p>
Environmental risk assessment	
Environmental risk	<p>We have reviewed the operator's assessment of the environmental risk from the facility.</p> <p>The operator's risk assessment is satisfactory.</p> <p>Refer to the Key Issues section for detail on:</p> <ul style="list-style-type: none"> • Emissions to air (see section on combustion plant) • Containment • Emissions to water and to sewer • Noise • Odour • Flood risk • Energy efficiency
Operating techniques	
General operating techniques	<p>We have reviewed the techniques used by the operator and compared these with the relevant guidance notes and we consider them to represent appropriate techniques for the facility.</p> <p>The operating techniques that the applicant must use are specified in table S1.2 in the environmental permit.</p> <p>The application includes a BAT assessment for the proposed</p>

Aspect considered	Decision
	<p>changes. It details compliance with the relevant clauses of:</p> <ul style="list-style-type: none"> • BAT for the common waste water and waste gas treatment and management systems in the chemical sector (BREF, 2016). • Additional guidance for the Inorganic Chemicals Sector (EPR 4.03, 2009). • Large Volume Inorganic Chemicals (Solids and Others) (BREF, 2007) – section 5.5.2 on BAT for synthetic amorphous precipitated silica and silica gel. • Industrial Emissions Directive (IED) requirement for large combustion plant. • Large Combustion Plant (BREF, 2006). • Emissions from Storage (BREF, 2006) <p>The EU directive on the limitation of emissions of certain pollutants into the air from medium combustion plant (2015/2193) was published on 25 November 2015 (MCPD). The applicant has not considered this in their application because they had thought their boilers to be LCP, so referenced the LCP BREF. We are satisfied that this presents suitably precautionary environmental considerations (including emission limit values) for our assessment ahead of the future implementation of the MCPD.</p>
<p>Operating techniques for emissions that do not screen out as insignificant</p>	<p>The Key Issues section explains our assessment and control of emissions of pollutants that cannot be screened out as insignificant.</p> <p>The proposed techniques/emission levels for emissions that do not screen out as insignificant are in line with the techniques and benchmark levels contained in the technical guidance and we consider them to represent appropriate techniques for the facility.</p> <p>Conditions are being imposed for NO_x for which the appropriate emission limits are more stringent than those associated with the IED. (see also emission limits)</p>
<p>Operating techniques for emissions that screen out as insignificant</p>	<p>The Key Issues section explains our assessment and control of emissions of pollutants that have been screened out as insignificant.</p>
Permit conditions	
<p>Updating permit conditions during consolidation</p>	<p>We have updated permit conditions to those in the current generic permit template as part of permit consolidation. The conditions will provide the same level of protection as those in the previous permits.</p>

Aspect considered	Decision
	The listed activity reference for the manufacture of a chemical which may result in the release of ammonia into the air has been updated to Section 4.7 Part A(1)(b)
Pre-operational conditions	<p>Based on the information in the application, we consider that we need to impose pre-operational conditions.</p> <p>The operator must notify us prior to Phase 1, Phase 2 and Phase 3 of the ES2 Gel Plant becoming operational, including detail of which processes will become operational, the number of plant involved and an update to the document on containment. This is so we know what stage the operations are at and to enable us to carry out an inspection if necessary.</p>
Improvement programme	<p>Based on the information on the application, we consider that we need to impose an improvement programme.</p> <p>We have imposed an improvement programme to ensure that:</p> <ul style="list-style-type: none"> • The outcome of the burner optimisation is appropriate (17).* • A baseline is established for soil and groundwater at the new areas of land (18). • The entire site has an up-to-date site condition report (19). • The integrity of the below ground drains is reviewed (20). • The actual noise impacts are reviewed, with implementation of any necessary control measures (21).* • Water is used efficiently on site (22).* <p>*See key issues for details of why these are necessary. The remainder are discussed in the row 'Site condition report'.</p>
Emission limits	<p>ELVs have been added/amended/deleted for the following substances:</p> <ul style="list-style-type: none"> • Tighter NO_x limit for the new boilers. • Removal of annual load limits on emission to water of mercury and cadmium. <p>We have imposed a stricter ELV in respect of emissions of NO_x from the new boilers because the applicant has stated that they can meet this limit and there is a nearby AQMA for NO₂.</p> <p>The load limits for mercury and cadmium have historically been set in permits where these substances are found as trace contaminants in their cleaning/treatment products. The limits are set in kg/yr and are only based on a mass balance calculation, rather than any actual monitoring. We are satisfied that the effluent concentrations will be insignificant and that we no longer require the annual calculation to be provided.</p> <p>No other emission limits have been added, amended or deleted as</p>

Aspect considered	Decision
	a result of this variation.
Monitoring	<p>The following monitoring requirements arise from this variation:</p> <ul style="list-style-type: none"> • A change of monitoring point for the boiler plant from A36 to A38. • The addition of annual monitoring for particulates from the ES2 spray dryer (A37). • The addition of flow monitoring for the emissions to sewer. <p>Otherwise, monitoring has not changed as a result of this variation.</p>
Reporting	<p>The following reporting requirements arise from this variation:</p> <ul style="list-style-type: none"> • A change to reporting for the boiler plant from A36 to A38. • The addition of annual reporting for particulates from the ES2 spray dryer (A37). • The addition of flow monitoring for the emissions to sewer. • Chapter III Performance parameters for reporting to DEFRA (relating to the LCP) have been removed. <p>Otherwise, reporting has not changed as a result of this variation.</p>
Operator competence	
Management system	<p>There is no known reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.</p> <p>The application includes evidence to demonstrate that PQ Silicas UK Limited are the legal operator of the new boiler plant. We are satisfied that they have sufficient control of the maintenance, which is undertaken by Veolia.</p>
Growth Duty	
Section 108 Deregulation Act 2015 – Growth duty	<p>We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit.</p> <p>Paragraph 1.3 of the guidance says:</p> <p>“The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation.”</p> <p>We have addressed the legislative requirements and environmental standards to be set for this operation in the body</p>

Aspect considered	Decision
	<p>of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.</p> <p>We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.</p>

Consultation

The following summarises the responses to consultation with other organisations, our notice on GOV.UK for the public, and the way in which we have considered these in the determination process.

Responses from organisations listed in the consultation section

Response received from
Warrington Borough Council
Brief summary of issues raised
<ol style="list-style-type: none">1. The site is adjacent to the Warrington air quality management area (AQMA), designated for NO₂. The permit should consider controls to reduce emissions beyond the basic permit limits to keep any impact on the AQMA to a minimum.2. Some formal assessment of new noise making equipment should be made through the application process, which should aim to ensure that cumulative rated noise outputs should be at a level that will not give rise to incidences of noise at sensitive properties.
Summary of actions taken or show how this has been covered
<ol style="list-style-type: none">1. We have imposed a stricter ELV than that required by the IED in respect of emissions of NO_x from the new boilers because the applicant has stated that they can meet this limit and there is a nearby AQMA for NO₂.2. The applicant has provided a review of the noise from the boilers. See the Key Issues section on Noise for further information.

Response received from
Public Health England
Brief summary of issues raised
We recommend that any environmental permit issued for this site should contain conditions to ensure that the following potential emissions do not impact upon public health: particulates, oxides of nitrogen, odour and noise.
Summary of actions taken or show how this has been covered
The impacts of particulates, oxides of nitrogen, odour and noise are considered in the Key Issues section. Appropriate conditions and emission limit values are included in the variation.

No responses were received from:

- Health and Safety Executive
- United Utilities (sewerage undertaker)
- Members of the public