

Permitting Decisions- Variation

We have decided to grant the variation for Chilton Manufacturing Area (formerly Manufacturing Science Centre) operated by Johnson Matthey PLC.

The variation number is EPR/KP3536UC/V005

The variation is to permit:

- An increase in the capacity of activities AR2 and AR4 to 60 tpa each with additional plant and buildings to the Pilot Plant for activities AR2 and AR4 facilitate this;
- Relocation of some ovens / kilns within the site into a new extension to the existing building area – used for activity AR1;
- Extension of the Installation boundary to accommodate the new buildings for activities AR1 and AR2;
- Addition of a Section 4.2 Part A(1) (a) (iv) activity for producing inorganic chemicals (AR5) for Metals Dissolving, in a new building located within the existing drum store area;
- Extension of the Installation boundary of the drum park;
- Additions to permitted range of raw materials for activities AR1, AR2 and AR4;
- Additional emission points to air;
- Addition of another Reverse Osmosis unit, to support the metal dissolving activity, with an associated discharge of reject water to the site drainage systems via emission point W1.
- Integration into the permit of previously agreed changes to oxides of nitrogen and particulates monitoring.

Minor alterations to permit wording have also been made to correct identified inaccuracies including an update to the site name and address (including postcode).

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 considerations section to show how the main 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.

Key issues of the decision

EMISSIONS TO WATER

All liquids associated with processing are collected and removed from the site by a licenced waste disposal contractor. Consequently, no process effluents are discharged to controlled waters. Formerly some process washings and effluent from vessel cleaning was discharged, via the adjacent Fuji and CF Fertilisers sites into the River Tees in accordance to a discharge consent managed by CF Fertilisers. The operator has confirmed in response to the Request for Further Information dated received 16/12/21 that this is no longer done.

The proposed changes to AR1, AR2, AR4 and the new AR5 will not lead to any emissions of aqueous effluent to either controlled waters, public sewer, or the onsite private drainage system that connects to the CF Fertilisers effluent plant with ultimate discharge to the River Tees via discharge point RTO1. A new discharge monitoring point W2 relating to the AR5 process and drum storage area is proposed. This has been added to Table S3.2 with a location to be confirmed by Pre-operational condition PO 1 and no monitoring parameters needed.

Activity AR3 relates to the effluent handling, storage and discharge to the private drainage system, and includes discharge of surface water from site areas including tanker loading/unloading bays, after measures to ensure it is uncontaminated. The description of AR3 directly associated activity has been amended to remove handling of effluent from production of metal oxide catalysts (activity AR1) and to add reverse osmosis retentate.

The proposed changes will have a negligible impact on this activity, with the only changes proposed being an increase in the discharge of retentate generated by the demineralised water reverse osmosis (RO) units associated with activities AR4 and AR5 leading to up to an additional 6m³ of retentate being discharged per day (a total of 6m³ from AR2, and up to 1m³ from the new RO unit associated with activity AR5).

As this material will be uncontaminated RO plant retentate (i.e. water containing slightly increased concentrations of naturally occurring minerals and salts), which will be discharged into the brackish / saline waters of the tidal River Tees via RTO1, no significant environmental impact is anticipated from this additional discharge.

No changes to monitoring conditions in the permit are required.

EMISSIONS TO AIR

Impact on Human Health

The proposed changes include the addition of several new emission points to air:

- A13-A15 a common vent header from local exhaust ventilation and thermal treatment process associated with changes to AR2 metal oxide production process.
- AR16 vent header from relocated ovens associated with changes to the AR1 metal oxide production process.
- AR17 vent from water scrubber for new AR5 metal leaching process.
- AR18 vent from sodium hydroxide scrubber for new AR5 metal leaching process when processing metals likely to lead to emissions of sulphur dioxide.
- AR19 vent from solvent extraction system using high boiling point solvent for new AR5 dissolving process.

The operator carried out a screening assessment for point source emissions including the existing and new emission points using the Environment Agency H1 methodology. The following emission points were excluded from this and the subsequent dispersion modelling assessment:

A4, A5 and A7 as being only for small scale Research and Development use,

A17 as the metal leaching process post scrubber is only likely to contain hydrogen and inerting nitrogen.

A19 as the solvent used has a boiling point >250degC and will only result in insignificant Volatile Organic Carbon emissions.

Sulphur Dioxide (human health and ecological), Ammonia (human health), and particulates (PM₁₀) screened out at Stage 1 with a long term process contribution (PC) <1% of the Environmental Assessment Level (EAL) and a short term PC <10% of EAL. However, Nitrogen Dioxide (human health and ecological), Ammonia (ecological), hydrogen fluoride (because the variation to allow the production of fluoride salts), Vanadium and Beryllium did not. The operator therefore submitted detailed ADMS dispersion modelling for the same selected emission points and full range of parameters.

The model represents a worst case in that it assumes peak emission rates when the operations are likely to be staggered, only emit a subset of the parameters dependent on the choice of product produced, and to have a peak emission early in the process cycle that then tails off. The long term annual average emission rates for input to the dispersion model were calculated by factoring the peak emission rate for predicted operational hours.

Emission Point	A1-A3	A6	A8	A9-A11	A12	A13-A15	A16	A18
Factor %	5	1	5	70	70	70	5	100

The AR5 vent A18 was assumed to operate 100% of the time as although this process is expected to operate only 50% of the time it has not yet been commissioned. Short term emissions were not factored.

We agree that the 9 chosen human receptor locations represent the closest residential buildings or schools in a variety of directions, the nearest being approximately 200m south of the installation. We also agree the 12 buildings included in the model represent those most likely to affect the emission points.

We carried out screening checks using the submitted modelling parameters and the ADMS programme (but not a full model replication audit). We confirmed the submitted conclusion that the model is most sensitive to changes in representation of building and meteorological data but we are satisfied that the submitted modelling conclusions can be used to support our assessment.

The maximum predicted process contributions (PC) and predicted environmental concentrations (PEC including background where available) for each parameter across the range of ecological receptors identified are shown below:

Parameter	Receptor	PC as % of Air Quality Standard	PEC as % of Air Quality Standard
NO ₂ Annual Mean AQS 40 µg/m ³	R1 Tibbersley Avenue	2.3	43.6
	At Maximum location	8.8	50.1
NO ₂ 1 hour 99.79 th percentile AQS 200 µg/m ³	R5 Billingham South CP School	14.3	30.8
	At Maximum location	31.2	47.7
PM ₁₀ Annual Mean AQS 40 µg/m ³	R1 Tibbersley Avenue and R7 St John Primary School	0.01	30.2
	At Maximum location	0.03	30.2
PM ₁₀ 24 hour 90.41 st percentile AQS 50 µg/m ³	R1 Tibbersley Avenue	0.04	36.3
	At Maximum location	0.10	36.3
NH ₃ Annual Mean AQAL 180 µg/m ³	All locations	<0.01	-
SO ₂ Annual Mean AQS 20 µg/m ³	R1 Tibbersley Avenue	<0.01	15.7
	At Maximum location	0.01	24.2
SO ₂ 1 hour 99.73 rd percentile AQS 350 µg/m ³	R1 Tibbersley Avenue	0.01	1.8
	At Maximum location	0.01	2.8

SO ₂ 15 min 99.9 th percentile AQS 266 µg/m ³	R1 Tibbersley Avenue	0.02	2.4
	At Maximum location	0.03	3.7
SO ₂ 24 hour 99.19 th percentile AQS 266 µg/m ³	R1 Tibbersley Avenue	<0.01	5.0
	At Maximum location	0.01	7.7
Vanadium Annual Mean AQS 5 µg/m ³	R1 Tibbersley Avenue	0.02	0.02
	At Maximum location	0.09	0.09
Vanadium Max 1 hour mean AQAL 1 µg/m ³	R5 Billingham South CP School	6.4	6.4
	At Maximum location	19.6	19.6
Beryllium Annual Mean AQS 0.0002 µg/m ³	R1 Tibbersley Avenue	17	17
	At Maximum location	63	63
HF Max 1 hour AQS 160 µg/m ³	R1 Tibbersley Avenue	1.7	-
	At Maximum location	5.5	-
HF Monthly AQS 160 µg/m ³	R1 Tibbersley Avenue	3.5	-
	At Maximum location	11.4	-

For Nitrogen Dioxide, Vanadium, Beryllium and Hydrogen Fluoride the Process Contribution at some identified receptors is greater than the 1% of AQS Long term or 10% of AQS short term for screening as insignificant but in all cases the PEC is less than 70% of the relevant AQS so all ground level concentrations can therefore be considered not to be significant.

The operator also took the maximum ground level particulate (as PM₁₀) concentrations from the modelling, already a worst case and assumed the whole particulate mass was each individual elemental species that is already permitted or is permitted by this variation for comparison with published EALs. Where EALs were not available data from EH40, or REACH DNELs was used in its place. This is acceptable as the worst case mass all as the metal approach is extremely conservative. No exceedance was demonstrated for any substance except beryllium. The use of beryllium is already limited to 1kg per year in only activity AR1 at a maximum concentration of 1% weight in the catalyst oxide products. When particulate emissions from AR1 emission points are assumed to be 1% there is no exceedance.

We therefore consider that the application will not have an unacceptable effect on the health of offsite people.

The decision was taken in accordance with our guidance.

Impact on Ecological Sites

The application is within our screening distances for these designations:

Teesmouth and Cleveland Coast Site of Special Scientific Interest (SSSI),
Special Protected Area (SPA) and Ramsar Site

Billingham Beck Local Nature Reserve (LNR) and Local Wildlife Site (LWS)
 Charlton's Pond LNR
 Gravel Hole LWS
 Cowpen Bewley Woodland Country Park LNR and LWS
 Billingham Norton Bottoms Reedbed Treatment System LWS
 Norton Bottoms LWS

The operator considered the ecological impact at these locations as well as Tees and Hartlepool Foreshore and Wetlands SSSI, SPA, Ramsar as a separate part of the Teesmouth and Cleveland Coast SSSI, SPA, Ramsar site.

Nitrogen Dioxide, Ammonia, Sulphur Dioxide and Hydrogen Fluoride emissions to air were screened against ecological environmental assessment levels (EALs) using the Environment Agency H1 methodology. Only Sulphur Dioxide screened out as insignificant (Process Contribution <1% of Long Term EAL and <10% of Short Term EAL) so the operator submitted more detailed dispersion modelling results for all the parameters.

We have carried out a check of the methodology of the dispersion modelling and concluded that the submitted results can be used to support our assessment.

The operator used the apis database to derive background concentrations at the ecological receptors for Oxides of nitrogen (17.4 – 25.7 $\mu\text{g}/\text{m}^3$ Long Term, 26.1 – 38.5 $\mu\text{g}/\text{m}^3$ Short Term); Ammonia (1.67 – 2.12 $\mu\text{g}/\text{m}^3$) and Sulphur Dioxide (1.37 – 4.81 $\mu\text{g}/\text{m}^3$). The background concentration of Hydrogen Fluoride was assumed as 0.006 $\mu\text{g}/\text{m}^3$ at all receptors.

The maximum predicted process contributions (PC) and predicted environmental concentrations (PEC including background) for each parameter across the range of ecological receptors identified are shown below:

Parameter	Receptor	PC as % of Environmental Quality Standard	PEC as % of Environmental Quality Standard
NOx Annual Mean EQS 30 $\mu\text{g}/\text{m}^3$	E4 Charlton Pond LNR	3.1	
	E8 Norton Bottom LWS		85.9
NOx 24 hour Mean EQS 75 $\mu\text{g}/\text{m}^3$	E4 Charlton Pond LNR	15.8	
	E4 Charlton Pond LNR		58.8
NH ₃ Annual Mean EQS 3 $\mu\text{g}/\text{m}^3$	E4 Charlton Pond LNR	0.22	
	E7 Gravel Hole LWS		70.7
HF Annual Mean EQS 0.5 $\mu\text{g}/\text{m}^3$	E4 Charlton Pond LNR	0.4	
	E4 Charlton Pond LNR		1.6
SO ₂ Annual Mean EQS 10 $\mu\text{g}/\text{m}^3$	E4 Charlton Pond LNR	<0.1	
	E4 Charlton Pond LNR		48.1

The PEC is less than the relevant Environmental Quality Standard in all cases. Charlton Pond LNR, at 0.6km, is the nearest ecological receptor to the installation.

The operator's modelling also predicted nutrient nitrogen and acid deposition at the identified ecological receptors. In all cases these were <1% of the relevant critical load and there screened out as insignificant impact.

We therefore consider that the application will not affect any site of nature conservation, landscape and heritage, and/or protected species or habitats identified.

We sent Natural England a Habitats Regulation Assessment for information for Teesmouth and Cleveland Coast Special Protected Area (SPA) and Ramsar Site.

The decision was taken in accordance with our guidance.

Natural England responded on 16/12/21 agreeing with our conclusion of no likely significant effect. They pointed out that the SPA/Ramsar features list had been updated for new species but that these would not add additional risks not already covered in the assessment.

Decision considerations

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.

The decision was taken in accordance with our guidance on confidentiality.

Consultation

The consultation requirements were identified in accordance with the Environmental Permitting (England and Wales) Regulations (2016) and our public participation statement.

The application was publicised on the GOV.UK website.

We consulted the following organisations:

Local Authority Environmental Protection Department
Health and Safety Executive
UK Health Security Agency (formerly Public Health England)
Local Director of Public Health

The comments and our responses are summarised in the [consultation responses](#) section.

The regulated facility

We considered the extent and nature of the facility at the site in accordance with RGN2 'Understanding the meaning of regulated facility', Appendix 2 of RGN2 'Defining the scope of the installation', Appendix 1 of RGN 2 'Interpretation of Schedule 1'.

The extent of the facility is defined in the site plan and in the permit. The activities are defined in table S1.1 of the permit.

This variation increases the permitted production of metal oxides on each of lines AR2 and AR4 to 60 tonnes per annum from 10 tonnes per annum. See Key Issues for our assessment of the impact of this change. The increased limits are included in Table S1.1 Activities (and removed from Table S2.1 Raw Materials).

The site

The operator has provided plans which we consider to be satisfactory. They include the extensions to the installation boundary permitted by this variation.

These show the extent of the site of the facility including the discharge points.

The plans are included in the permit.

At the operator's request the site name on the permit is updated from Manufacturing Science Centre to Chilton Manufacturing Area. This does not affect the legal operator of the installation.

Site condition report

The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports.

Two extensions to the site boundary are proposed;

a) to the northwest of the existing MSC and Pilot Plant buildings up to Belasis Avenue and land to the south and west of the existing tanker loading area. This additional land is required to allow the construction of the additional buildings to increase the size of the Pilot Plant to accommodate the proposed changes to activities AR2 and AR4, and to provide the required access arrangements to these new buildings.

In response to a Schedule 5 notice for further information the operator submitted a report of a survey including ground contamination sampling results to form a baseline for the this new area of the installation.

b) to the north end of the of the drum park to incorporate the full drum park and storage area. This is required to allow the construction of the new building to house activity AR5 at the south end of the existing drum park.

The operator has committed to defining a baseline for the areas from existing data or by intrusive sampling before commencement of operational activities. Pre-operational condition PO 1 has been set to require this to be completed before the start of process chemical commissioning of activity AR5.

A qualitative risk assessment was also submitted with reference to the application site report. Neither area has been used previously for activities since the permit was issued.

Nature conservation, landscape, heritage and protected species and habitat designations

We have checked the location of the application to assess if it is within the screening distances we consider relevant for impacts on nature conservation, landscape, heritage and protected species and habitat designations. See Key Issues above.

Environmental risk

We have reviewed the operator's assessment of the environmental risk from the facility.

The operator's risk assessment is satisfactory.

Operating techniques

We have reviewed the techniques proposed by the operator and compared these with the relevant technical guidance and we consider them to represent appropriate techniques for the facility.

The operating techniques that the applicant must use are specified in table S1.2 in the environmental permit.

Operating techniques for emissions that do not screen out as insignificant

Emissions of nitrogen dioxide, vanadium, beryllium and hydrogen fluoride cannot be screened out as insignificant. The techniques proposed are an expansion or reconfiguration of existing production processes (AR1, AR2 and AR4) or a new metal dissolving process with vent abatement (AR5).

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. The permit conditions enable compliance with relevant BAT reference documents (BREFs)

Operating techniques for emissions that screen out as insignificant

Emissions of particulates (including when assumed to be completely each individual elemental substance used), ammonia and sulphur dioxide have been screened out as insignificant, and so we agree that the applicant's proposed techniques are Best Available Techniques (BAT) for the installation.

We consider that the emission limits included in the installation permit reflect the BAT for the sector.

National Air Pollution Control Programme

We have considered the National Air Pollution Control Programme as required by the National Emissions Ceilings Regulations 2018. By setting emission limit values in line with technical guidance we are minimising emissions to air. This will aid the delivery of national air quality targets. We do not consider that we need to include any additional conditions in this permit.

Updating permit conditions during consolidation

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 permit.

Changes to the permit conditions due to an Environment Agency initiated variation

We have varied the permit as stated in the variation notice.

Raw materials

The operator requested the extension of the range of materials permitted for the following processes to include:

AR1

Tin and Silicon

Fluoride salt types

Quaternary ammonium salts as structure directing agents/templates

AR2

Boron, Niobium, Cerium, Molybdenum, Tin and Antimony

AR4

Boron, Niobium, Cerium, Molybdenum, Tin and Antimony

AR5 will process the same range of metal salt raw materials as the updated list for AR4 plus Cobalt and Nickel as metal powders or briquettes.

Table S2.1 has been amended accordingly

We have specified limits and controls on the use of raw materials.

We requested additional information (dated 10/12/21 response received 16/12/21) about the use of antimony that has a long term EAL of 5mg/m³, the same as vanadium. The operator committed to restriction on use, in the same manner as Vanadium and Beryllium, of 900kg per year at no more than 1.5% by weight in metal oxide products. This restriction has been added to Table S2.1 Raw Materials.

Pre-operational measures and Improvement programme

In the application and response to Schedule 5 notice for further information the operator stated that design details of the new metals dissolving process AR5 have not yet been finalised.

We have include a pre-operational measure for future development (PO 1) to require a report be submitted for approval to provide the additional detail required before chemical commissioning of AR5 can begin. We have also included an improvement condition (IC4) to require a post commissioning report be submitted comparing actual performance to that expected in the pre-commissioning report including any changes to plant or operational techniques.

Emission limits, Monitoring and Reporting

We have made amendments to Table S3.1 Point source emissions to air and monitoring requirements and Table S4.1 Reporting of monitoring data.

We have added the new point source emissions to air A13-A15 (AR2), A16 (AR1) and A17-A19 (AR5).

A13-A15 is an additional common vent for the AR2 process and so has the same oxides of nitrogen (200mg/m³) limit and monitoring as the other AR2 process common vent A9-A11.

A16 is an additional vent for the AR1 process and so has the same oxides of nitrogen (120mg/m³) limit and monitoring as the other AR1 process common vent A1-A3.

The production of fluoride salts to the AR1 process range of raw materials has been added by this variation. The emission of hydrogen fluoride could not be screened out as insignificant in the air emission modelling so benchmark limit of 5mg/m³ has been set with six monthly monitoring for

A1-A3 and A16 with a note for this to be performed when the process is using fluoride salts.

The addition of quaternary ammonium salts as structure directing agents/templates was requested for the AR1 process. This would lead to the potential for ammonia emissions from A1-A3 and A16 but the submitted assessment screens this out as insignificant so no monitoring has been added. The existing ammonia modelling requirement and Emission Limit Value for A12 (AR4 process) has been retained as this was not part of this variation application.

A17-A19 vents have been included but without monitoring or limits as only sulphur dioxide was an expected potential emission and this screened out as insignificant in the air emissions assessment.

Emission points A4, A5 and A7 are included in the table but have no parameters set as they are only used for small scale Research and Development activities.

Reporting requirements in Table S4.1 have been amended to include the monitoring of A13-A15 and A16.

Reporting of total metal solutions produced in AR5 has been added to Table S4.2 Annual production/treatment and reporting of the total metal raw material used in AR5 has been added to S4.3 Performance parameters in a similar manner to the requirements for AR1, AR2 and AR4.

As part of Improvement Condition IC1 (now complete) the operator proposed an alternative calculation based methodology for the assessment of emissions of NO_x to air from AR1 and AR2 processes based on monitoring the nitrogen put into each batch process and assuming a worst case 100% conversion to NO_x. The batch loads can then be used to calculate the annual load of NO_x. This alternative approach was accepted by the Environment Agency in EPR Compliance Report KP3536UC/0335596 dated 19/06/19. The method was trialled and subsequently reviewed with an Operator Monitoring Assessment as documented in EPR Compliance Assessment Report KP3536UC/0347021 dated 27/11/19.

The operator has proposed ceasing monitoring of oxides of nitrogen for emission points A1-A3 and A9-A11 and not adding it for A13-A15 and A16 in favour of a theoretical calculation requirement for emissions supported by theoretical emission profiling for new batch and campaign planning in Table S3.3 Process monitoring.

This variation will increase the expected plant occupancy for process AR2 (and AR4) to 70%, which is no longer the short and variable batches described in the calculation method proposal but retaining the emission limit values as the maximum calculation for any batch in the reporting period will ensure protection of the environment.

As part of the response to IC1 the operator also proposed ceasing monitoring for particulates because:

- There is HEPA filtration on 3 of the 9 exhaust streams (at the time).
- The BS EN 14792 originally stated in the permit is not accurate to the permit limit of $1\text{mg}/\text{m}^3$.
- The permit also previously referenced method BS EN 23210 which is for size fractionation in the range $1\text{-}50\text{mg}/\text{m}^3$, again not below the $1\text{mg}/\text{m}^3$ permit limit.

We accept the BS EN 23210 method is not suitable for $<1\text{mg}/\text{m}^3$. But the first statement implies two thirds of the emission points do not have HEPA filtration and the permit method for particulates is BS EN 13284-1 not BS EN 14792.

However, emission of particulates screen out as insignificant in the submitted air dispersion modelling so we agree that monitoring and emission limits values are not required at present.

Management system

We are not aware of any reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.

A full review of the management system is undertaken during compliance checks.

There is no known reason to consider the applicant will not comply with the permit conditions

Growth duty

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 variation.

Paragraph 1.3 of the guidance says:

“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.”

We have addressed the legislative requirements and environmental standards to be set for this operation in the body 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.

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.

Consultation Responses

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 Stockton Borough Council.

Brief summary of issues raised: Acknowledgement of consultation, no comments made.

Summary of actions taken: No action required

Response received from United Kingdom Health Security Agency.

Brief summary of issues raised: Acknowledgement of consultation, no comments made as long as the permit holder shall take all appropriate measures to prevent or control pollution, in accordance with the relevant sector guidance and industry best practice.

Summary of actions taken: No action required. Operator will be subject to routine compliance inspections.