



POLLUTION PREVENTION AND CONTROL ACT 1999
 POLLUTION PREVENTION AND CONTROL (ENGLAND AND WALES)
 REGULATIONS 2000
PERMIT OF PROCESS

THIS IS TO CERTIFY THAT the plaster manufacturing process and exfoliation of Vermiculite and expansion of Perlite

at: **British Gypsum Ltd, Barrow Works, Paudy Lane, Barrow On Soar, Loughborough, Leicestershire**

National Grid Reference: SK 594166

has been duly permitted in accordance with Regulation 10 of the Pollution Prevention and Control (England and Wales) Regulations 2000 subject to the conditions outlined in this document.

Name of Operator: British Gypsum Ltd
Registered Office British Gypsum Ltd, Head Office, East Leake
 Loughborough, LE12 6HX

This Permit shall apply only to the premises occupied by the applicant, as specified and described in the Application for Permit submitted to the Borough of Charnwood. This Permit, consisting of seventeen pages, shall be subject to replacement, variation or amendment, as may be considered appropriate by the Borough of Charnwood at any time, according to provisions of Regulations 12,, 15, and 17 of the Pollution Prevention and Control (England and Wales) Regulations 2000.

The conditions contained herein shall apply from the date of the Permit unless otherwise stated.

- Refer to Variation Notice dated 16 December 1999
- Refer to Variation Notice dated 8 July 2002
- Refer to Variation Notice dated 18 February 2004
- Refer to Variation Notice dated 30 March 2006

Signed on behalf of Charnwood Borough Council

Matthew Holford,
 Environmental Health Manager
 (the designated officer of the Council)

Counter-signed..... Dated **30 March 2006**
 Directorate of Housing & Health, Environmental Services,, Southfield Road, Loughborough, LE11 2TX

BRITISH GYPSUM LTD, BARROW WORKS, PAUDY LANE, BARROW ON SOAR, LOUGHBOROUGH, LEICESTERSHIRE

I.0 Process Description

I.1 Purpose

The purpose of the plant is to crush and prepare by grinding, milling raw and calcining gypsum and subject perlite (a volcanic rock) and vermiculite (a ground mica) to rapid heating to cause expansion prior to their use in the manufacture of building plasters when mixed with other materials.

These processes are included in Schedule I, Section 3.5, Part B of The Pollution Prevention and Control (England and Wales) Regulations 2000.

The best available techniques for these processes are defined in the Secretary of State's Guidance Notes PG3/09(04) and 3/12(04) and these form the basis of this Permit.

I.2 Plant Detail

The premises are located on the outskirts of Barrow on Soar and are approached down Paudy Lane, off Melton Road. (As shown on Appendix I/023 attached).

1.2.1 Gypsum Processing

Two LMI6 Lopulco Mills, air classifier (gyrotor) Mogensen size screen, 4 kettle feed bins, 2 mineral storage silos, 4 calcination kettles linked to 4 hot pits beneath, 5 tube mills, 4 tubed plaster silos, 2 tubed plaster silos in the mixing plant, 4 plaster export silos.

Control Plant and Equipment

2 Lodge Sturtevant Electrostatic Precipitators
Reversed jet bag filters (numerous)

1.2.2 Perlite Processing

Storage silos, 3 feed bins, 3 vertical expanders, cyclone

Control Plant and Equipment

Perlite electrostatic precipitator

Reversed jet bag filters

1.2.3 Vermiculite Processing

Storage silos, 2 feed silos, vermiculite exfoliator, 2 expanded vermiculite silos

Control Plant and Equipment

Reversed jet bag filter

1.2.4 Other Additives

Storage silos and reversed jet bag filters

1.2.5 Mixing Plant

Storage silos, ingredient weighers, paddle and ribbon mixers

Numerous reversed jet bag filters

Stucco screens 4 off

1.2.6 Packing Plant

1 x 14 spout rotary packer

2 x 10 spout rotary packer with automatic bag placing

Reversed jet bag filter

1.3 Plant Operation

The process is summarised diagrammatically in Appendix 03/023.

1.3.1 Gypsum Crushing and Grinding

Raw Gypsum is mined underground and some is exported to other company sites and some stored in a homogeniser.

The stored rock is crushed in one of two Lopulco Mills which dry and grind the rock to produce kettle feed. This material is separated using a gyrotor, the finer material being separated by a cyclone later on. The air from the cyclone passes to the mill electrostatic precipitator before being exhausted.

Oversized particles are screened and returned to the mill for re-grinding. The kettle feed is stored in 4 bins or 2 mineral storage silos.

Hot air for the mill is supplied by a natural gas-fired burner, some air is recycled from the perlite expansion process to reduce fuel costs, the heat input is controlled by the temperature of the mill vent to the precipitator.

The standby fuel available in the event of an interrupted gas supply is 35 sec. gas oil.

A reversed jet D.C.E. dust collector is fitted to control dust emissions from the mills feed, conveying and sizing system, the dust being returned to the product via its own air lock. The dust collection system is fitted to both mill circuits and vents into the building.

1.3.2 Calcination

The ground material is stored in either mineral silos or ready to use mineral weigh silos. All silos are enclosed and fitted with reversed jet bag filters which exhaust into the building. The gypsum is converted into plaster by an endothermic chemical reaction and this is achieved by calcination at nominally 150°C by the application of heat in a conically shaped vessel called a 'kettle'. The heat is supplied directly into the ground gypsum by submerged combustion from a natural gas/oil burner. This has the effect of converting the gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) into a "hemi-hydrate" plaster ($\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$). After calcination the plaster flows into a hot pit and then to storage. Water vapour and dust are drawn off three of the kettles through a pre-cleaning cyclone to the electrostatic precipitators. The hot pit is kept under a negative pressure by connection to the electrostatic precipitator.

All exhaust gases from the Lopulco Mills are also cleaned through the 2 electrostatic precipitators, emissions from these being continuously monitored using an opacity monitor

Water vapour, combustion products and dust are drawn off the fourth kettle through a bag filter. Emissions from this filter are continuously monitored using an opacity monitor.

The plaster storage silos also enclosed are fitted with reversed jet bag filters which exhaust into the building.

The fourth kettle uses a reverse jet bag filter. The hot pits are kept under negative pressure by connection to the mill electrostatic precipitator for the units on kettles, 1, 2 and 3 and by the reverse jet bag filter on kettle 4.

1.3.3 Post Calcination Treatment

To finely size and grade the plaster it is passed through a tube mill. These mills are kept under a negative pressure by a reversed jet bag filter. The plaster is then stored in various silos, all of which are equipped with reversed jet bag filters. All milled plaster is conveyed using a “dense-phase” pneumatic conveying system to mixing and packing plant.

1.3.4 Lightweight Aggregate Production

Raw perlite is imported to the site and stored in a covered building and a silo. All screening points, belt transfers and silos are covered by dust collection facilities linked to reversed jet bag filters. Perlite is fed into one of three vertical expanders, these are heated using a natural gas burner which cause the perlite to expand. A cyclone disenetrains the expanded perlite and passes it to a storage silo. Overflow from the cyclone passes to the perlite electrostatic precipitator (emission point 2 in condition 1.3.7) where the dust is removed for recycling and hot gases are exhausted or used to heat the Lopulco Mill. The electrostatic precipitator is continuously monitored using an opacity monitor. The standby fuel available for the burners in the event of an interrupted gas supply is 35 sec gas oil.

Raw vermiculite is imported into the site where it is screened and conveyed to storage silos or a stock pile. The vermiculite is then passed to an exfoliator indirectly, which is heated by natural gas with 35 sec gas oil as the standby fuel. The material is collected in a cooler and is then stored in silos. Dust laden gases are collected in a reversed jet bag filter and all screens, silos and conveyor belt transfer points are similarly covered. The combustion gases from the indirect gas heaters are either recycled to heat the Lopulco mill or discharged via the perlite electrostatic precipitator.

1.3.5 Mixing and Packing

Numerous smaller ingredients are used in the mixing and blending to produce the final product. Emissions from the storage silos, weighers and mixers are vented using reversed jet bag filters. The finished product is packed into sacks automatically, the whole system is vented to a reverse jet dust collector which discharges to atmosphere.

1.3.6 Site Output

The total production capacity of the site is approximately 900,000 tonnes of plaster product per annum

1.3.7 Summary of External Emission Points

The following points on the site are of relevance in relation to potential atmospheric emissions:-

Emission Point	Emission
1. 57.9m stack to gypsum electrostatic precipitator	Particulate Natural gas/oil combustion products
2. 31m stack to perlite electrostatic precipitator	Particulate Natural gas/oil combustion products
3. 31m stack to 4th kettle bag filter	Particulate Natural gas/oil combustion products
4. 3 external emission points to packers.	Particulate
5. Vacuum extraction storage containers sited externally at locations marked x on Appendix 4/023	Particulate
6. Various fugitive sources including storage bay access points and ventilation points serving the process.	Particulate

The location of each emission point is shown on Appendix 4/023 attached.

2.0 Emission Limits and Controls

2.1 All emissions to air, other than steam or water vapour, shall be colourless. All emissions to air shall be free from droplets..

All emissions shall be free from offensive odour outside the process boundary (see Appendix 2/023), as perceived by Charnwood Borough Council authorised officers. For the plaster processing all emissions to air other than steam or water vapour shall also be free from persistent mist.

2.2 Emissions from combustion processes shall in normal operation be free from smoke and in any case shall not exceed the equivalent of Ringelmann Shade I as described in British Standard BS 2742: 1969.

2.3 All pollutant concentrations shall be expressed at standard conditions, 273K, 101.3kPa, without correction for water vapour content.

2.4 The introduction of dilution air to achieve emission concentration limits shall not be permitted. Exhaust flow rates shall be consistent with efficient capture of emissions and good operating practice.

2.5 The total emission limits shall not exceed the following:-

Emission Point	Maximum Emission Limit
1. Stack serving the gypsum electrostatic precipitators	100mg/m ³ until 31.06.2014 50mg/m ³ from 01.07.2014
2. Stack serving the perlite electrostatic precipitator	100mg/m ³ until 31.06.2007 50mg/m ³ from 01.07.2007
3. Stack serving the bag filter to the 4th kettle	30mg/m ³
4. 3 vents serving the extract ventilation system to the packers..	100mg/m ³ until 31.06.2014 50mg/m ³ from 01.07.2014
5. Vacuum extraction units	No prescribed limit
6. Loading bay access points and ventilation points	No prescribed limit

3.0 Monitoring, Sampling and Measurement of Emissions

3.1 A visual inspection of all emissions shall be made at least once a day.

Investigation of the cause and remedial action shall be taken immediately if any abnormal emission is recognised or any breach of the emission limit recorded.

3.2 Emissions from emission points 1, 2 and 3 in condition 1.3.7 shall be continuously monitored and measured for particulate matter using make and models of monitoring equipment agreed with the local authority inspector. The monitors must be operated, maintained and calibrated in such a way as to be capable of warning the operator of any exceedence of the emission limits in 2.5. Annual calibration of the monitors must be based on annual non-continuous isokinetic sampling.

Emissions from emission points 4 in condition 1.3.7 shall be continuously indicatively monitored for particulate mater using opacity meters of a make and model to be agreed with the local authority. The monitors shall be operated, maintained and referenced in accordance with manufacturers' instructions.

3.3 Monitoring instruments required by 3.2 shall be checked once a day and calibrated to the manufacturer's instructions at least once a year. Emissions from the relevant emission points shall be visually inspected to ensure that the monitoring instruments are operating correctly.

They shall be capable of warning the operator of any malfunction of any arrestment plant.

3.4 The records required to be kept by condition 3.7 shall be kept by the operator on the premises and be made available for inspection by an authorised officer of Charnwood Borough Council. These records shall be retained so each entry is kept for a period of not less than 4 years from the date on which that entry was made.

All dust arrestment equipment with a nominal capacity of less than 50m³/min shall be designed to meet the requirement of condition 2.5.

3.5 Emissions from the electrostatic precipitators and bag filter described in clause 1.3.7 shall be sampled once a year to demonstrate compliance with condition 2.5. The data obtained must be used to assist in the calibration of the continuous particulate monitor described in clause 3.2

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Monitoring instruments required by 3.2 shall be checked daily and calibrated at least annually in accordance with the manufacturer's instructions.

Where new plant and equipment is being commissioned or emission levels are close to the emission limits the frequency of testing shall be increased.

- 3.6 The results of all non-continuous emission testing shall be forwarded to Charnwood Borough Council within 8 weeks of the completion of the sampling. The local authority must be advised at least 7 days in advance of any non-continuous monitoring exercise.
- 3.7 The results of the continuous particulate monitor recording exceedences of the emission limit must be recorded to include the date and time of the incident, the result of the investigation of the breach and details of the remedial action taken. These records shall be made available to the local authority inspector on request.
- 3.8 Emissions from combustion processes shall in normal operation be free from smoke and in any case shall not exceed the equivalent of Ringelmann Shade I described in British standard BS 2742:1969.
- 3.9 All testing for particulate matter emissions shall be carried out in accordance with the main procedural requirements of British Standard BS.9096:2003. Compliance date:1 April 2007

4.0 Materials Handling and Building Construction

- 4.1 All raw materials likely to generate dust emissions must be delivered to the site in enclosed or covered vehicles or in enclosed containers. The material, except for uncrushed ore or rejects, shall be stored in silos or under cover and transferred to the furnace or grinding mills by a system which minimises visible dust emissions. The discharge of bulk consignments shall be carried out in a manner which minimises dust emissions..
- 4.2 Uncrushed ore or reject material may be stored outside but where this is done, it shall be treated to minimise wind whipping, e.g. with regular water spraying in accordance with a method approved in advance by the Local Authority.
- 4.3 All conveyors handling material from storage or after crushing shall be covered and fitted with suitable windboards to each side. The conveyors shall be fitted with effective means for keeping the return belt clean and for collecting materials removed by this cleaning.
- 4.4 By-product gypsum shall be received only in covered or contained lorries, vessels or wagons. All by-product gypsum for day-to-day usage shall be stored under cover. The minimum covered storage provided shall be at least sufficient to contain 10 days production requirement. When this storage is full, outside storage shall be permitted subject to agreement with Charnwood Borough Council about position of the stock pile and its size and handling. When material is removed from this stock pile it shall only be moved into the covered store. Where reasonably practicable, the covered store shall be loaded by conveyor and material shall only be removed by conveyor.
- 4.5. All expanded or exfoliated material shall be handled in enclosed systems. Where dust extraction is used at bagging and other filling points, it shall meet condition 2.5.
- 4.6 Exfoliated or expanded material on its own or in a pre-mix with other powders shall be removed from the site in tankers or in closed containers or bags.
- 4.7 Bulk storage silos shall be fitted with a high level alarm or volume indicator to warn of overfilling.
- 4.8 To ensure compliance with condition 2.5, all high speed crushers, screens and conveyor transfer points shall be fitted with dust extraction and ducted to arrestment plant.
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- 4.9 Where loading dusty material including wastes to or from lorries or rail wagons, dust emissions shall be minimised and the material shall be sheeted or held in closed containers.
- 4.10 In the case of liquid and solid spillages, adequate provisions shall be made available for containment and clearing up any spillage using vacuum cleaning, wet methods or other approved methods agreed with Charnwood Borough Council
- 4.11 Internal accumulations of dust in the area housing the perlite expanders and vermiculite exfoliator must be reduced so as to prevent visible fugitive emissions from this area. Cleaning records of this area shall be documented and made available to the local authority inspector on request.
- 4.12 Routine inspections of all abatement equipment including the electrostatic precipitators and reverse jet filters shall be recorded. These service records shall be made available to the local authority inspector on request.
- 4.13 All silos are currently located internally in the fabric of the works so that in the event of overfilling, there will be no external emissions. No new or replacement silos will be installed which are likely to emit overflow outside unless they are designed to achieve an emission limit of 10mg/m^3 and are installed with automatic protection systems to control the delivery of material from the tanker to the silo such that it is not possible to overflow or over-pressurise the silo.

5.0 Processing

- 5.1 The chimney serving the mill electrostatic precipitators shall be no less than 57.9 metres in height. The chimney serving the perlite electrostatic precipitator shall be no less than 39 metres in height. The chimney serving the bag filter to the 4th kettle shall be not less than 39m in height.
- 5.2 Chimneys or vents shall not be fitted with any restriction at the final opening such as a plate, cap or cowl.
- 5.3 Chimneys or vents shall be designed for an efflux velocity of not less than 15m/sec in normal operation. Care shall be taken to avoid generating positive pressure zones within the chimney unless the chimney wall is impervious or lined. Where a wet method of arrestment is used, the linear velocity within the chimney shall not exceed 9m/sec, to avoid entrainment of droplets from the chimney surface into the gas stream.
- 5.4 The stack of the mill electrostatic precipitator shall be maintained in accordance with HELA Guide Note GS53 "Single Flue Steel Industrial Chimneys". In particular it shall be internally lined to inhibit dust accumulation and shall be internally cleaned a minimum of two times a year.
- 5.5 Wherever reasonably possible the final discharge point from the particulate matter arrestment plant where it is not necessary to achieve dispersion of the residual pollutants shall be at low level to minimise the effect on local community in case of abnormal emissions and to facilitate maintenance and inspection.
- 5.6 Safe facilities for sampling shall be provided on vents or ducts as specified by Charnwood Borough Council. Care is needed in the design and location of sampling systems in order to obtain representative samples as specified in the relevant British Standards.

6.0 General

- 6.1 British Gypsum shall have regard to the effects of emissions from their process on the surrounding neighbourhood, e.g. by regular off-site observations. Effective maintenance, including cleaning of filters and ducts, shall be employed on all plant and equipment concerned with the control of emissions to the air. Essential spares and consumables necessary to ensure effective maintenance shall be readily available.

As a minimum these essential spares will include the following:-

Bag filter socks, rappers, bag filter frames.

- 6.2 Any malfunction or breakdown leading to abnormal emissions shall be dealt with promptly and process operations adjusted until normal operations can be restored. All such malfunctions shall be recorded in the log book required to be maintained along with date, time and the name of the person making the entry.
- 6.3 If there is likely to be an effect on the local community Charnwood Borough Council shall be informed without delay. Failure of key arrestment plant must be notified immediately to Charnwood Borough Council.
- 6.4 A written maintenance programme shall be provided to the local authority and maintained on site identifying the preventative maintenance programme for all plant associated with emissions control. Specifically, this should include maintenance of chimneys and external ducting carrying dust-laden air, quantitative and indicative particle monitors, cyclones and electrostatic precipitators.

Compliance date: 1 April 2007

EXPLANATORY NOTES

These notes do not comprise part of Permit Serial No.023 but contain guidance relevant to the Permit.

1. You should note that Regulation 12(10) of the Regulations provides that in relation to any aspect of the process not regulated by conditions 1.1 to 6.4 the best available techniques ('BAT') shall be used for the purpose of preventing or, where that is not practicable, reducing emissions into the air.

Section 3(7) of the Regulations describes 'BAT' as meaning the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole.

2. This Permit is issued under the Pollution Prevention and Control (England and Wales) Regulations 2000. The responsibility you have under legislation for Health, Safety and Welfare in the workplace remains in force. In addition, the Permit does not relieve you of your obligations to obtain planning permission, hazardous substances consent, discharge consent from the Environment Agency Building Regulations approval, or a Waste Disposal Licence.
3. Any proposed 'change in operation' in the process (within the meaning of Regulation 2(1)) shall be notified to Charnwood Borough Council as required by Section 16(1) of the Regulations.