IPSWICH
BOROUGH COUNCIL

POLLUTION PREVENTION AND CONTROL ACT 1999

LOCAL AUTHORITY POLLUTION PREVENTION AND CONTROL

APPLICATION FOR A PERMIT
to operate a
ROADSTONE COATING PLANT.

Operator Name: Tarmac Ltd

Name/Address of Installation:

Tarmac Ltd Ipswich Works
The Docks, Cliff Road
Cliff Quay
Ipswich
Suffolk

Post code: IP3

Contact Name: Mr J Gillan

Telephone number: 07753 831005.

Fax number:

IPSWICH
BOROUGH COUNCIL

The New Pollution Prevention and Control Regime

A new system of regulation for dealing with pollution issues, known as Pollution Prevention Control (PPC), came into force in 2000. PPC is introduced by way of the Environmental Protection Act 1990, the current pollution framework under which you are authorised for Local Air Pollution Control.

The basic purpose of the PPC regime is to introduce a more integrated approach to controlling pollution from industrial sources. It aims to achieve "a high level of protection of the environment taken as a whole by, in particular, preventing, or where that is not practicable, reducing emission into the air, water and land" (*Regulation 8(2)-(3)*).

The PPC system applies an integrated environmental approach to the regulation of certain industrial activities. This means that emissions to air, water (including discharges to sewer) and land, plus a range of other environmental effects, must be considered together. It also means that permit conditions must be set so as to achieve a high level of protection for the environment as a whole. These conditions are based on the use of the ***"Best Available Technique"*** (BAT), which balances the costs to the operator against the benefits to the environment.

The PPC system places industrial and commercial installations into three new parallel regimes:-

A1 Integrated Pollution Prevention and Control enforced by Environment Agency.
A2 Integrated Pollution Prevention and Control (LA-IPPC) enforced by Local Authorities.
B Local Air Pollution Prevention Control (LAPPC) enforced by Local Authorities.

Installations falling within the A1 and A2 regimes will be subject to control of pollution to land, air and water, together with noise and vibration, energy, land contamination, emergencies, amongst other thins. Part B processes currently authorised under Part 1 of the Environmental Protection Act 1990, like your authorised process, will transfer to the LAPPC regime and I remain subject to air pollution control only.

New installations falling under the LA-IPPC or LAPPC regimes should contact the Local Authority for an application pack. You will be given advice on how to prepare your application and how the regime will apply.

For existing authorised processes, the changeover from LAP Cot LAPPC will essentially be an administrative one and will not involve payment of new application fees. The transfer will take place over a phased timetable. An extract of Defra guidance setting out the transfer timetable is attached.

Installations transferring from LAPC to LAPPC do not have to take action at this stage. You are considered to have made a deemed application. The Local Authority has 12 months to transfer your LAPC authorisation to an LAPPC permit. If your authorised process is due for transfer, you will be contacted to confirm that a deemed application has been made. If the Local Authority fails to notify you of its determination of the application within 12 months the operator can notify the Local Authority in writing which then triggers a deemed refusal. The operator will then have leave to appeal against this refusal.

For further information, contact Environmental Protection Services on 01473 433115.

Application for a permit

Local Authority Pollution Prevention and Control

Pollution Prevention and Control Act, 1999
Pollution Prevention and Control (England and Wales) Regulations 2000 (as amended)

Introduction

When to use this form
This regime is known as Local Authority Pollution Prevention and Control, LAPPC. Installations permitted under this regime are known as B installations. Use this form if you are sending an application for a 'Part B' permit to a Local Authority under the Pollution Prevention and Control (England and Wales) Regulations 2000 (as amended) ("the PPC Regulations").

Before you start to fill in this form
Please read the Defra general guidance manual issued for LA-IPPC and LAPPC. This contains a list of other documents you may need to refer to when you are preparing your application, and explains some of the technical terms used. You will also need to read the relevant sector guidance note, BREF note or Process Guidance note as relevant. The Pollution Prevention and Control (England and Wales) Regulations 2000 can be obtained from The Stationary Office, or viewed on their website at: www.legislation.hmso.gov.uk/si/si2000/20001973.htm

Which parts of the form to fill in
You should fill in as much of this form as possible. The appropriate fee must be enclosed with the application to enable it to be processed further. When complete return to:

Environmental Protection Services
Ipswich Borough Council
4th Floor
Grafton House
15-17 Russell Road
Ipswich IP1 2DE

Other documents you may need to submit
There are number of other documents you may need to send us with your application. Each time a request for a document is made in the application form you will need to record a document reference number for the document or documents that you are submitting in the space provided on the form for this purpose. Please also mark the document(s) clearly with this reference number and the application reference number, if you have been given one, which will be at the top of the form overleaf. If you do not have either of these, please use the name of the installation.

Using continuation sheets
In the case of the questions on the application form itself, please use a continuation sheet if you need extra space; but please indicate clearly on the form that you have done so by stating a document reference number for that continuation sheet. Please also mark the continuation sheet itself clearly with the information referred to above.

Copies
Please send the **original and 3 copies of the form** and all other supporting material, to assist consultation.

If you need help and advice
We have made the application form as straightforward as possible, but please get in touch with us at the local authority address given above if you need any advice on how to set out the information we need.

LAPPC Application Form: to be completed by the operator		
For Local Authority use		
Application Reference:	Officer Reference:	Date received:

A1.1 Name of the installation

Tarmac Ltd – Roadstone coating plant Ipswich.

A1.2 Please give the address of the site of the installation

The Docks, Cliff Road,

Cliff Quay, Ipswich, Suffolk

Postcode IP3 Telephone

Ordnance Survey national grid reference *8 characters, for example, SJ 123 456*

TM 168 419.

A1.3 Existing authorisations:
Please give details of any existing LAPC or IPC authorisation for the installation, including reference number(s):

None on the proposed site

Please provide the information requested below about the "Operator", which means the person who it is proposed will have control over the installation in accordance with the permit (if granted)

A2.1 The Operator – Please provide the full name of company or corporate body

Tarmac Ltd

Trading/business name (if different)

Registered Office address
Millfields Road/ Spring Road.

Ettingshall,

Wolverhampton Postcode: WV4 6JP.

LAPPC Application Form: to be completed by the operator		
For Local Authority use		
Application Reference:	Officer Reference:	Date received:

Principal Office address (if different)

Postcode:

Company registration number

453791

A2.2 Holding Companies

Is the operator a subsidiary of a holding company within the meaning of Section 736 of the Companies Act 1985?

No ❑

Yes X❑ *name of ultimate holding company*

Anglo American PLC

Registered office address

20 Charlton House,

London.

Postcode SW1Y 5 AN.

Principal Office address (if different)

As above.

Postcode

Company registration number: _____

LAPPC Application Form: to be completed by the operator		
For Local Authority use		
Application Reference:	Officer Reference:	Date received:

A3.1 Who can we contact about your application?

It will help to have someone who we can contact directly with any questions about your application. The person you name should have the authority to act on behalf of the operator. This could be an agent or consultant rather than the operator.

Name R D Hudson,

Position Principal Engineer,

Address 12 Thorntree Close,

Ravenstone,

Leicestershire Postcode LE67 2JY.

Telephone number 01530 832291

Fax number 01530 454032.

E. Mail address robhudsoncons@ntlworld.com

LAPPC Application Form: to be completed by the operator		
For Local Authority use		
Application Reference:	Officer Reference:	Date received:

B1 About the Installation

Please fill in the table below with details of all the current activities in operation at the whole installation.

In **Column 1a *Activities in the stationary technical unit***
Please identify all activities listed in Schedule 1 to the PPC Regulations that are, or are proposed, to be carried out in the stationary technical unit of the installation.

In **Column 1b *Directly associated activities***
Please identify any directly associated activities that are, or are proposed, to be carried out on the same site which:

* have a technical connection with the activities in the stationary technical unit
* could have an effect on pollution

In **column 2a and b Schedule 1 references**, please quote the Chapter number, Section number, then paragraph and sub-paragraph number as shown in Part 1 of Schedule 1 to the PPC Regulations. For example, *Manufacturing glass where the use of lead or any lead compound is involved*, would be listed as Chapter 3, Section 3.3, Part B(b).

B1.1 Installation table for new permit application

COLUMN 1a	**COLUMN 2a**
Activities in the Stationary Technical Unit	**Schedule 1 References**
	Chapter 3 section 3:5
Coated Roadstone process and aggregate storage.	Part B(e) ✓
	'coating roadstone with tar or bitumen.
COLUMN 1b	**COLUMN 2b**
Directly associated activities	**Schedule 1 References**
Handing, loading, screening, weighing and mixing of aggregates and sand with Bitumen.	As part of the installation under Part B (e)
Handling, weighing and mixing of reclaimed fillers and other additives.	As part of the installation under Part B (e).

B1.2 Why is the application being made?

☒ the installation is new

☐ it is an existing Part B process authorised under the Environmental Protection Act for which a substantial change is proposed within 4 months of the transitional date and an LAPPC permit is required.

B.1.3 Site Maps

Please provide:-

- A suitable map showing the location of the installation clearly defining extent of the installations in red

Doc Reference Drawing No IPS/517/B

- A suitable plan showing the layout of activities on the site, including bulk storage of materials, waste storage areas and any external emission points to atmosphere

Doc Reference Drawing No IPS/517/B and Elevation Drawing No IPS/519/A

B2 The Installation

Please provide written information about the aspects of your installation listed below. We need this information to determine whether you will operate the installation in a way in which all the environmental requirements of the PPC Regulations are met.

B2.1 Describe the proposed installation and activities and identify the foreseeable emissions to air from each stage of the process (this will include any foreseeable emissions during start up, shut down and any breakdown/abnormal operation)

The use of process flow diagrams may aid to simplify the operations

Doc Reference: Appendix 1 Section B2.1 and flow diagram No EPI -00046

B2.2 Once all foreseeable emissions have been identified in the proposed installation activities, each emission should be characterised (including odour) and quantified.

- **atmospheric emissions** should be categorised under the following
(i) point source, (e.g. chimney / vent, identified by a number and detailed on a plan)
(ii) fugitive source (e.g. from stockpiles / storage areas).

If any monitoring has been undertaken please provide the details of emission concentrations and quantify in terms of mass emissions. If no monitoring has been undertaken please state this.

(Mass Emission - the quantification of an emission in terms of its physical mass per period of time. Eg. Grams per hour, tonnes per year)

Doc reference: Appendix 1 Sections B2.2, Table 2.2.1, B2.2.2. and B2.2.3.

B2.3 For each emission identified from the installations' activities describe the current and proposed technology and other techniques for preventing or, where that is not practicable reducing the emissions. If no techniques are currently used and the emission goes directly to the environment, without abatement or treatment this should be stated

Doc Reference: Appendix 1 Section B2.3.

B2.4 Describe the proposed systems to be used in the event of unintentional releases and their consequences. This must identify, assess and minimise the environmental risks and hazards, provide a risk based assessment of any likely unintentional releases, including the use of historical evidence. If no assessments have been carried out please state.

Doc Reference: Appendix 1 Section B2.4.

B2.5 Describe the proposed measures for monitoring all identified emissions including any environmental monitoring, and the frequency, measurement methodology and evaluation procedure proposed. (e.g. particulate matter emissions, odour etc). Include the details of any monitoring which has been carried out which has not been requested in any other part of this application. If no monitoring is proposed for an emission please state the reason.

Doc Reference: Appendix 1 Section B2.5.

B2.6 Provide detailed procedures and policies of your proposed environmental management techniques, in relation to the installation activities described.

Doc Reference: Appendix 1 section B2.6.

B3 Impact on the Environment

B3.1 Provide an assessment of the potential significant local environmental effects of the foreseeable emissions (for example, is there a history of complaints, is the installation in an air quality management area?)

Doc Reference: Appendix 1 Section B3.1.

B3.2 Are there any sites of special scientific interest (SSSIs) or European Sites which are within 2 kilometres of the installation?

No ☐

Yes X☐ *please give names of the sites*

Bobbits Hole Belstead and Orwell Estuary.

B3.3 Provide an assessment of whether the installation is likely to have a significant effect on such sites and, if it is, provide an assessment of the implications of the installation for that site, for the purposes of the Conservation (Natural Habitats etc) Regulations 1994.

Doc Reference: Appendix 1 section B3.3

B4 Environmental Statements

B4.1 Has an environmental impact assessment been carried out under The Town and Country Planning (Environmental Impact Assessment)(England & Wales) Regulations 1999, or for any other reason with respect to the installation.

No ☒X

Yes ☐ *Please supply a copy of the environmental impact assessment and details of any decision made*

Doc Reference:

B5 Additional information

Please supply any additional information which you would like us to take account of in considering this application.

Doc Reference Appendix Section B5.1

C1 Fees and Charges

The enclosed charging scheme gives details of how to calculate the application fee. Your application cannot be processed unless the application fee is correct and enclosed.

The current fees are attached in Appendix A.

C1.1 Please state the amount enclosed as an application fee for this installation.

£1514 . Cheques should be made payable to: *Ipswich Borough Council*

We will confirm receipt of this fee when we write to you acknowledging your application.

C1.2 Please give any company purchase order number or other reference you wish to be used in relation to this fee.

C2 Annual charges

If we grant you a permit, you will be required to pay an annual subsistence charge, failure to do so will result in revocation of your permit and you will not be able to operate your installation.

C2.1 Please provide details of the address you wish invoices to be sent to and details of someone we may contact about fees and charges within your finance section.

Tarmac Ltd

Colchester Area office

Warren Lane, Stanway, Near Colchester.

Postcode: CO3 0NN. Telephone: 01206 330795.

C3 Commercial confidentiality

C3.1 Is there any information in the application that you wish to justify being kept from the public register on the grounds of commercial confidentiality?

No X ☐

Yes ☐

Please provide full justification, considering the definition of commercial confidentiality within the PPC regulations.

Doc Reference _____

C3.2 Is there any information in the application that you believe should be kept from the public register on the grounds of national security?

No X ☐

Yes ☐

Do not write anything about this information on the form. Please provide full details on separate sheets, plus provide a copy of the application form to the Secretary of State for a Direction on the issue of National Security.

C4 Data Protection

The information you give will be used by the Local Authority to process your application. It will be placed on the relevant public register and used to monitor compliance with the permit conditions. We may also use and or disclose any of the information you give us in order to:

- consult with the public, public bodies and other organisations,
- carry out statistical analysis, research and development on environmental issues,
- provide public register information to enquirers,
- investigate possible breaches of environmental law and take any resulting action,
- prevent breaches of environmental law,
- assess customer service satisfaction and improve our service.

We may pass on the information to agents/ representatives who we ask to do any of these things on our behalf.

It is an offence under Regulation 32 of the PPC regulations, for the purpose of obtaining a permit (for yourself or anyone else) to: -

- make a false statement which you know to be false or misleading in a material particular,
- recklessly make a statement which is false or misleading in a material particular.

If you make a false statement

- we may prosecute you, and
- if you are convicted, you are liable to a fine or imprisonment (or both).

C5 Declaration

C5.1 Signature of current operator(s)*

I / We certify that the information in this application is correct. I / We apply for a permit in respect of the particulars described in this application (including supporting documentation) I / We have supplied.

Please note that each individual operator must sign the declaration themselves, even if an agent is acting on their behalf.

For the application from:

Installation name: Tarmac Ltd - Ipswich Roadstone coating plant

Signature 

Name Mr J Gillan

Position Zone Manager

Date 28.04.08

Signature

Name

Position

Date

* Where more than one person is defined as the operator, all should sign. Where a company or other body corporate – an authorised person should sign and provide evidence of authority from the board of the company or body corporate.

Appendix 1.

Supplementary technical information.

in support of an application for an LAPPC Permit

to

Ipswich Borough Council,
Environmental Services,
Grafton house,
15 -17 Russell Road,
Ipswich,
Suffolk IP1 2DE.

Under section 3.5 PPC Regulations SI2000 no 1973.

for

A Roadstone Coating Plant.

at

Tarmac Ltd,
The Docks, Cliff Road,
Cliff Quay
Ipswich
Suffolk IP3

Prepared by R D Hudson
Rob Hudson Consultancy

April 2008.

B.1. 2. Introduction.

This application seeks an LAPPC Permit to cover the operation of a new roadstone coating plant located on a new site at Cliff Quay as outlined in the foregoing. After completion of commissioning and an acceptable proving trial period for the new plant, the ageing roadstone plant at Tarmac Ltd, South West Quay, Ipswich IP3 OBH, will be taken out of service and the site cleared. At an agreed time, the existing LAPPC Permit No 3.4/RJD/1/05 for the South West Dock plant, will be revoked.

The new plant is larger than the existing unit operated by the company, capable of producing upwards of 160t/hr of a wide range of Dense Macadam and Hot Rolled asphalt at product temperatures of up to 200°C with up to 8% aggregate and sand feed moisture.

The plant is designed in its entirety to meet the more stringent standards of process guidance note PG3/15a(04). In addition to encapsulated enclosures containing the whole process flow during and following the drying stage, the screening, weighing and mixing sections together with hot material storage of final products, the plant will be contained within sheeted buildings to ensure containment of all emissions during operation.

In support of this application the following is provided.

1.1. Appendix 2 and 3 chimney D1 calculations for max and min plant capacity.
1.2. Site location and plan drawing No IPS/517/B.
1.3. Site elevations drawing No IPS/519/B
1.4. Manufacturers layout and elevation drawing No EPO-00299-U
1.5. Manufactures flow diagram drawing No EPI-00046.
1.6. Manufactures brochure of plant installation with cutaway views

The following supplementary technical information provides details of the new plant in the format necessary to answer the specific questions contained within Part B of the application form.

B.2.1. Description of the plant process.

The following process description should be read in conjunction with the plant manufacturers drawing No EPO-00299-U and Flow diagram No EPI-00046 together with the manufacturers illustrative brochure showing cutaway views of the process.

The road stone process will comprise :-

- Site aggregate and sand stocks contained within 11 x 1,500t three sided stock bays. <3mm fines and sand will be contained within three covered storage bays.
- A cold feed system comprising 10 x15t capacity feed hoppers covered on three sides and roof, complete with gathering and inclined feed conveyors to the dryer.
- A rotary dryer module with dual fuel oil burner and fuel supply system, together with an exhaust and filtration plant with a 38m high chimney.
- A recycled asphalt planings (RAP) dryer system with gas oil burner and fuel supply.
- A screening, weighing and mixing tower enclosed within sheeted buildings.
- Reclaimed-imported filler and cement silos with transfer systems to the plant mixer.
- Pigment granulate and fibre pellet silos with transfer systems to plant mixer.
- A 6 x60t capacity, final hot product storage system enclosed within a building.
- 4 bitumen storage tanks supplying a pipe work supply system to the mixer.
- A PC controlled operating and monitoring system housed within a control room.
- Site weighbridges and mess facilities, surfaced access and hard standing areas.

Single sized crushed aggregates and sand imported into the site by road vehicles will be discharged into a number of dedicated high three sided stock bays having a total storage capacity of 16,500t. Of these, three bays will be covered to house stocks of <3mm aggregates and sand.

Sized aggregates and sand drawn from stock by rubber tyres mechanical shovels, will be fed into one or more 10 x 15m^3 capacity cold feed hoppers. Selected single size aggregates from each hopper will be controlled by variable speed proportioning feeders onto a gathering and inclined conveyer feeding into the rotary dryer feed box.

The rotary dryer cascades the product through the hot gases and is fired by an efficient forced draft burner designed to burn fuel oil up to a maximum rate of 1600litres/hr (16MW) with an exhaust volume of 70,000m^3/hr at 130°C.

Heated aggregates and sand leaving the dryer, will be fed by an enclosed bucket elevator into a sealed and vented screening unit where the product is separated into 2 x 75t capacity rows of six insulated and contained hot bins vented into the plant exhaust system.

Selected single sized aggregates will then be weighed out by gravity by an aggregate weigh hopper for loading into a 3tonne capacity twin shafted mixer where weighed proportions of bitumen, filler and other pigment and fibre granulate additives will be added and mixed for a predetermined time to complete the coated product recipe.

Coated asphalt products are then discharged from the mixer into a transporting skip system that delivers the coated product into any one of 6 x 60tonne capacity hot material storage silos designed to hold the product for up to 24hours at design temperature.

In addition, there is provision for the skip to discharge coated products into vehicles through a direct loading insulated silo of 20t capacity.

The exhaust and collection plant will comprise a terminal fabric filter to control particulate emissions to air, preceded by a course dust pre separator that collects and separately returns +75micron course dust into the product stream at the sealed hot bucket elevator.

Cleaned gases from the terminal filter will be passed though a 38m high chimney having particulate releases of <25mg/m^3 to air to comply with the limit of 50mg/m^3.

Reclaimed filler material collected by the terminal filter will be fed continuously by screw conveyers and a bucket elevator system into the silo tower which houses an 85m^3 capacity reclaimed filler silo and a 60m^3 capacity imported filler silo.

Reclaimed filler received in the silo tower will be fed by a bucket elevator into a buffer hopper for controlled return into product through the filler weigh system to the mixer. Filler material not able to be returned to the product will be discharged into an 85m^3 reclaimed filler silo for storage and later return into the product through the elevator and screw conveyer system.

Excess filler dust from the reclaimed filler silo may also be separately discharged from the process through a pug mill dust conditioner that mixes collected dusts with water to provide a soil like material for safe dust free disposal from site into an authorised tip facility.

Imported filler powders will be delivered to site in bulk carrier tankers and transferred via pneumatic pipe work system into a vented 60m^3 imported filler silo for storage and eventual addition into the product through screw conveyers feeding the filler weigh system to mixer.

Cement powders will also delivered to site in bulk tankers and transferred via pneumatic pipework into a separate vented 90m^3 silo for storage and eventual addition into the product through a screw conveyer and elevator system feeding the filler weigh hopper to mixer.

Fibre granulates will be received from bulk tankers and transferred into a 30m^3 capacity fibre granulate silo which is vented and protected. Stored granulate will then be fed into a weighing vessel shared with the pigment transfer system; and then pneumatically conveyed into a holding hopper for sequential addition into coated product at the mixer.

Colouring Pigment is received in bags in pellet form and these will be fed into a 3m^3 capacity hopper through an actuated top door. Pigment pellets will then be fed from the hopper into the shared weigh vessel and pneumatically conveyed into the holding hopper for controlled addition into the coated product at the mixer.

Recycled Asphalt Planings (RAP) will be fed from storage by a mechanical shovel into two feed hopers and a transfer system comprising a bucket elevator and belt conveyer into the recycled dryer drum.

Recycled Asphalt Planings (RAP) as granulate pre milled material will be pre heated within a parallel dryer drum recycling system designed to handle up to 110t/h of recycled material at 5% moisture to a heated temperature of 130°C.

The RAP dryer drum will be specifically designed to process granulate recycled materials and is fitted with a forced draft burner capable of up to 1000l/h (10MW). The dryer has features that facilitate gentle and unhindered flow throughout the heat transfer zones. This also serves to limit material temperatures to well below fume liberation levels to prevent odours.

Heated RAP materials are fed into an electrically heated and insulated 20t surge hopper discharging into a weigh system for controlled addition into the coated product at the mixer.

Bitumen will be stored within 4 x 80m^3 capacity vertical Tanks. The tanks will be electrically heated and insulated, having continuous level indication with high level alarm, low level safety cut out and over temperature protection. Bitumen is introduced into the product at the mixer by a heated pumping system and weigh hopper.

The virgin aggregate rotary dryer burner will be fired on Gas oil or BS2869 CFO stored within double skinned storage tanks having contents gauges. The RAP dryer will be fired on gas oil stored within a double skinned tank with content gauge.

B.2.2. Potential releases to air.

- Fugitive dust emissions from sand and gravel, hardstone, Limestone and other single sized aggregates during handling, drying, screening, weighing and mixing processes.
- Limestone filler and other alternative additives and cement powders during handling, weighing and mixing processes..
- Cleaned air from the terminal filter and 38m chimney, drawn from the rotary dryer, RAP dryer and mixing tower containing <25mg/m^3 particulate.
- Products of combustion at the terminal filter and chimney from BS2869 <0.8% sulphur CFO and <0.1% Sulphur gas oil, including oxides of Sulphur, Nitrogen and Carbon.

Table B2.2.1. Release Points.

Release point and Abatement technique.	Prescribed substances.	Release to air Assessment	Concentration Expected	Release condition.
Internal traffic routes and hard standing surfaced and cleaned or wetted.	Dust particulate.	Aggregates delivered with 3% to 4% moisture. Sand to 8%. No visible emissions beyond site boundary.	Negligible.	Fugitive
Site aggregate stored in three sided bays for single sized aggregate. Sand and <3mm fines covered.	Dust particulate.	Contained during loading. Protected against wind. No visible emissions beyond site boundary.	Negligible	Fugitive
Feed hoppers covered on 3 sides and roof. Covered feed conveyers.	Dust particulate.	Contained during loading. Protected against wind.	Negligible	Fugitive
Rotary aggregate dryer enclosed under suction vented to filtration plant.	Dust particulate. Products of combustion.	Well contained and under suction from exhaust system.	Negligible	Fugitive
Both dryers with burner 8:1 turndown and auto Vacuum volume controls	Products of combustion.	Dryers under suction control at all times to prevent secondary releases.	Negligible	Fugitive
Screening and weighing system encapsulated and vented to filtration plant	Dust particulate	Encapsulated at source and contained within sheeted building.	Negligible	Fugitive
Overflow from hot bins sealed to overflow chute and collection hopper.	Duct particulate	Overflow hopper discharges Within loading area under plant.	Negligible.	Fugitive
Releases to air controlled by reverse air fabric filter to 38m high chimney. Exhaust velocity vary with burner between 17m/s and 12m/s normal operation.	Dust particulate. Oxides of Sulphur gas oil & CFO <0.8% Sulphur.	Particulate. Total of both dryer burners Max 16MW SO_2 at 17m/s Min 10MW SO_2 at 12m/s	<25mg/m^3 for 50mg/m^3 limit <109mg/m^3 <96mg/m^3	Point source 85m chimney 900nm^3/m without correction for water vapour.
RAP dryer contained and vented to main exhaust and terminal filter.	Oxides of Sulphur Gas oil <0.1% Sulphur.	Product of combustion exhausted to terminal filtration unit and 38m chimney	Negligible	Included in 38m chimney point source. Above.
Reclaimed filler silo. Naturally Vented - No transfer air Imported filler silo. Fibre/ pigment silo. Cement silo	Reclaimed filler. Limestone powder Granulate Cement powder	Returned to product or removed wet for disposal.) contained, vented, Protected) by over pressure and level) indication trip system.	Negligible <10mg/m^3 <10mg/m^3 <10mg/m^3	Fugitive Point source
Mixer discharge to product storage or direct load out.	Final products and dry materials.	Controlled by water sprays when necessary from discharge hopper.	Negligible.	Fugitive
Hot mixed product storage Hoppers with load cells for direct loading and temperature monitoring.	Hot asphalt products.	Coated products maintained below fuming temperature. Load out contained below building, under cover.	Negligible	Fugitive

B2.2.2. Nature of raw substances being handled.

Prescribed substances handled by the installation will include sized aggregates and sand together with cement powder, limestone and hardstone filler powders, each having the potential for fugitive particulate releases during handling and processing on site. In addition recycled asphalt planings, bitumen, pigment and fibre granulates are also handled at site having the potential for emissions.

The specific BAT standards employed to adequately control these substances at site are fully described later in section B2.3, however the magnitude and nature of the substances being handled are briefly mentioned as follows. :-

2.2.2.1. Sand is produced from a wet process and will be supplied containing 8% moisture to prevent any fugitive releases during handling at site before being fed into the process and dried. Similarly the various single sized aggregates will also retain a moisture of between 2% and 3% to minimise releases to air. <3mm materials will be imported to the site pre-treated by suppression.

2.2.2.2. Imported filler powders and cement powders, typically 85% <75microns may only be delivered in bulk tankers and stored within imported silos fitted with interlocked high level and overpressure protection and pulse jet filtration systems designed to control releases to air.

2.2.2.3. Reclaimed filler powders arising from the plant terminal fabric filter may only be transferred from the plant into a dedicated reclaimed filler handling system designed to maximise re use into the product on a weight basis.

2.2.2.4. Both colour pigment and paper fibre additives are delivered in bulk and may only be stored within dedicated silos and thereafter handled within sealed dedicated systems.

2.2.2.5. A range of bitumen grades are received in bulk tankers at a temperature of 150°C and may only be delivered into dedicated heated and protected storage tanks.

2.2.2.6. Recycled Asphalt Planings (RAP) are delivered following granulation at another site. RAP has a residual moisture of 3% to 5% and is dust free.

2.2.2.7. The plume from the proposed 38m chimney will contain dried and filtered aggregate and sand particulates together with water vapour driven from the product. In addition the chimney will also handle products of combustion arising from the two burners serving the virgin aggregate dryer and the RAP dryer and will include oxides of Sulphur, Nitrogen and Carbon.

2.2.2.8. It should be noted that the main 160t/h product flow through the plant installation will be through the virgin aggregate dryer fired by a 1,600l/h burner.

However, when recycled materials are being introduced into the product through the Hot RAP dryer and its 1,000l/h burner, the RAP directly displaces and proportionally reduces the material flow through the virgin aggregate dryer.

The total thermal output from both burners therefore cannot increase beyond the installed capacity of the virgin aggregate dryer at 1600l/h from which the chimney and its plume dispersal has been designed.

B2.2.3. Odours - Assessment and prevention.

Process guidance note PG3/15a(04) section 4.5 lists potential odours from typical asphalt coating plants that are clearly unacceptable for both environmental and production reasons. These can be considered within two groups for assessment and prevention as follows: -

Fugitive odour emissions.

Odours of a local fugitive nature can arise from overheated bitumen fumes escaping from tank vents or from overheated coated product fumes when loading into road vehicles and subsequent transport from site. In the past it has also been known to introduce wrong additives into the product also giving rise to odour problems.

Such odours can be detected within the site and the immediate locality, but such problems are due to one or a known number of sequential problems that when corrected, will quickly eradicate the problem at source.

Overheating of bitumen and the final coated mixed product is unacceptable causing serious deterioration of the final product. Essentially, modern plants producing large quantities of coated road stone materials operate within a PC driven mandatory Quality Assurance control regime together with appropriate back up control techniques that prevent unacceptable out of temperature specification problems that would scrap the product. This strict control regime serves to prevent the vast majority of odours at source. Separate bitumen additives added at site have previously given rise to odour problems when misused are not now used. Proprietary premixed modified bitumen is now universally used.

Quantitative odour emissions from the chimney.

Odorous emissions have in the past also been known to occur within the confines of the manufacturing Process. Such odours were drawn into the exhaust and filtration plant and subsequently released to atmosphere through the chimney into the wider area of dispersal.

This was sometime the case when firing on ageing dryer burners operating under restricted combustion air flows giving rise to poor fuel atomisation and combustion conditions with subsequent blue smoke and odorous emissions. Poor combustion problems at the burner also allowed various stages of un-burnt fuel to be deposited on the product and within the plant internals and filtration plant where it lingered.

For this new plant firing on proprietary Gas oil or alternative CFO fuel oils, this type of problem will be prevented by modern burner design and PC driven control systems that prevents burner start up unless all operational parameters in terms of air to fuel ratio, fuel atomising pressures and adequate excess air, for complete combustion are met over its operating turn down cycle. Failure to meet these parameters will initiate a burner flame lock out and the remainder of the plant being sequentially shut down until the problem is rectified.

The Hot RAP system ensures that pre heated recycled materials are maintained at a reliably steady temperature more compatible with the virgin product temperature at well below fuming levels to ensure that the final product target temperature is achieved with minimum overheating of virgin aggregates.

With these BAT solutions in place, which are also outlined in section B2.3, it is expected that there will be no reasonable cause for annoyance from odours.

B2.3. Techniques for preventing or reducing emissions.

2.3.1. Single sized aggregates and sand collected from stock-bays by loading shovels, will be protected from wind whipping by three sided high walled storage bays. <3mm fines and sand materials will be stored in three covered bays. The vast majority of aggregates imported into the site will be sand and gravel naturally delivered dampened from a wet process.

2.3.2. The road traffic route to and from the site entrance to the plant process, together with all hard standing areas, will be hard surfaced and regularly wetted or cleaned with a vacuum road sweeper to an agreed program.

2.3.3. The cold feed system comprising 10 hoppers, will be fitted with wing plates to prevent spillage and contamination and covered within an enclosure comprising three sides and a roof. Each hopper will be complete with variable speed belt feeders discharging onto collecting conveyers feeding the rotary dryer. All feed conveyers will be fitted with belt scrapers and the external inclined conveyer feeding the dryer will be fitted with steel covers at least to one side and the roof.

2.3.4. The virgin aggregate rotary dryer will be a contra flow design with modern lifter patterns designed to achieve maximum thermal efficiency. The dryer will be fully sealed and will operate under variable suction control from the main exhaust system to ensure maximum thermal efficiency and negative pressure within the feed and discharge sections at all times.

2.3.5. The burner will have its own primary air fan control system designed to maintain correct air to fuel ratios, over its 8:1 turndown range to maintain optimum combustion efficiency. Smoke emissions due to poor combustion will therefore be eliminated at all times especially during burner start up and under low fuel flow operation.

Both Gas oil and CFO fuel tanks will have continuous contents level indication and a double skin designed to contain the maximum ruptured tank capacity in event of leakage or damage.

2.3.6. The screening and mixing tower comprising the hot bucket elevator, screening unit, the hot bins, weight gear and mixer will be totally enclosed within sheeted encapsulated enclosures to contain dust nuisances at source and ventilated under suction from the main plant exhaust system. Some 5,000m^3/h ventilation air will be exhausted to the filtration plant.

2.3.7. The insulated twin row hot bins will have continuous level indication. In addition, hot bin overflows will discharge through a sealed manifold and chute system to a storage hopper for removal by site vehicles at ground level. Discharge dust suppression sprays will be fitted to control local emissions.

2.3.8. The Hot RAP dryer circuit will be operated at a steady RAP temperature of 130°C, well within the peak allowable temperature of the recycled product to prevent fuming at all times.

The heated RAP will be discharged into a sealed 20t heated and insulated hopper and weigh hopper designed to introduce RAP into the plant mixer at a pre determined time within the mixing cycle.

The steady temperature achieved by restricting the material dwell time within the heating zones of the dryer drum together with automatic burner and airflow controls, will eliminate the need to overheat the virgin aggregates and serve to prevent fuming problems at the mixer.

2.3.9. The exhaust and collection system will comprise a terminal fabric filter preceded by a pre separator designed to return all coarse particles and grits above 75 microns continuously back into the process at hot elevator.

The terminal filter will be fully insulated with filter bags manufactured from high temperature 400grm/m^2 needle felt designed to handle exhaust gas volumes of up to 75,000 m^3/hour with a filtering speed of <1.55 m/min.

Aramid heat resistant filter bags are divided into sections and each section cleaned in turn by reverse air blown from an air cleaning fan system. Normal filter operating temperatures vary between 80°C and 220°C. Two transducer and thermostat sensors will provide exhaust gas temperature protection with warnings at around 180°C and burner shut down at 210°C.

The filtration equipment is capable of typical particulate emissions of <25mg/m^3 to adequately meet <50mg/m^3 at 273°k and 101.32kpa without correction for water vapour.

2.3.10. The 38m chimney will have an efflux velocity of 17metres/m at full thermal load. However, the volumetric turndown under reduced thermal loads down to 60% MCR will reduce the efflux velocity down to a minimum of 12m/sec. D1 Calculations prepared for each scenario are attached as Appendix 2 and 3 to confirm that the chimney will provide adequate dispersal for both scenarios.

2.3.11. Difficulties are still being experienced with continuous emission monitors in road stone plant chimneys throughout the industry and the company prefers to opt for twice per year extractive monitoring as the primary regulatory means of measuring particulate releases to air. This option is included in PG3/15a(04).

2.3.12. Reclaimed filter dusts from the filter will preferably be returned into the process by the reclaimed filler return system through sealed screw conveyers and filler weigh gear. Excess reclaimed fillers may be discharged from the reclaimed filler silo through a pug mill dust conditioner that wets the outgoing dust to form a soil like material for safe disposal to tip.

2.3.13. Imported fillers and cement silos will have continuous level indication with both high and low level alarms. Each silo will be fully enclosed and vented to air through proprietary pulse jet cleaned filters interlocked with the fill line shut off valve to ensure correct operation before filling. Mechanical integrity of each vessel will be maintained by a protection system designed to shut the fill line valve in the event of high contents level or high pressure. In addition a self sealing PRV will be fitted and inspected regularly. -> how often?

2.3.14. Deliveries of imported filler and cement powders will only be made using bulk tankers having on-board pressure relieve and filtration systems. Whilst each silo will be fitted with its own protection system, the truck mounted protection system will ensure that excess transfer air from the tanker at the end of a delivery will not be released through the silo.

2.3.15. Various grades of bitumen will be stored in electrically heated tanks at the recommended temperature range in order to prevent the release of fume from the tanks. Each tank will be fitted with continuous level indication. In addition safety features will be in place including, high temperature back up protection, low level electrical cut out and high level indication systems. In addition, incoming tankers will be inspected to ensure that the material being delivered is at the correct temperature.

2.3.16. The fibre granulate silo will also be vented by a pulse jet filter and the vessel protected by a high level and high pressure feed cut out system and self sealing PRV.

2.3.17. The pigment pellets are delivered in bags that are fed by into a ground mounted sealed hoper.

2.2.18. Both fibre and pigment materials will be discharged from their respective storage systems into a common sealed weigh hoper and pneumatic conveying system to a vented holding hopper for measured addition into the final product at the plant mixer. The pneumatic conveying system will be sequence interlocked, sealed and vented through a cyclone into the plant exhaust system at the hot elevator.

B2.4. Proposed action to be taken to control unintentional release to air.

The installation will have a plant control room with a number operating staff, comprising mixing plant controllers, patrol operators and a mechanical shovel driver. Operational staff are supported by numerous fleet drivers, maintenance contractors and suppliers of components and consumable spares.

A PC driven control system will monitor all operational aspects of the process and the current status will be displayed on one or more colour monitors in the plant control room.

Should any section of the plant fail for any reason or a fault condition arise, automatic fail safe trip systems will be initiated to trip out the faulty motor or device and also trip out the affected preceding section of the process to prevent plant damage and danger to life. These precautions will also prevent loss of product and secondary nuisance leading to fugitive environmental problems.

Alarms will be also initiated, both visually and audibly in the control room and remotely. In addition, a data logging system continuously records all operational aspects of the plant including a fault log .

With the appropriate techniques in place, the mechanical integrity of the process is assured and adventitious emissions across the site boundary from the plant process most unlikely.

However a contingency plan will include :-

2.4.1. Essential repairs to vital equipment associated with the control of emissions will be carried out as a matter of priority and urgency. The company will ensure that essential spares for compliance with the Permit will be available at site or on the shelf of a known stockist.

2.4.2. Should the emissions persist then the offending section of the plant will be shut down until the appropriate repairs have been carried out.

2.4.3. In the unlikely event that such failures give rise to emissions across the site boundary, then the plant process will be shut down until the problem is solved and the incident reported to Ipswich Borough Council.

B2.5. Monitoring and inspections.

2.5.1. In compliance with modern QA techniques each section of the process is continuously monitored for product quality and plant safety, by PC driven hardware and software systems. Process status is continuously displayed in colour graphics on two monitors in the plant control room with separate back up pages containing vital historic and inventory information and a number of fault logs.

The monitoring systems provide immediate plant status for burner and filtration operating parameters to alert plant operators of possible malfunctions and consequential problems to ensure rapid response and action to minimise environmental problems.

2.5.2. Daily visual assessments at strategic positions around the site will be made. The inspections will be carried out by nominated members of the staff and the following noted in the environmental log book.

- Dust emissions from the process plant, internal roads and stock bays.
- Emissions from the new Asphalt Coating Plant chimney.

Details of any emissions along with corrective action will be noted in the Environmental log book.

2.5.3. Extractive particulate emission sampling will be carried out twice per year to BS ISO 9096:2003 by a known accredited test laboratory as specified within PG3/15a(04). Sampling points and an access platform will be provided at the chimney to complete sampling tests.

2.5.4. All deliveries of imported filler or cement powders will be observed and logged in the environmental log book together with the time in and time out the delivery bulk tanker.

2.5.5 All deliveries of bitumen will be noted and the temperature checked and logged.

B2.6. Procedures and policies of the Company Environmental Management System.

The Company operates an Environmental Management System (EMS) certified as being compliant with BS EN ISO 14001 :1996.

The system is audited by the British Standards Institute (BSI). It is envisaged that the new plant installation will be prepared for normal production during late 2008 and as part of the preparation process, the EMS will be established for the new installation seeking to achieve full site ISO 14001 accreditation during early 2009.

2.6.1. To meet the requirements of the permit, a high standard of maintenance is considered essential to ensure that the process operates at its optimum performance. The Company operates a planned maintenance scheme at each unit designed to create maximum efficiency in terms of reliability and output. Key items of equipment have been identified as critical to controlling releases to air and will be listed in the site Environmental Management System.

2.6.2. A high Standard of housekeeping will be maintained. A management statement will be prepared for each operational part of the plant with regard to environmental matters, including responsibility for each section and actions defined.

2.6.3. Training will be given to all managers, supervisors and plant operators in all aspect of process plant operation including aspects of their work which directly or indirectly could give rise to emissions to the atmosphere. The training needs for each member of the staff will be reviewed annually and a training plan developed in accordance with the relative procedure under the Quality Management System.

B3.1 Impact on the Environment.

3.1.1. For the proposed plant installation, The Secretary of State's Guidance note PG3/15a(04) covering Road stone Processes, provides statutory guidance to both operators and regulators regarding BAT standards and also gives details of mandatory air emission limits for full compliance with PPC Regulations 2000 SI1972.

PG3/15a(04) states that particulate matter may arise from all parts of the process where dried mineral aggregates are processed and handled. In addition the process may also give rise to fugitive releases of particulate matter from ancillary activities such as unloading from bulk tipping vehicles, aggregate storage and conveyer transfer, handling and transfer by site vehicles, roadways and filling of silos.

3.1.2. In response to statutory guidance, due regard has been given to BAT standards and emission limits relating to the process in order to appropriately control, prevent and reduce such releases, as follows :-

- The nature and magnitude of potential releases have been identified in section B2.2.
- Potential dust releases from the proposed plant will be effectively controlled by BAT standard prevention, reduction and control techniques as described in section B2.3.
- In the unlikely event of unintentional emissions from the process, a contingency plan will be in place to rapidly rectify the problem or shut down the plant as described in Section B2.4.
- The process will be monitored and operated within tight parameters by modern PC driven automatic controls with sequence protection systems to protect the plant from malfunction and damage leading to secondary emissions as outlined within section B2.5.

After installation of the new plant, the site will be controlled and operated to an ISO 14001 accredited Environmental Management System as described in Section B2.6.

3.1.3 Controlled releases within the hot processes will be limited by proven abatement techniques to well within mandatory limits and dispersed to atmosphere through a 38m chimney, calculated by the HMPI D1 method based upon the maximum releases from the pollutants when the process is operating at maximum thermal output.

The approved HMIP D1 Dispersion Technical Guidance Note method used to establish an acceptable chimney height, calculates the uncorrected height based upon the emissions from the various pollutants at the maximum thermal capacity of the plant.

The severity of each pollutant is categorised by calculating a Pollution Index (Pi) which corrects the actual emission by both the appropriate short term exposure limit and local back - ground limit depending the type of district being considered. The calculation also corrects for thermal lift and finally for the effect of adjacent buildings with a given radius from the chimney to ensure adequate dispersal of the stated pollutants within local air quality standards.

For this location the district is considered to be an "Urban area of limited size with parkland or rural surroundings".

Appendix 2 includes a D1 calculation for maximum continuous thermal load.

Appendix 3 includes a D1 calculation for minimum continuous thermal load.

The D1 Calculations show that for all operating conditions, the pollution index (Pi) for particulate releases of 50mg/m^3 together with the worst case of SO_2 acid gas release of 107mg/m^3 from combustion of BS2869 Clean fuel oil (CFO) with 0.8% Sulphur, are relatively low resulting in a an uncorrected chimney height of (Um) of less than 5m above ground level.

But the most significant contribution to calculating the final chimney height is the effect of the adjacent tall slender screening and mixer house building and hot RAP dryer house, itself extending some 35m above ground datum level. The final correction confirms that the proposed 38m high chimney will provide adequate plume dispersal.

3.1.4. Ipswich Borough Council has declared three relatively local areas of the Borough as Air Quality Management Areas (AQMA) due to the impact of excess NO_2 from road traffic.

Ipswich AQMA 1 is 4km to the North West of the proposed installation site.
Ipswich AQMA 2 is 3.5km to the north of the proposed installation site.
Ipswich AQMA 3 is 2.5km to the North of the proposed installation site.

The assessment carried out within section 3.1.2. above indicates that with the proposed compliance emission level controls installed, there will be no significant environmental impact beyond the installation site boundary.

In addition, with chimney exit velocities finely adjusted to thermal load between 17m/s and 12m/s at 130°C, thermal lift and plume buoyancy will be well established before reaching the AQMA areas. Therefore there will be no significant environmental impact or residual risk to the AQMA areas stated, hence this LAPPC application does not require any changes to be made in relation to AQMA areas.

B3.3 Effect on SSSI's.

There are two areas listed as an SSSI's within the 2km of the proposed installation site, to the South East, the Orwell Estuary and to the West, Bobbitt's Hole, Belstead.

The assessment carried out within 3.1.3 above indicates that with the proposed compliance emission level controls installed, there will be no significant environmental impact or residual risk beyond the installation boundary and therefore none to the ASSSI listed. Hence this application does not require any changes to be made to the installation to protect these locations.

B5. Additional information.

Using the BAT standards detailed in this application, the process will comply with Statutory Guidance contained within PG3/1(2004).

With the measures in place, it is concluded that with the BAT design and operational standards outlined above for the new road stone plant installation, the impact of the proposed development on local air quality will be negligible.

Indeed, there will prove to be a considerable improvement in operational emission standards when compared to the existing road stone operation on South West Quay, which this new plant installation will replace in its entirety during early 2009.

R D Hudson
Environmental Engineer.
On behalf of Tarmac Ltd.

April 2008.

DISCHARGE STACK HEIGHTS D1

160tonne/hr Proposed Asphalt Coating Plant

Tarmac Ltd - Ipswich Cliff Quay Works

MAXIMUM CONTINUOUS OPERATING CONDITIONS

Discharge Volume (DV)	75,000 m^3/hr at operating temperature	
Discharge Volume (V)	20.83 m^3/sec	
Discharge Velocity (W)	17.0 m/sec	
Discharge Temp (TD)	403 K	
Moisture Content	11 %	
Max continuous Firing Rate	1600 lph	Burning gas oil or BS2869
Chimney diameter	1.25 M	CFO at 0.8% Sulphur

POLLUTANTS

From the Secretary of State's Guidance notes PG3/15a (04) for Mineral Drying and Roadstone Coating Processes the emission concentration limits for the following are :-

Table A	Typical	maximum	PG limit
	mg/m^3	mg/m^3	mg/m^3
Sulphur dioxide	87	109	
Particulate matter	<25	50	50

At reference conditions of 273°K, 101.3kPa without correction for water vapour.

Short term ambient guideline concentrations for the above pollutants .

Table 1

Pollutant	guideline conc. mg/m^3	source
Particulates SPM	0.3	table 1 HMIP guidance note D1
Sulphur Dioxide	0.44	table 1 HMIP guidance note D1

Background levels of common pollutants

Table 2

	Concentrations mg/m^3				
Type of district	Lead	SPM	S02	NO2	PM10
Major city centre/heavy industrial area	0.0005	0.4	0.16	0.17	0.15
Highly developed large uban area	0.00025	0.2	0.12	0.12	0.03
Urban area of limited size with parkland or rural surrounding.	0.0001	0.1	0.1	0.09	0.07
Partially developed area	0.00005	0.07	0.07	0.07	0.05
Rural area with little development	0.00002	0.05	0.05	0.05	0.03

CALCULATIONS

Step 1 - Convert all pollutions to stack conditions , this is done by using the equation;

$$Cd = Cs \frac{x\,(273)\,(100 - H2O\,d)}{(Td)\,(100)}$$ With correction for water vapour.

or

$$Cd = Cs \frac{x\,273}{Td}$$ Without correction for water vpour.

where, Cd is the pollutant concentration at discharge conditions
Cs is the pollutant concentration at the reference conditions see Table A
Td is the discharge temperature in degrees kelvin
H2O d is the discharge moisture content

The discharge rates for pollutants is then given by:

$$\text{Discharge rate (D) g/s} = \frac{(V \times Cd)}{1000}$$

where V is the discharge volume flowrate.

Using the above equations values for Cd and D can then be calculated ;

Pollutant	Table A	Abatement	Cs mg/m³	Cd mg/m³	D g/s
Particulate matter	50		50	33.871	0.706
Sulphur dioxide*	109	(Corrected for abatement)			1.534

The discharge rate for sulphur dioxide can be calculated using the equation given in the chimney heights memorandum 1956, is given as :-

$$R = 0.02WS$$

where R denotes the rate of discharge in Kg/h
W denotes the maximum firing rate of the burner Kg/h
S denotes the % sulphur in fuel = 0.8 %
The production abatement = 75 %

therefore R= 5.52 Kg/h or 109 mg/m^3 SO_2
= 1.53 g/sec

Step 2 - Calculate the Pollution Index corrected for background levels of pollutants.

$$\text{Pollution Index (Pi)} = \frac{D}{(Gd - Bc)} \times 1000$$

where Gd denotes the guideline concentration of the pollutant see Table 1.
Bc denotes the background concentration of the pollutant see Table 2.

The background levels used in this calculation are for an urban area of limited size with parkland or rural surounding.

Therefore :-
Pi SO_2 = 4,512
Pi particulate = 3,528

The Pollution indices for acid gases are normally used to detirmine chimney height unless there is another larger sensitive pollutant for consideration :-

Pi (acid gases) = 4,512

In this case, the largest Pi is from SO_2 and will be used. :-

Thus Pi SO_2 = 4,512

Step 3 - Calculation of the uncorrected chimney height for buoyancy Ub

Heat release Q (MW) = $\frac{V\,(1-(283/Td))}{2.9}$

where V is the volume flowrate at discharge conditions m^3/sec
Td is the discharge gas temperature in K
The ambient temperature is taken to be 10 C (283 k)

Thus heat release Q = 2.139 MW

The uncorrected stack height due to buoyancy is determined by ;

Ub= 10^a x Pi^b

where a= -1.11 - 0.19 LOG10 Q
b= 0.49 + 0.005 LOG10Q

Thus a= -1.173
b= 0.492

Ub= 4.207

The minimum value for Ub can be calculated by using the equation

min Ub= 1.7 + 0.25 x Q^0.9
min Ub= 2.196

The higher value of Ub is used in calculating the stack height , then Ub = 4.21

Step 4 - Calculation of the uncorrected chimney height for momentum Um

The discharge momentum is calculated using the equation ;

$$M = \frac{283 \times V W}{Td} \quad m4/sec$$

thus M = 248.49 m4/sec

from equation 15 section 5.3 ;

log 10 Um = x + (y.log10.Pi + z)^0.5

where x = -3.7 + (log10 M)^0.9
y = 5.9 - 0.624 log10 M
and z = 4.24 - 9.7log10 M + 1.47(log10 M)^2 - 0.07(log10 M)^3

then x = -1.505
y = 4.405
z = -11.522

log Um= 0.634
Um = 4.308

the minum value for Um is calculated by Um min =0.82 x M^0.32

Um min = 4.790

The higher value of Um is used in calculating the stack height , then Um = 4.79

Step 5 - Calculation of the final discharge stack height , C .

All buildings within 5Um have to be considered = 24 m

If there is more than one relevant building within 5Um's then the following equation is used to calculate the discharge height .

$$C = Hm + (1 - Hm/Tm) \times (U + (Tm - U) \times (1 - A^{-Um/Hm}))$$

where Hm is the maximum building or adjacent face height
Tm is the maximum height of disturbed flow over building T = H+1.5 K
K is the lesser of the building height or width
U is the uncorrected stack height the lesser of Um and Ub . 4.21
A is Um/Ub A = 1.14

Building	Distance	Height	Width	K	1.5k	T
Elevator	8	36	1.5	1.5	2.25	38.25
Screenhouse	11	26	9	9	13.5	39.5
Screen unit	5	30	4	4	6	36
RAP dryer unit	13	35	21	21	31.5	66.5
Hot storage	5	14	8	8	12	26
Bitumen tanks	19	14	6	6	9	23
Filler silos	5	30	6	6	9	39

Thus Hm = 36.0
Tm = 66.5
Thus C = 38

Final corrected chimney height 38m.

DISCHARGE STACK HEIGHTS D1

160tonne/hr Proposed Asphalt Coating Plant

Tarmac Ltd - Ipswich Cliff Quay Works

MINIMUM CONTINUOUS OPERATING CONDITIONS

Discharge Volume (DV)	53,000 m^3/hr at operating temperature	
Discharge Volume (V)	14.72 m^3/sec	
Discharge Velocity (W)	12.0 m/sec	
Discharge Temp (TD)	403 K	
Moisture Content	11 %	
Max continuous Firing Rate	1000 lph	Burning gas oil or BS2869
Chimney diameter	1.25 M	CFO at 0.8% Sulphur

POLLUTANTS

From the Secretary of State's Guidance notes PG3/15a (04) for Mineral Drying and Roadstone Coating Processes the emission concentration limits for the following are :-

Table A	Typical	maximum	PG limit
	mg/m^3	mg/m^3	mg/m^3
Sulphur dioxide	77	96	
Particulate matter	<25	50	50

At reference conditions of 273°K, 101.3kPa without correction for water vapour.

Short term ambient guideline concentrations for the above pollutants .

Table 1

Pollutant	guideline conc. mg/m^3	source
Particulates SPM	0.3	table 1 HMIP guidance note D1
Sulphur Dioxide	0.44	table 1 HMIP guidance note D1

Background levels of common pollutants

Table 2

	Concentrations mg/m^3				
Type of district	Lead	SPM	S02	NO2	PM10
Major city centre/heavy industrial area	0.0005	0.4	0.16	0.17	0.15
Highly developed large uban area	0.00025	0.2	0.12	0.12	0.03
Urban area of limited size with parkland or rural surrounding.	0.0001	0.1	0.1	0.09	0.07
Partially developed area	0.00005	0.07	0.07	0.07	0.05
Rural area with little development	0.00002	0.05	0.05	0.05	0.03

CALCULATIONS

Step 1 - Convert all pollutions to stack conditions , this is done by using the equation;

$$Cd = Cs \frac{x\,(273)\,(100 - H2O\,d)}{(Td)\,(100)}$$ With correction for water vapour.

or

$$Cd = Cs \frac{x\ 273}{Td}$$ Without correction for water vpour.

where, Cd is the pollutant concentration at discharge conditions
Cs is the pollutant concentration at the reference conditions see Table A
Td is the discharge temperature in degrees kelvin
H2O d is the discharge moisture content

The discharge rates for pollutants is then given by:

$$\text{Discharge rate (D) g/s} = \frac{(V \times Cd)}{1000}$$

where V is the discharge volume flowrate.

Using the above equations values for Cd and D can then be calculated ;

Pollutant	Table A	Abatement	Cs mg/m³	Cd mg/m³	D g/s
Particulate matter	50		50	33.871	0.499
Sulphur dioxide*	96	(Corrected for abatement)			0.959

The discharge rate for sulphur dioxide can be calculated using the equation given in the chimney heights memorandum 1956, is given as :-

$$R = 0.02WS$$

where R denotes the rate of discharge in Kg/h
W denotes the maximum firing rate of the burner Kg/h
S denotes the % sulphur in fuel = 0.8 %
The production abatement = 75 %

therefore R= 3.45 Kg/h or 96 mg/m^3 SO_2
= 0.96 g/sec

Step 2 - Calculate the Pollution Index corrected for background levels of pollutants.

$$\text{Pollution Index (Pi)} = \frac{D}{(Gd - Bc)} \times 1000$$

where Gd denotes the guideline concentration of the pollutant see Table 1.
Bc denotes the background concentration of the pollutant see Table 2.

The background levels used in this calculation are for an urban area of limited size with parkland or rural surounding.

Therefore :-

Pi SO_2	=	2,820
Pi particulate	=	2,493

The Pollution indices for acid gases are normally used to detirmine chimney height unless there is another larger sensitive pollutant for consideration :-

Pi (acid gases) = 2,820

In this case, the largest Pi is from SO_2 and will be used. :-

Thus Pi SO_2 = 2,820

Step 3 - Calculation of the uncorrected chimney height for buoyancy Ub

Heat release Q (MW) = $\frac{V\,(1-(283/Td))}{2.9}$

where V is the volume flowrate at discharge conditions m^3/sec
Td is the discharge gas temperature in K
The ambient temperature is taken to be 10 C (283 k)

Thus heat release Q = 1.512 MW

The uncorrected stack height due to buoyancy is determined by ;

Ub= 10^a x Pi^b

where a= -1.11 - 0.19 LOG10 Q
b= 0.49 + 0.005 LOG10Q

Thus a= -1.144
b= 0.491

Ub= 3.545

The minimum value for Ub can be calculated by using the equation

min Ub= 1.7 + 0.25 x Q^0.9
min Ub= 2.063

The higher value of Ub is used in calculating the stack height , then Ub = 3.55

Step 4 - Calculation of the uncorrected chimney height for momentum Um

The discharge momentum is calculated using the equation ;

$M = \frac{283 \times V\,W}{Td}$ m4/sec

thus M = 124.09 m4/sec

from equation 15 section 5.3 ;

log 10 Um = x + (y.log10.Pi + z)^0.5

where x = -3.7 + (log10 M)^0.9
y = 5.9 - 0.624 log10 M
and z = 4.24 - 9.7log10 M + 1.47(log10 M)^2 - 0.07(log10 M)^3

then x = -1.755
y = 4.594
z = -10.268

log Um= 0.607
Um = 4.046

the minum value for Um is calculated by Um min =0.82 x M^0.32

Um min = 3.835

The higher value of Um is used in calculating the stack height , then Um = 4.05

Step 5 - Calculation of the final discharge stack height , C .

All buildings within 5Um have to be considered = 20 m

If there is more than one relevant building within 5Um's then the following equation is used to calculate the discharge height .

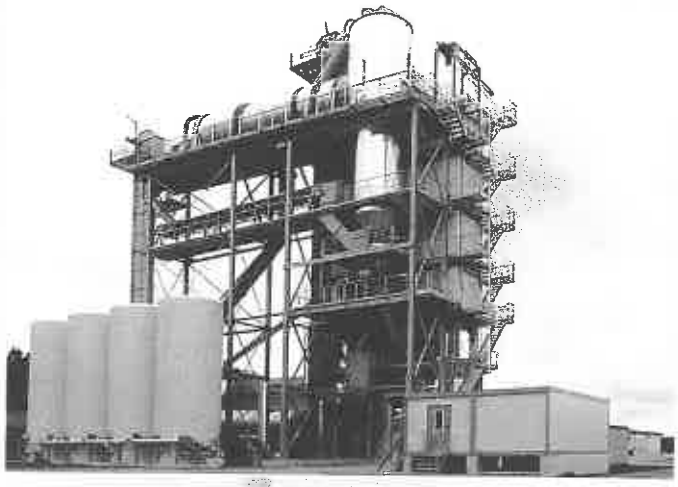
$$C = Hm + (1 - Hm/Tm) \times (U + (Tm - U) \times (1 - A^{-Um/Hm}))$$

where Hm is the maximum building or adjacent face height
Tm is the maximum height of disturbed flow over building T = H+1.5 K
K is the lesser of the building height or width
U is the uncorrected stack height the lesser of Um and Ub . 3.55
A is Um/Ub A = 1.14

Building	Distance	Height	Width	K	1.5k	T
Elevator	8	36	1.5	1.5	2.25	38.25
Screenhouse	11	26	9	9	13.5	39.5
Screen unit	5	30	4	4	6	36
RAP dryer unit	13	35	21	21	31.5	66.5
Hot storage	5	14	8	8	12	26
Bitumen tanks	19	14	6	6	9	23
Filler silos	5	30	6	6	9	39

Thus Hm = 36.0
Tm = 66.5
Thus C = 38

Final corrected chimney height 38m.

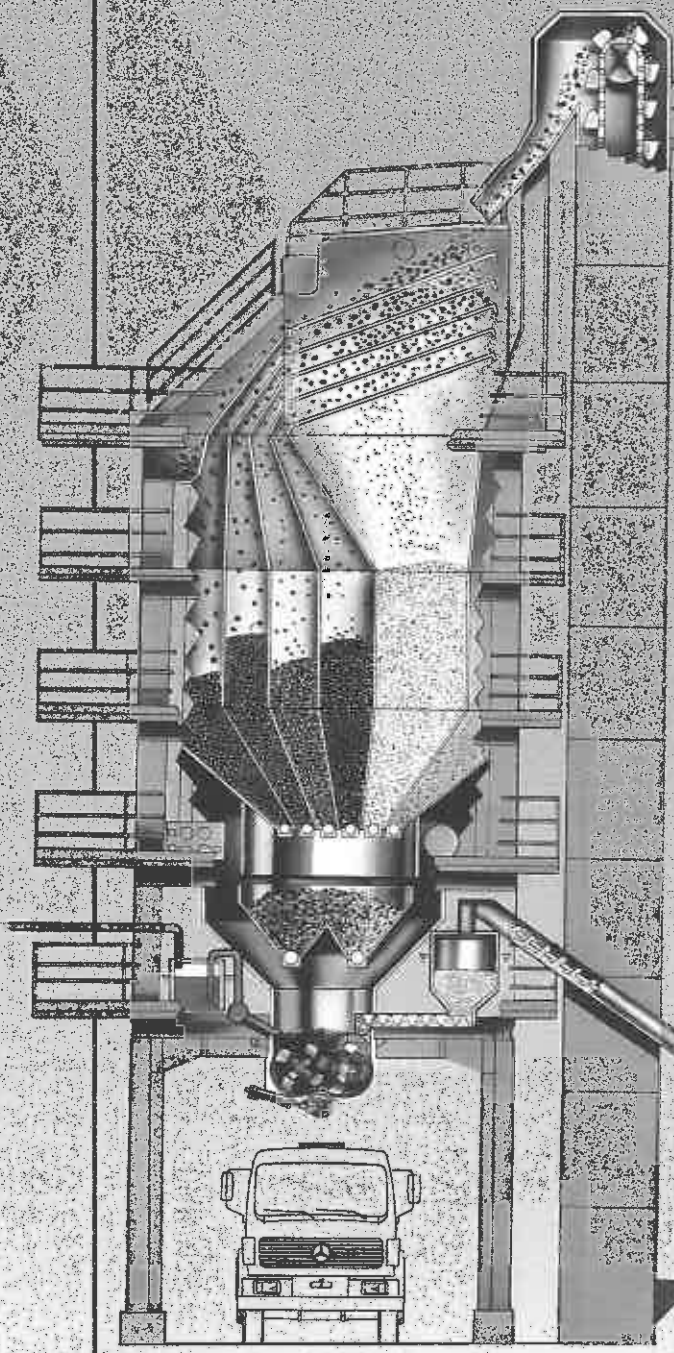


180 t/h Hot Recycling Parallel drum system

Material flow diagram of hot recycling drum system including by-pass chute for the cold feed into the mixer

BENNINGHOVEN

Asphalt Mixing Plant Type BA



Plant Structure

The plant is designed to standard container dimensions. Each container sized section is installed within a heavy ölst section steel frame and is completely assembled, including electric cables and piperuns, resulting in simplified erection of the plant. Generously dimensioned walkways around the tower and stairways provide easy access for service.

Material Production Process

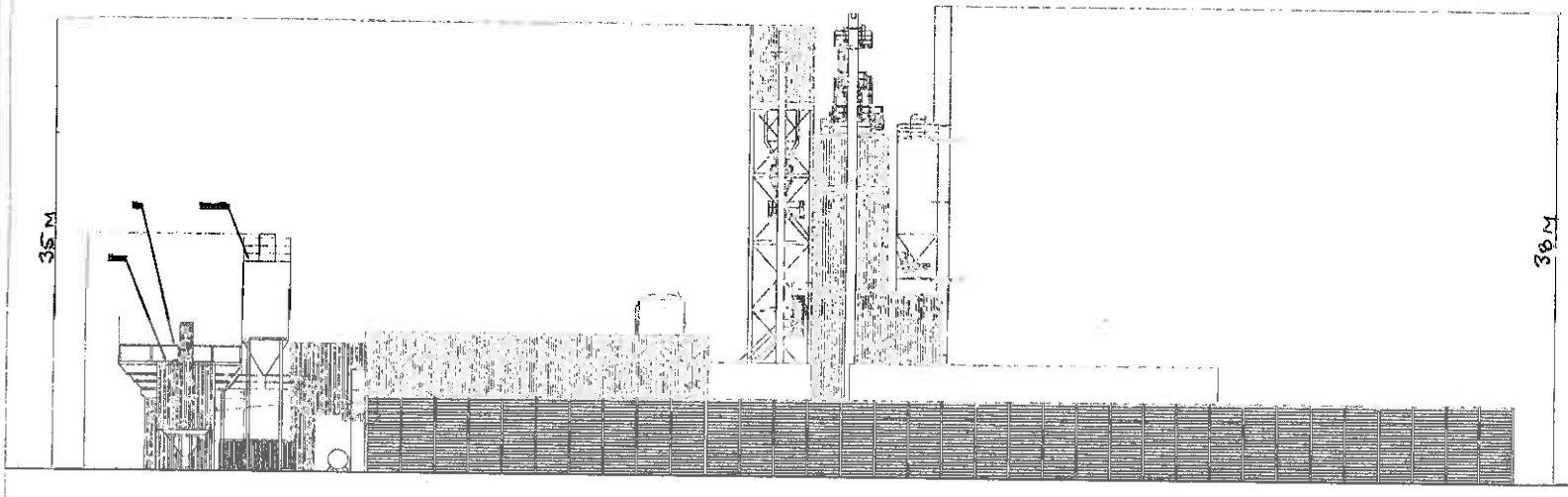
Aggregates are supplied from the cold feed hoppers by conveyor to the rotary dryer where they are heated and dried by the RAX JET burner. The hot aggregates are elevated to the multi deck screen where they are separated and sized into the hot stone bins. The screen can size 6 sizes and rejects and by means of a diverter chute the materials can be directed to either of two banks of 6 compartments each in the hot stone bins. Bypass of the screen is possible via a chute direct from the elevator discharge to the hot stone bins. Oversize and overflow material is directed to a separate hopper for direct discharge to trucks. Separate weigh hoppers, mounted on load cells, are provided for aggregates, filler and bitumen. Weight indication and control is located in the control cabin. Batches are weighed out and discharged to the twin shaft paddle mixer where they are mixed to a homogeneous mixture

Environmentally Friendly

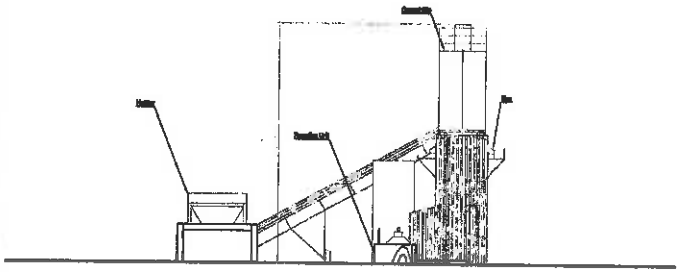
The BA model asphalt plant is designed to operate with minimum energy usage. The aggregate is heated and dried in a matched dryer burner combination. Guaranteed exit gas temperatures of less than 100° C together with a high efficiency pressure jet type air assisted burner ensure maximum heat exchange from the fuel to the aggregates. Heat losses are minimised throughout the plant by the use of high density insulation around the dryer cylinder, hot storage bins and other radiation areas. Dust emissions are prevented by the use of seals and an air scavenging system which maintains a negative pressure within the plant. The strictest emission limits are always maintained.

Quality Control

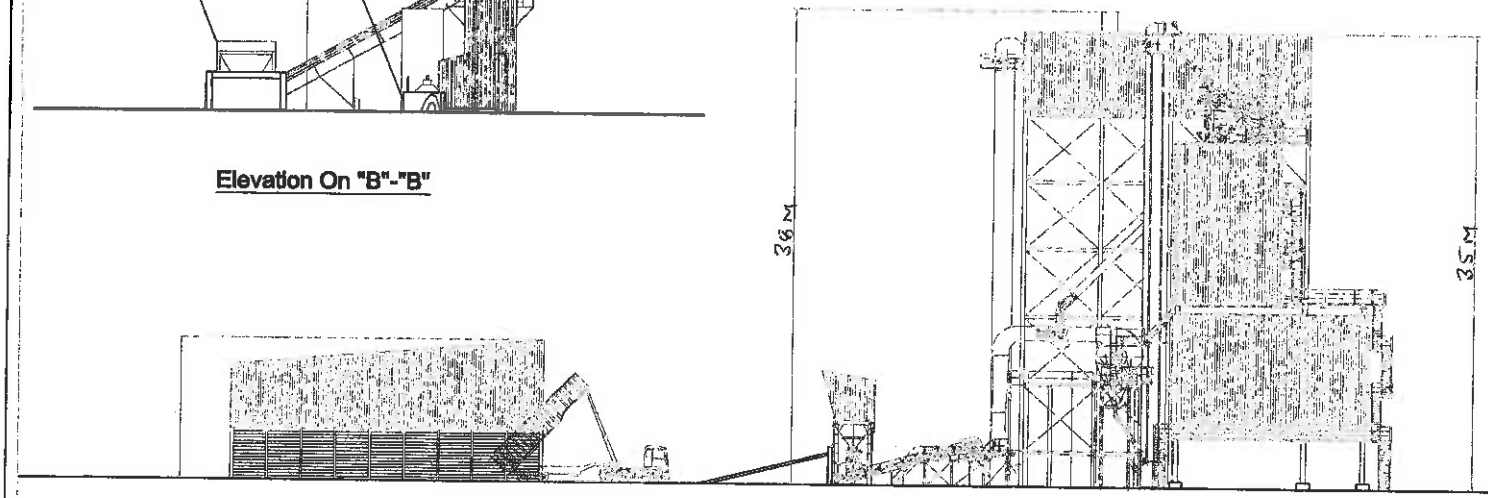
Years of experience in the design and field operation of plants producing, storing and transporting bituminous based products are built into the design concept of the Model BA asphalt plant. Controlled production techniques, combined with modern machine tools and using selected high quality materials, ensure the highest standards of the finished product giving maximum performance and reliability to the plant. Back up spares and service is provided by a highly qualified team of dedicated engineers.



Elevation On "A"-"A"



Elevation On "B"-"B"



Elevation On "C"-"C"

Legend

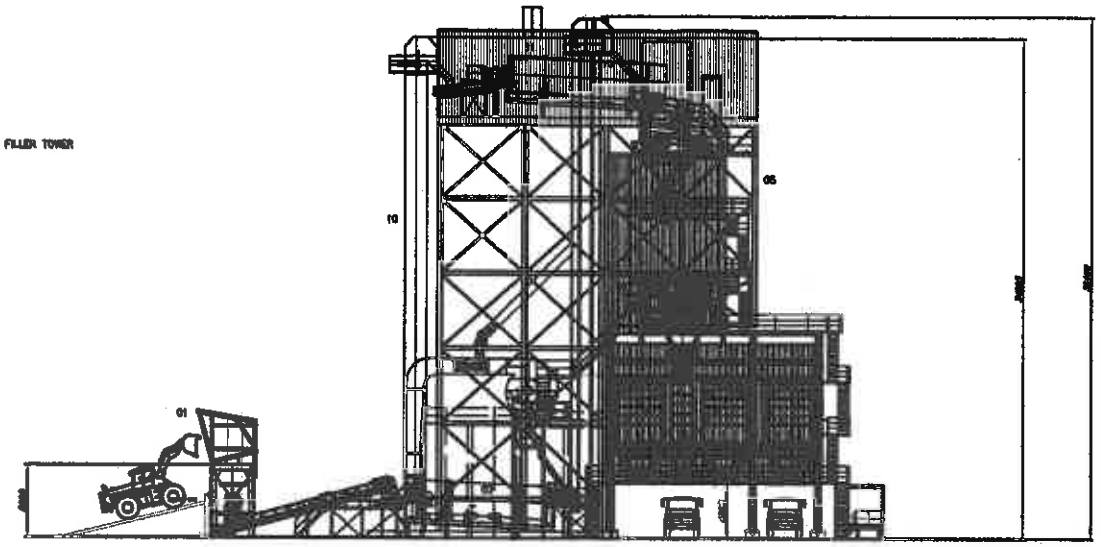
N

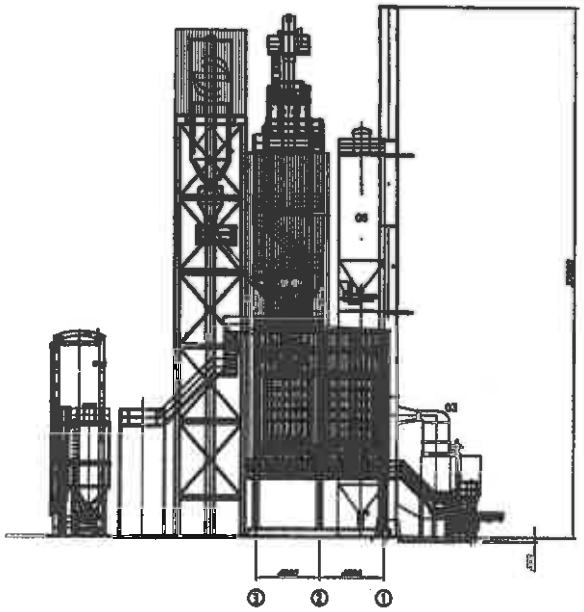
Tarmac

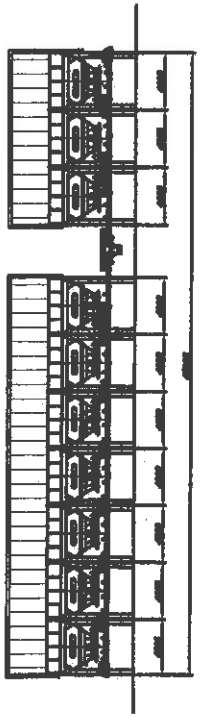
Tarmac Limited
Engineering Dept
Colchester Quarry,
Warren Lane, Stanway,
Colchester, Essex. CO3 0NN.
Tel 01206 330706

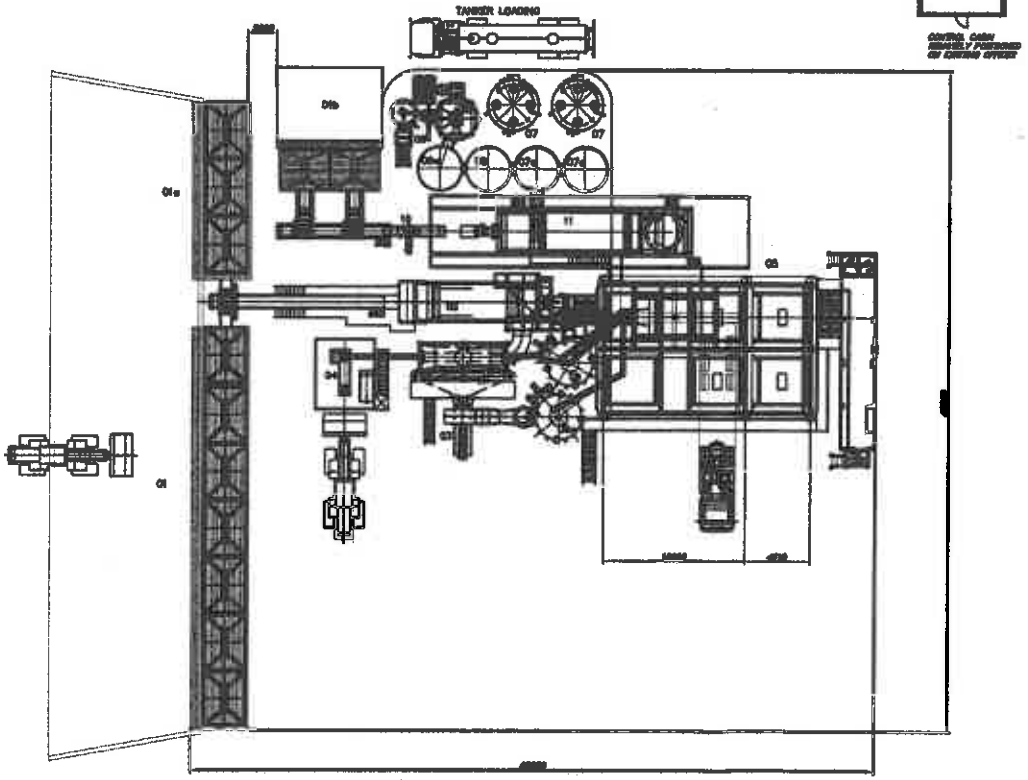
Site	Ipswich
Title	Proposed New Asphalt Plant & Concrete Plant Elevations
Drawn By	D.T.
Scale	1:200
Date	15/04/08
Drawing No	IPS/519/B

REF	DESCRIPTION
01	1 – 7 MH FEED UNITS
01a	1 – 3 MH FEED UNITS
01b	2 – RAP HOPPERS
02	TT 9.22 DRYER
03	DUST COLLECTION SYSTEM
04	DUST CONDITIONER
05	TBA–2300–U MIXING TOWER ON 6 x 60t MM SILOS
06	85.cu.M IMPORTED/85.cu.M RECLAIMED FILLER TOWER
06a	100/cu.M CEMENT SILO
07	2 – 85000 BITUMEN TANKS
07a	CUSTOMERS EXISTING BITUMEN TANKS
08	50 cu.M FUEL TANK
08a	LIGHT FUEL TANK
09	GRANULATE & PIGMENT SYSTEM
10	HOT RAP SYSTEM
11	6x2.4M CONTROL CABIN
12	40/FT. CONTAINER SWITCHHOUSE

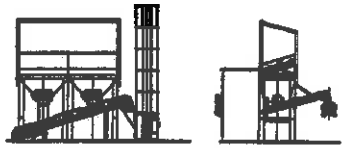






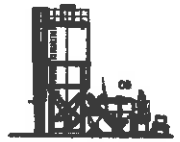


CONTROL CABIN ASSEMBLY POSITIONED ON CUSTOMERS OPTION



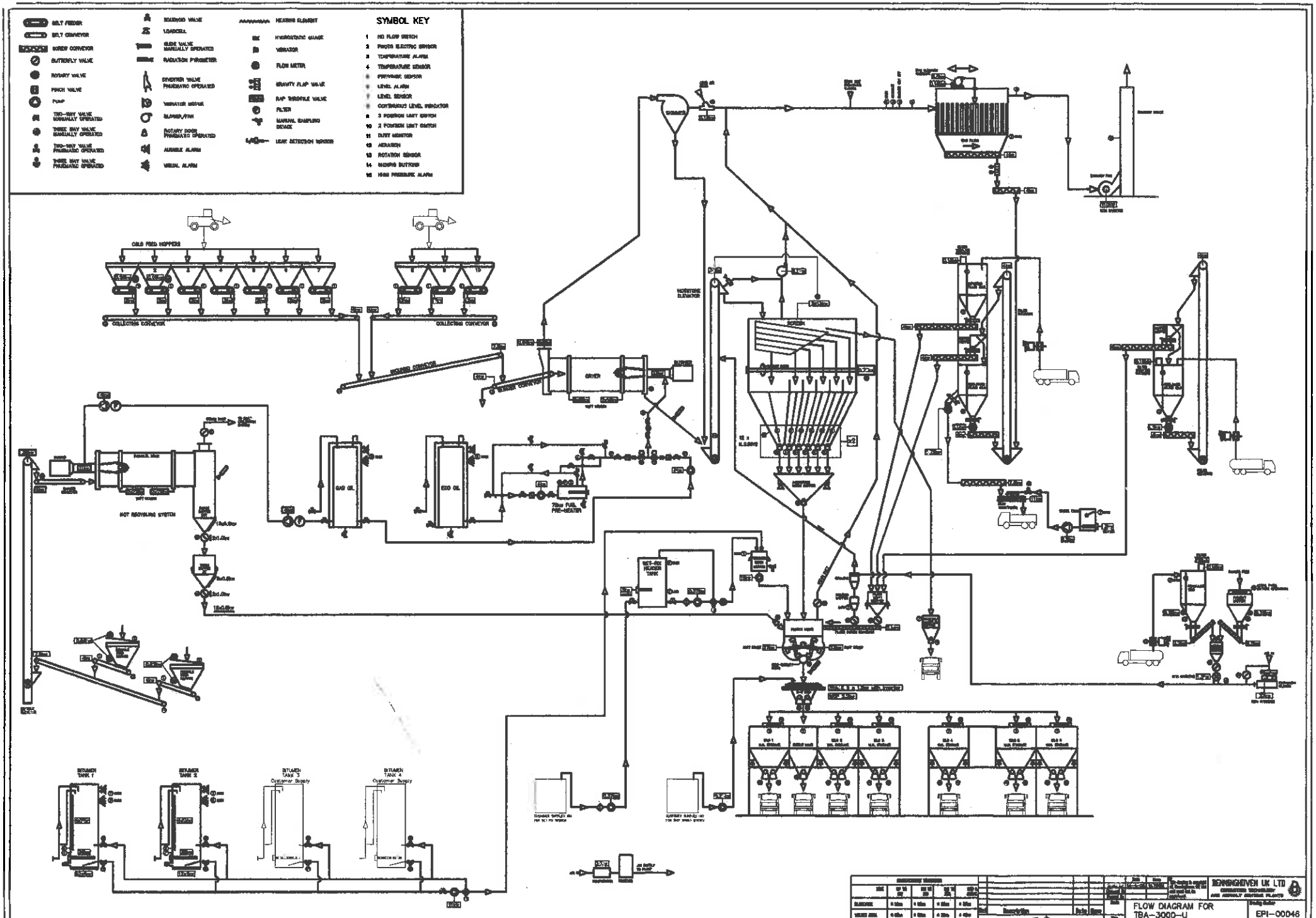
VIEWS ON RAP FEED HOPPERS

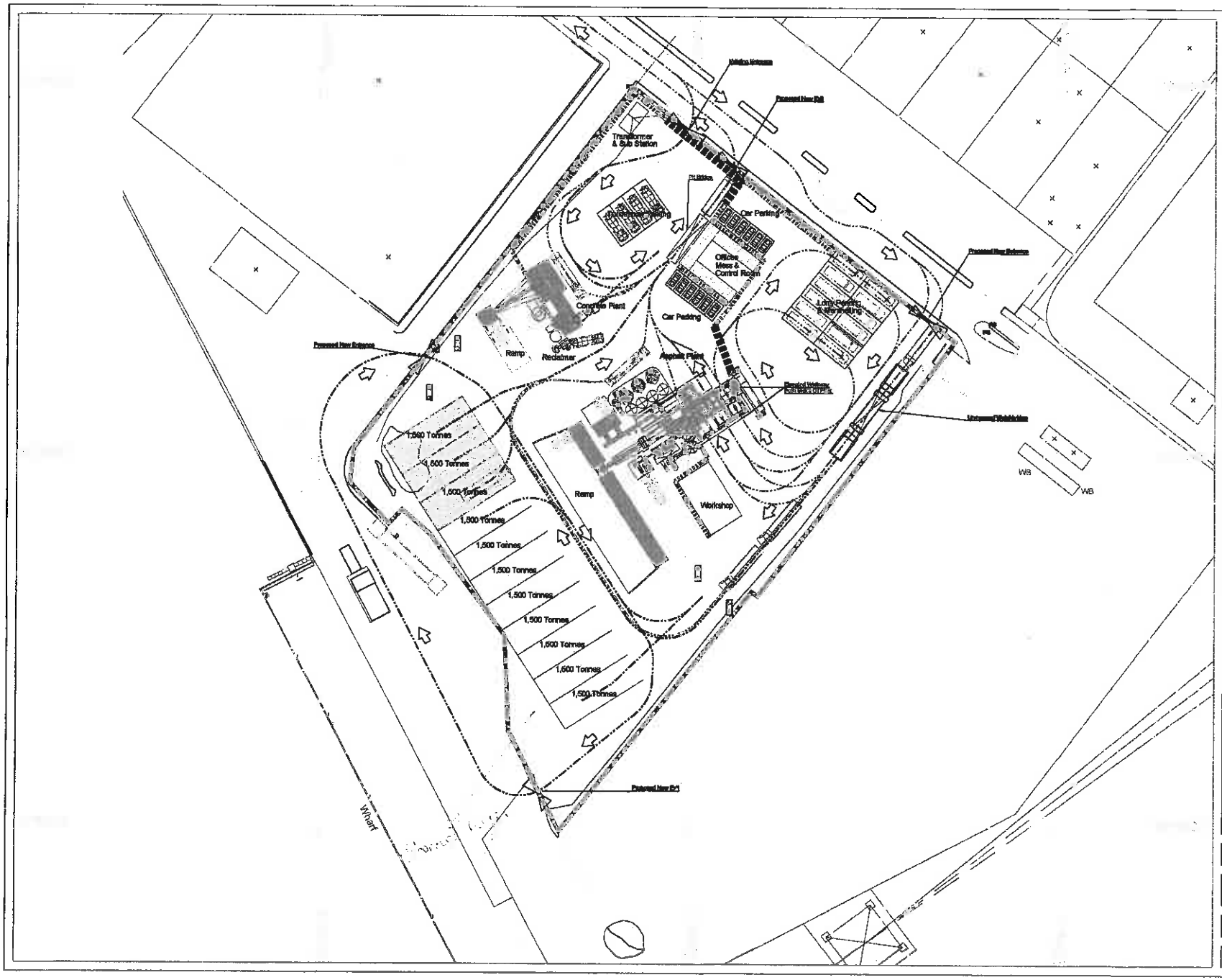
VIEW ON CONDITIONER



VIEW ON GRANULATE & PIGMENT SILOS

								BENNINGHOVEN UK LTD	
								PROPOSED TBA–2300–U ASPHALT PLANT TARMAC IPSWICH	EPD–00229–0


SYMBOL KEY
1 NO FLOW SWITCH
2 PHOTO ELECTRIC SENSOR
3 TEMPERATURE ALARM
4 TEMPERATURE SENSOR
5 FIRE/SMOKE SENSOR
6 LEVEL ALARM
7 LEVEL SENSOR
8 CONTINUOUS LEVEL INDICATOR
9 3 POSITION LIMIT SWITCH
10 2 POSITION LIMIT SWITCH
11 DUST MONITOR
12 AERATOR
13 ROTATION SENSOR
14 HOMING BUTTON
15 HIGH PRESSURE ALARM
COLD FEED HOPPERS
COLLECTING CONVEYOR
COLLECTING CONVEYOR
HOT RECYCLING SYSTEM
BITUMEN TANK 1
BITUMEN TANK 2
BITUMEN TANK 3 Customer Supply
BITUMEN TANK 4 Customer Supply
FLOW DIAGRAM FOR TBA-3000-U TARMAC IPSWICH
EPI-00046
A0
BENNINGHOVEN UK LTD



Legend

Storage Bays To Be Constructed From Posts & Sleepers
All Tonnages Are Based On Material Stacked 6m High
By Loading Shovel, & A Density Of 1.6 Tonnes / m3

- Asphalt Lorries
- Dumpers
- Bitumen & Fuel Oil Tankers
- Filler Tankers
- Truckmixers
- Protected Walkways
- Pedestrian Crossings
- Direction Of Traffic Flow

N

Tarmac

Tarmac Limited
Engineering Dept
Colchester Quarry,
Warren Lane, Stanway,
Colchester, Essex, CO3 0NN.
Tel 01206 330798

Site: Ipswich

Title: Proposed New Asphalt Plant Layout & Traffic Management Plan

Drawn By: D.T.

Scale: 1:500

Date: 10/03/08

Drawing No: IPS/517/D

Rob Hudson consultancy, - Environmental, energy and engineering Services to the quarrying industry.

12 Thorntree Close
Ravenstone,
Leicestershire
LE6 7 2JY.

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robhudsoncons@ntlworld.com

Ipswich Borough Council,
Environmental Protection Services,
Floor 4 East,
Grafton house,
15-17 Russell Road,
Ipswich 1P12DE.

For the attention of Mr Oswald.

19th February 2008.

Ipswich road stone plant, draft permit 3/5/LJB/08/08
Tarmac Ltd, Cliff Road, Cliff Quay, Ipswich IP3 0BS.

Dear Mr Oswald,

Thank you for attending our site meeting together with Mr P Gudde on Friday 23rd January 2009 to finalised draft permit documents for the proposed road stone and concrete plants. As requested, we now provide further information relating to the use of recovered fuel oils including the following introductory notes and the attached technical support document in a format that would normally accompany a full PPC application for converting to recovered fuel.

You will know that in July 2007 a successful Court Judgment allowed industry to burn recovered oils providing they meet with the basic requirements of BS2869 class G specification for Virgin medium fuel oils.

In addition, the Judgement also recommended that Defra and EA should provide practical guidance as to an "end of waste test" to allow recovered fuel to be considered as an acceptable fuel product for use in Part B processes. An EA task force was set up late in 2007 and their final report was completed mid 2008 in readiness for consultation with industry which is still ongoing.

In practical terms, when the application for this permit was prepared and submitted in April 2008, we had little or no knowledge of any expected oil quality standard for recovered oils. Therefore in order to complete D1 calculations to determine final chimney height, we used the largest known recovered oil pollutant of 0.8% Sulphur as the measure for calculating acid gases.

During consultation, the Environment Agency have proposed a draft oil quality protocol including less than 0.1% Halogens made up of Chlorine and Fluorine together with traces of a number heavy metals as worse case pollutant levels. In general terms the recovered oil Industry can meet the 0.1% halogens limit, however all standards are still under consultation.

For the purpose of completing this PPC application, further D1 calculations Appendix 2a and 3a are enclosed to show that the 38m chimney will provide adequate plume dispersal for the proposed worst case oil quality standard and alternatively, the higher recovered oil limits set in PG3/15a(04) taking into account the well proven excellent aggregate abatement levels stated.

In the absence of any initial emission limit values, local authorities tend to use the emission limit values set in PG3/15a(04) during the EA interim period or until they are advised otherwise. In reality numerous extractive emission tests have shown that emissions from recovered fuels will be less than 10% of set emission limit values for Chlorine, Fluorine and metals in PG3/15a(04). In addition for all plants tested, PCBs have been found to be <5ppm and Dioxins have proved to be well below 0.1ng/m^3 at 11% O_2 at all installations.

As part of the commissioning process therefore, the company will carry out an extractive emission monitoring test to determine the emissions and process abatement levels for all stated pollutants together with PCBs and Dioxins. It is certain that with the excellent proven abatement levels of aggregate dryers, emission limits values set out in PG3/15a (04) cannot be exceeded.

Following at least one emission monitoring exercise, it is requested that the company may choose to further demonstrate compliance by means of calculations from a fuel analysis using the calculation methodology set out in clause 5.10 of PG3/15a(04). A set of calculations Appendix 4a are enclosed.

Regarding permit conditions, I have worked through a number of applications to convert to recovered fuel products with local Environmental Health and Scientific Officers and the following Permit conditions have been thought to be appropriate.

a) The use of recovered oils to fire the aggregate dryer is prohibited unless it has been processed so as to comply with BS2869 :2006 Class D for gas oil or Class G For M2 Fuel oil (M2). will have a Sulphur content of <0.8% and will have no more than 10ppm of PCBs. Gas oil shall have a Sulphur content of <0.1%.

b). Receipt of M2 with details of the supplier, oil type and volume received shall be recorded and such records shall be kept at site for a minimum of 2 years. For each load a sample shall be taken and also kept at site for a minimum of 2years. These records shall be made available for examination by the regulator at any reasonable time.

c). The operator shall provide the regulator with the results of a representative analysis of M2 and any other recovered fuel oil meeting the definition of gas oil being burnt at the installation, carried out not less than once every three months by their fuel supplier.

d). In addition to suppliers fuel analysis supplied under the above conditions, the operator shall once per year provide the regulator with their own representative analysis of M2 being burnt at the installation, and such analysis shall include the measurement of the pollutants detailed in the condition and in addition, the Sulphur and PCB content.

e). As soon as possible following any change in oil supplier, the operator shall provide the regulator with the information required by the above conditions.

f). Use of M2 under the interim arrangement set by the Environment Agency allows BS2869 compliant recovered fuel oil to be used under the emission limits set in PG3/15a(04) until "the end of waste" standard has been finalised.

g). None continuous emission monitoring shall be carried out once per year to determine compliance with the emission limits values set out in PG3/15a(04) Table 2 together with Dioxins and PCBs. No results shall exceed the emission limit values stated.

h). Following at least one emission monitoring exercise mentioned in (g) and with the agreement of the regulator, the operator may choose to further demonstrate compliance with the condition by means of calculations from a fuel analysis. Any such fuel analysis shall be produced at the frequency specified and using the calculation methodology set out in clause 5.10 of PG3/15a(04)

j). If any results of non-continuous monitoring exercise exceeds the emission limit values detailed in clause 5.10 of PG3/15a(04), then the operator shall (a) immediately notify the regulator and (b) investigate and identify the causes and (c) take corrective action, and (d) record in the log book as much detail as possible (e) re-test to demonstrate compliance as soon as possible.

I trust that these notes are helpful.

Just one final point, at the time of preparation of the LAPPC Application, recovered oils had generic names, such as Pure fuel Oil (PFO) or clean fuel oil (CFO) or Recovered Fuel oil (RFO). These terms were used freely within applications. More recently, these terms have become brand names and cannot now used. In this case, the fuel supplier will be M2 Environmental Solutions of Cambridge with their M2 brand.

I trust that the attached meets your requirements and look forward to receiving the final permit as soon as it is convenient. Should you require any further information please do not hesitate to contact me.

With kind regards

Yours faithfully

R D Hudson
Environmental Engineer
On behalf of Tarmac Ltd.

D1 CHIMNEY HEIGHT CALCULATIONS

Tarmac Ltd Ipswich Cliff Quay works

For PG3/15a(04) limit concentrations with natural plant abatements

MAXIMUM OPERATING CONDITIONS

Discharge Volume (DV)	75,000	m³/hr(at stack conditions)
Discharge Volume (V)	20.83	m³/sec
Discharge Velocity (W)	17	m/sec
Discharge Temp (TD)	403	K
Moisture Content		% When apropriate
Max Firing Rate	1600	lph
Chimney exit diameter.	1.25	m

From the Secretary of State's Guidance notes PG3/15a (04) for Mineral Drying and Roadstone Coating Processes the emission concentration limits for the following are;

Table A		mg/m³
Cadmium		0.5
Nickel		1.5
Chromium)		
Copper)	Total	1.5
Vanadium)		
Lead		5
Chloride (expressed as hydrogen chloride)		100
Fluorine (expressed as hydrogen fluoride)		5
Particulate matter		50

at conditions of 273°K, 101.3kPa without correction for water vapour.

Short term ambient guideline concentrations for the above pollutants .

Table B		
Pollutant	*guideline conc. mg/m³*	source
Cadmium	0.00125	occupational exposure limits 1993
Nickel	0.0125	occupational exposure limits 1993
Chromium)		
Copper)	0.01875	occupational exposure limits 1993
Vanadium)		
Lead	0.00375	occupational exposure limits 1993
Hydrogen Chloride	0.1	table 1 HMIP guidance note D1
Hydrogen Fluoride	0.0625	occupational exposure limits 1993
Particulates	0.3	table 1 HMIP guidance note D1
Sulphur Dioxide	0.44	table 1 HMIP guidance note D1

Background levels of common pollutants

Table C

Type of district	Concentrations mg/m³				
	Lead	SPM	S02	HCl*	HF *
Major city centre/heavy industrial area	0.0005	0.4	0.16	0.037	0.022
Highly developed urban area	0.00025	0.2	0.12	0.028	0.017
Urban area of limited size with parkland or rural surrounding.	0.0001	0.1	0.1	0.023	0.014
Partially developed area	0.00005	0.07	0.07	0.016	0.01
Rural area with little development	0.00002	0.05	0.05	0.012	0.007

* Values for HCl and HF are equivalent concentrations calculated by using the background value for SO2 and the conversion value given in Table 3 of guidenance note D1.

CALCULATIONS

Step 1 - Convert all pollutions to stack conditions , this is done by using the equation;

$$Cd = Cs \frac{(273)(100 - H2O\ d)}{(Td)(100)}$$

where, Cd is the pollutant concentration at discharge conditions
Cs is the pollutant concentration at the reference conditions see Table A
Td is the discharge temperature in degrees kelvin
H2O d is the discharge moisture content

The discharge rates for pollutants is then given by:

$$\text{Discharge rate (D) g/s} = \frac{(V \times Cd)}{1000}$$

where V is the discharge volume flowrate.

Using the above equations values for Cd and D can then be calculated ;

Pollutant	Table A	Abatement	Cs mg/m³	Cd mg/m³	D g/s
Cadmium	0.5	95	0.025	0.017	0.0004
Nickel	1	95	0.05	0.034	0.001
Chromium) Copper) total Vanadium)	1.5	95	0.075	0.051	0.001
Lead	5	95	0.25	0.169	0.004
HCL	100	85	15	10.161	0.212
HF	5	85	0.75	0.508	0.011
Particulate matter	50		50	33.871	0.706
Sulphur dioxide*		(Corrected)			1.582

The discharge rate for sulphur dioxide can be calculated using the equation given in the chimney heights memorandum 1956 ;

$$R = 0.02\ WS$$

where R denotes the rate of discharge in Kg/h
W denotes the maximum firing rate of the burner Kg/h
S denotes the Sulphur content in RFO = 0.8 %
the abatement figure assumed is:- 75 %

therefore R= 5.70 Kg/h
= 1.58 g/sec

Step 2 - Calculate the Pollution Index corrected for background levels of pollutants.

$$\textit{Pollution Index (Pi)} = \frac{D}{(GD - BC)} \times 1000$$

where Gd denotes the guideline concentration of the pollutant see Table B.
Bc denotes the background concentration of the pollutant see Table C

The background levels used in this calculation are for an Urban area of limited size with parkland or rural surroundings as noted in table C.

Therefore ;

Pi cadmium	=	282.26
Pi nickel	=	56.45
Pi chromium)	=	
Pi copper)	=	56.45
Pi vanadium)	=	
Pi lead	=	954
Pi HCL	=	2,749.27
Pi HF	=	218.24
Pi SO2	=	4,653.59
Pi particulates	=	3,068.02

The Pollution indices for the acid gases are summed therefore

Pi (acid gases) = 7,621.10

The largest Pollution Index value is used in determining the discharge stack height.

Thus Pi = 7,621.10

Step 3 - Calculation of the uncorrected chimney height for buoyancy Ub

Heat release Q (MW) = $\frac{V\,(1-(283/Td))}{2.9}$

where V is the volume flowrate at discharge conditions m^3/sec
Td is the discharge gas temperature in K
The ambient temperature is taken to be 10 C (283 k)

Thus heat release Q = 2.139 MW

The uncorrected stack height due to buoyancy is determined by ;

Ub= 10^a x Pi^b

where a= -1.11 - 0.19 LOG10 Q
b= 0.49 + 0.005 LOG10Q

Thus a= -1.173
b= 0.492

Ub= 5.443

The minimum value for Ub can be calculated by using the equation

min Ub= 1.7 + 0.25 x Q^0.9
min Ub= 2.196

The higher value of Ub is used in calculating the stack height , then Ub = 5.44

Step 4 - Calculation of the uncorrected chimney height for momentum Um

The discharge momentum is calculated using the equation ;

$$M = \frac{283 \times V\,W}{Td} \quad m4/sec$$

thus M = 248.49 m4/sec

from equation 15 section 5.3 ;

log 10 Um = x + (y.log10.Pi + z)^0.5

where x = -3.7 + (log10 M)^0.9
y = 5.9 - 0.624 log10 M
and z = 4.24 - 9.7log10 M + 1.47(log10 M)^2 - 0.07(log10 M)^3

then x = -1.505
y = 4.405
z = -11.522

log Um= 0.857
Um = 7.194

the minum value for Um is calculated by Um min =0.82 x M^0.32

Um min = 4.790

The higher value of Um is used in calculating the stack height , then Um = 7.19

Step 5 - Calculation of the final discharge stack height , C .

All buildings within 5Um have to be considered = 36 m

If there is more than one relevant building within 5Um's then the following equation is used to calculate the discharge height .

$$C = Hm + (1 - Hm/Tm) \times (U + (Tm - U) \times (1 - A^{-Um/Hm}))$$

where Hm is the maximum building width
Tm is the maximum height of disturbed flow over building T = H+1.5 K
K is the lesser of the building height or width
U is the uncorrected stack height the lesser of Um and Ub . U = 5.44
A is Um/Ub A = 1.32

Building	Distance	Height	Width	K	1.5k	T	
Hot elevator	8	36	1.5	1.5	2.25	38.25	
Screenhouse	11	26	9	9	13.5	39.5	
Screen unit	5	30	4	4	6	36	
RAP dryer	13	35	9	9	13.5	48.5	*lattice structure*
Hot storage	5	14	8	8	12	26	
Bitumen tanks	19	14	6	6	9	23	
Filler silos	5	30	6	6	9	39	

Thus Hm = 36
Tm = 48.5

Thus C = 37.9 m

The final discharge height required is **38.0 m**

Effective width of open lattice structure of RAP dryer equal to 22m x 40% CSA as D1 calculations section 5.4.3.

Technical support for PPC application to burn recovered fuel oils. Appendix 1.

1. The legal case for burning recovered fuel oils as a process fuel product.

1.1. Following the positive outcome of the Court judgement dated 28th June 2007 regarding processed derived fuel, the Environment Agency responded with bulletins outlining their long term and interim arrangements, as follows and are attached.

- Regulation of Waste oil : Interim arrangements.
- Determination when waste oil has been fully recovered : Interim position.

Firstly, the court concluded that in order for waste derived oils to cease to be a waste, *'it should be good enough that the holder has converted the waste material into a distinct, marketable product, which can be used in exactly the same way as ordinary fuel and with no worse environmental effects'. The court suggested that Defra and the EA should provide practical guidance for those affected on what is referred to as 'the end of waste test.'*

The Environment Agency then set up a Task and Finishing group to develop a standard to satisfy the courts recommended objectives with a brief to prepare proposals, which are being considered under the consultation process.

In the interim period, the Environment agency confirmed that it will not regard fuel oils derived wholly or in part from waste lubricating oils, and that are used as a fuel, as waste ; if they are processed to meet the specification for Class G oils, excluding the requirements for viscosity as specified within Table 3 of BS2869.

1.2. Tarmac Ltd have therefore designed the virgin dryer burner to handle M2 fuel, with the agreement that fuel oil quality will be regularly and annually independently tested from the outset for pollutants and a program for extractive emission testing will be undertaken as soon as possible after commissioning as possible.

1.3. Recovered fuels have been used in many asphalt plants within the industry based upon an excellent operational record that the industry has enjoyed for over 30 years. This has been due to excellent aggregate filtration properties of the product during the drying process to provide pollutant abatement levels of at least 70% and 80% for Sulphur dioxide, 85% for Chlorine, as Hydrogen Chloride and in excess of 90% to 95% for traces of Metals and Fluorine as Hydrogen Fluoride. These pollutants are collected in the coated road stone product as trace elements.

1.4 When plant pollutant abatement levels have been established from initial extractive emission tests, it will be possible to calculate the release concentrations for each agreed pollutant from the delivery note oil quality sample for each load, as outlined within PG3/15a (04) condition 5.10 and as shown on calculation sheet Appendix 4a.

2. Specific design features for handling both Gas oil and MF2.

2.1. The virgin aggregate dryer burner is designed to handle a number of alternative fuels. However all road stone burners are designed to operate with gas oil having a viscosity of between 2-5 centistokes (38 redwood sec). M2 is typically 45centistokes (160redwood sec) fuel oil needing heating to 55^0C achieve equal fuel atomisation and combustion efficiency as experienced with gas oil.

2.2. For the RAP dryer, a dedicated gas oil fuel supply system will be installed taking its supply from the gas oil fuel tank dedicated to the plant installation.

2.3. For the Virgin aggregate dryer, a dedicated gas oil fuel supply system will be installed for initial start up and shut down purposes. In addition, a separate M2 fuel supply system will be installed complete with an automatically controlled and protected in line heater.

2.4. The dual pipe work system will be connected into the burner by a three port changeover valve that will allow the burner to be fired up on gas oil while the alternative fuel is being preheated and up to operating pressure, before being fed into the burner. When the alternative fuel system pressure and temperature reaches design levels, the recovered fuel will be fed into the burner and the gas oil system switched out of sequence.

2.5. During plant shut down the gas oil system will be initiated to flush out any alternative fuel residues from the pipe work system and the alternative fuel system will be shut down in readiness for the next start up procedure.

2.6. During normal operation on the alternative fuel, the gas oil supply system will continue running on standby to allow immediate changeover to burn gas oil.

2.7. The dual fuel system will be designed such that plant start up and shut down sequences will always be completed when burning gas oil to ensure that no additional emissions become apparent during start up or shut down periods or any other breakdown or abnormal operation.

2.8. In the unlikely event of poor burner efficiency leading to an emission problem with M2 fuel, it can be immediately switched out and a gas oil supply restored to the burner to maintain normal plant operation.

3. Character of substances and releases.

3.1 M2 BS 2869 compliant fuels have a Sulphur content of less than 0.8% being well below the 1% limit set within BS2869 for heavy fuels. This is an increase over gas oil, however at least 70% of SO_2 is abated in the process by aggregate filtration as the flame and hot gasses are passed through many heavy cascades of the product being dried through the dryer along its entire length of 9 metres.

This virgin aggregate dryer has a 16MW dryer burner matched to a 75,000m^3/h exhaust and filtration system which can be infinitely controlled over its operating range for efficient combustion efficiency down to 10MW and 53,000m^3/h.

3.2. There are small additional releases expected from derived MF2 fuels found as traces of heavy metals, and <0.1% Halogens of Chlorine and Fluorine found in most oil samples. Of these at least 85% will be abated by aggregate filtration a outlined above in 1.3, rendering such releases to atmosphere to be negligible.

3.3. Releases from the chimney will include dust particulate and products of combustion from the drying process exhausted through the terminal filter and chimney when firing on <0.8% Sulphur fuel oil, including abated oxides of Sulphur, Hydrogen Chloride, Hydrogen Fluorine, and Carbon.

4. Techniques for the control of releases to air.

4.1. When pre heated to 55°C, the viscosity of BS2869 derived fuel oil will be the same as gas oil ensuring good fuel atomisation. Burner efficiency will therefore be well maintained over its operating range. The net calorific value of the fuel is normally slightly higher than gas oil resulting in a reduction in overall fuel consumption and a subsequent reduction in products of combustion per tonne of product, released to air by the chimney.

4.2. The exhaust and collection system, sized to handle between 53,000m^3/hr and 75,000m^3/hr will adequately handle both fuels and the 38m chimney will ensure adequate plume dispersal.

The attached additional D1 chimney height calculations included in Appendix 2a and 3a show that the pollution index (Pi) for both acidic gases and Particulate emissions are low resulting in an uncorrected chimney height (Um) of <7metres above ground level. But the most significant contribution to calculating the final chimney height is the effect of the adjacent tall slender screen house and mixing tower, also the RAP dryer house, itself supported by a lattice open structure extending some 35m above ground datum level. The final D1 corrections confirm that a 38m high chimney will provide adequate plume dispersal for the whole operating range of the installation with both fuels.

4.3. An additional fuel tank will store the M2 derived fuel for the rotary drier burner. The fuel will be stored within a fuel tank having a bunded area or double skin construction to comply with EA guidelines EPG2 and guidance notes.

5. Monitoring and inspections.

5.1. In compliance with modern QA techniques each section of the process will be continuously monitored for product quality and plant safety, by PC driven hardware and software systems.

5.2. Daily visual assessments at strategic positions around the site will be carried out. The inspections will cover the alternative fuel and heating system, carried out by nominated members of the staff and the following noted in the environmental log book.

a). Oil pressures of both fuels and heater outlet temperature for the BS2869 fuel.
b). Emissions from the Asphalt Coating Plant and chimney.

5.3. Extractive particulate emission sampling already planned to be carried out twice per year to BS ISO9096:2003 and will continue from acceptable sampling points and an access platform to be provided at the chimney.

5.4. As soon as possible after installation and commissioning of the M2 BS2869 complaint recovered fuel, a suite of extractive emission sampling will be carried out for Dioxins, Heavy metals, Chlorine, Fluorine and Sulphur, together with the plant abatements for each pollutant.

5.5. Regular fuel quality analysis will be carried out to measure Sulphur and Chlorine together with traces of heavy metals and fluorine. From this analysis, emissions to atmosphere will be calculated at least once every three months using the well proven calculation method contained within PG3/15a(04) and as outlined on spreadsheet Appendix 4a.

Regulation of Waste Oil: Interim Arrangements
1 August 2008

Following the Court of Appeal judgement in *OSS Group Ltd v Environment Agency* we have worked with industry and government departments to review the implications of the judgement and take the actions necessary.

The appeal concerned the limited question '..whether a lubricating oil, thus not originally used as a fuel, which becomes waste can thereafter be burnt other than as waste...'. The conclusion was that, in order for a waste to cease to be waste 'it should be enough that the holder has converted the waste material into a distinct, marketable product, which can be used in exactly the same way as an ordinary fuel, and with no worse environmental effects'. The Court also suggested that Defra and the Environment Agency should provide practical guidance for those affected on what it referred to as "the end of waste test".

We set up a Technical Advisory Group (TAG) to develop a standard that satisfies the criteria set by the Court for waste lubricating oils. The TAG produced a Technical Report to inform the development of the Quality Protocol and standard. There were gaps in the information provided by the TAG and full agreement was not achieved on the limits to be set. It was therefore necessary to commission further work to develop the Quality Protocol for processed fuel oil from waste lubricating oil. The consultation for the Quality Protocol for processed fuel oil from waste lubricating oil has now opened and can be viewed on http://wiqp.dialoguebydesign.net.

In the meantime, the Environment Agency believes industry requires guidance, on an interim basis, as to the circumstances in which we will regard a substance derived wholly or partially from used lubricating oils as having ceased to be waste. This guidance will be operative only until the Quality Protocol has been agreed, and is entirely without prejudice. It should therefore not be relied upon as the basis for any long-term arrangements.

During this interim period, the Environment Agency will not regard fuel oils that are derived wholly or partly from waste lubricating oils, and that are used as fuel, as waste, if they are processed to meet the specification for Class G oils, excluding the requirements for viscosity, as specified within Table 3 of British Standard BS 2869:2006, (Fuel oils for Agricultural, domestic and industrial engines and boilers – Specification). In addition, a total halides limit, expressed as chlorine will apply. For convenience these requirements are reproduced below.

Properties of residue-containing burner fuels

Property	Class G	Test Method
Flash point (Rapid Equilibrium Test) (°C) (min)	66.0	IP523
Sulfur content [% (m/m)] (max)	1.0	IP 336
Water content [%(V/V)] (max)	1.0	IP 74
Ash content [%(m/m)] (max)	0.15	IP 163[1]
Carbon residue [micro0 [%(m/m)](max)	20.0	IP 398
Total sediment (existent) [% (m/m)] (max)	0.15	IP 375
Strong acid number	Zero	IP 139
Total halogens , as chlorine (ppm)	1000	IP503

This position reflects the minimum requirements to enable optimal performance of burners/boilers using Heavy Fuel Oil as a fuel. It is not appropriate to require compliance for viscosity, as oils derived from waste lubricants will inevitably have a different viscosity and it would be unfair to penalise them for this.

The oil supplier and users are responsible for demonstrating that reprocessed oil meets the required specification. Reprocessed oils that do not meet the required specification will remain waste, and their use consignment and burning as fuel without compliance with the national controls in place to fulfil the requirements of the Waste Framework Directive, the Hazardous Waste Directive and the Waste Incineration Directive will constitute a criminal offence.

[1] The precision associated with the use of this method on used lubricating oil has not been determined.

Determining when Waste Oil has been fully recovered: Interim Position

The Environment and Heritage Service (EHS) are currently working with the Environment Agency (EA), the Scottish Environment Protection Agency (SEPA) and the Department for Environment, Food and Rural Affairs (DEFRA) to review the implications of the recent Court of Appeal judgement in *OSS Group Ltd v Environment Agency* and take the actions necessary.
The appeal concerned the limited question 'whether a lubricating oil, thus not originally used as a fuel, which becomes waste can thereafter be burnt other than as waste…' The conclusion was that, in order for a waste to cease to be waste 'it should be enough that the holder has converted the waste material into a distinct, marketable product, which can be used in exactly the same way as an ordinary fuel, and with no worse environmental effects'. The Court also suggested that DEFRA and the EA should provide practical guidance for those affected on what it referred to as "the end of waste test".
The EA set up a Task and Finish Group which aimed to develop a standard that satisfied the criteria set by the Court for waste lubricating oils. The initial report from that group showed that there was agreement that a specification is necessary to establish the point at which waste oil ceases to be considered as such. However, it was felt that the risks to human health and the environment of materials present in waste oils, which were subsequently burnt as a fuel, had not been clearly assessed.

The EHS agree with both DEFRA and the EA that more information is needed to develop the protocol, including the effects of zinc and certain heavy metals on human health and the environment. This will be taken forward by the EA with a view to producing a draft Protocol by the end of April.

In the meantime, the EHS believes industry requires guidance, on an interim basis, as to the circumstances in which we will regard a substance derived wholly or partially from used lubricating oils as having ceased to be waste. This guidance will be operative only until the Protocol is agreed, and is entirely without prejudice to any conclusions the protocol may produce. It should therefore not be relied upon as the basis for any long-term arrangements. During this interim period, the EHS will not regard fuel oils that are derived wholly or partly from waste lubricating oils, and that are used as fuel, as waste, if they are processed to meet the specification for Class G oils, excluding the requirements for viscosity, as specified within Table 3 of British Standard BS 2869:2006, (Fuel oils for Agricultural, domestic and industrial engines and boilers – Specification). For convenience these requirements are reproduced below.

Properties of residue-containing burner fuels

Property	Class G	Test Method
Kinematic Flash point (Pensky-Martens closed cup) (^{o}C) (min)	66.0	BS2000-34
Sulfur content [% (m/m)] (max)	1.0	BS2000-336
Water content [%(V/V)] (max)	1.0	BS2000-3374
Ash content [%(m/m)] (max)	0.15	BS2000-4
Carbon residue [micro0 [%(m/m)](max)	20.0	BS2000-398
Total sediment (existent) [% (m/m)] (max)	0.15	BS2000-375
Strong acid number	Zero	BS2000-336

This position reflects the minimum requirements to enable optimal performance of burners/boilers using Heavy Fuel Oil as a fuel. It is not appropriate to require compliance for viscosity, as oils derived from waste lubricants will inevitably have a different viscosity and it would be unfair to penalise them for this.
The oil supplier and users are responsible for demonstrating that reprocessed oil meets the required specification. Reprocessed oils that do not meet the required specification will remain waste, and their movement and subsequent burning as fuel without compliance with the national controls in place to fulfil the requirements of the Waste Framework Directive, the Hazardous Waste Directive and the Waste Incineration Directive will constitute a criminal offence.

Please note that where an installation receiving such a fuel is permitted under the Pollution Prevention and Control Regulations (NI) 2003 or the Industrial Pollution Control (NI) Order 1997, additional requirements may apply and you should contact the Industrial Pollution and Radiochemical Inspectorate (IPRI) of EHS on 02890 569299.

If you have any queries about this note, please contact the EHS's Hazardous Waste team on 028 90 569710.

Pollution prevention and control Act 1999.

DISCHARGE STACK HEIGHTS D1

Appendix 2a

Tarmac Ipswich 160t/h Proposed Asphalt Coating Plant

Known M2 oil quality and natural plant abatement levels.

MAXIMUM CONTINUOUS OPERATING CONDITIONS

Discharge Volume (DV)	75,000	m^3/hr at operating temperature	
Discharge Volume (V)	20.83	m^3/sec	
Discharge Velocity (W)	17	m/sec	
Discharge Temp (TD)	403	K	
Moisture Content		% when appropriate	
Max continuous Firing Rate	1600	lph	BS2869 compliant fuel 0.8% Sulphur
Chimney exit diameter	1.25	M	

POLLUTANTS

From the Secretary of State's Guidance notes PG3/15a (04) for Mineral Drying and Roadstone Coating Processes the emission concentration limits for the following are :-

Table A	Typical	maximum	PG limit
	mg/m^3	mg/m^3	mg/m^3
Sulphur dioxide	90	112	
Particulate matter	<25	50	50
PM10	<8	15	
HCL		6	100

At reference conditions of 273°K, 101.3kPa without correction for water vapour.

Short term ambient guideline concentrations for the above pollutants .

Table 1

Pollutant	guideline conc. mg/m^3	source
Particulates SPM	0.3	table 1 HMIP guidance note D1
PM10	0.05	Short term AQ strategy objective.
Sulphur Dioxide	0.44	table 1 HMIP guidance note D1
Nitrogen Chloride	0.1	table 1 HMIP guidance note D1

Background levels of common pollutants

Table 2

	Concentrations mg/m^3			
Type of district	SPM	PM10	S02	HCL
Major city centre/heavy industrial area	0.4		0.16	0.037
Highly developed large uban area	0.2		0.12	0.028
Urban area of limited size with parkland or rural surrounding.	0.1	0.018	0.1	0.023
Partially developed area	0.07		0.07	0.016
Rural area with little development	0.05		0.05	0.012

Bc. PM10 background level taken as 90.40th Percentile from local AQ monitoing records.

CALCULATIONS

Step 1 - Convert all pollutions to stack conditions , this is done by using the equation;

$$Cd = Cs \frac{x\,(273)\,(100 - H2O\,d)}{(Td)\,(100)}$$ With correction for water vapour.

or

$$Cd = Cs \frac{x\ 273}{Td}$$ Without correction for water vpour.

where, Cd is the pollutant concentration at discharge conditions
Cs is the pollutant concentration at the reference conditions see Table A
Td is the discharge temperature in degrees kelvin
H2O d is the discharge moisture content

The discharge rates for pollutants is then given by:

$$\text{Discharge rate (D) g/s} = \frac{(V \times Cd)}{1000}$$

where V is the discharge volume flowrate.

Using the above equations values for Cd and D can then be calculated ;

Pollutant	Table A	Abatement	Cs mg/m³	Cd mg/m³	D g/s
Particulate matter	50		50	33.9	0.706
PM10	15		15	10.2	0.212
SO2 Abatement corrected	112		112	75.9	1.582
HCL	40	85	6	4.1	0.085

The discharge rate for sulphur dioxide can be calculated using the equation given in the chimney heights memorandum 1956, is given as :-

$$R = 0.02WS$$

where R denotes the rate of discharge in Kg/h
W denotes the maximum firing rate of the burner Kg/h
S denotes the % sulphur in fuel = 0.8 %
The production abatement = 75 %

therefore R= 5.70 Kg/h or 112 mg/m^3 SO_2
= 1.58 g/sec

Step 2 - Calculate the Pollution Index corrected for background levels of pollutants.

$$\text{Pollution Index (Pi)} = \frac{D}{(Gd - Bc)} \times 1000$$

where Gd denotes the guideline concentration of the pollutant see Table 1.
Bc denotes the background concentration of the pollutant see Table 2.

The Table 2 Background levels used in this calculation are for an uban area of limited size with parkland or rural surroundings.

Therefore :-

Pi particulate = 3,528
Pi PM10 = 6,615
Pi SO_2 = 4,654
Pi HCL = 1,100

The Pollution indices for acid gases are normally used to detirmine chimney height unless there is another larger sensitive pollutant for consideration :-

Pi (total acid gases) = 5,753

In this case, the largest Pi is from acidic gases and will be used

Thus Pi (total acidic gases 5,753

Step 3 - Calculation of the uncorrected chimney height for buoyancy Ub

Heat release Q (MW) = $\frac{V\ (1-(283/Td))}{2.9}$

where V is the volume flowrate at discharge conditions m³/sec
Td is the discharge gas temperature in K
The ambient temperature is taken to be 10 C (283 k)

Thus heat release Q = 2.139 MW

The uncorrected stack height due to buoyancy is determined by ;

Ub= 10^a x Pi^b

where a= -1.11 - 0.19 LOG10 Q
b= 0.49 + 0.005 LOG10Q

Thus a= -1.173
b= 0.492

Ub= 4.740

The minimum value for Ub can be calculated by using the equation

min Ub= 1.7 + 0.25 x Q^0.9
min Ub= 2.196

The higher value of Ub is used in calculating the stack height , then Ub = 4.74

Step 4 - Calculation of the uncorrected chimney height for momentum Um

The discharge momentum is calculated using the equation ;

$M = \frac{283 \times V\,W}{Td}$ m4/sec

thus M = 248.49 m4/sec

from equation 15 section 5.3 ;

log 10 Um = x + (y.log10.Pi + z)^0.5

where x = -3.7 + (log10 M)^0.9
y = 5.9 - 0.624 log10 M
and z = 4.24 - 9.7log10 M + 1.47(log10 M)^2 - 0.07(log10 M)^3

then x = -1.505
y = 4.405
z = -11.522

log Um= 0.740
Um = 5.498

the minum value for Um is calculated by Um min =0.82 x M^0.32

Um min = 4.790

The higher value of Um is used in calculating the stack height , then Um = 5.50

Step 5 - Calculation of the final discharge stack height , C .

All buildings within 5Um have to be considered = 27 m

If there is more than one relevant building within 5Um's then the following equation is used to calculate the discharge height .

$$C = Hm + (1 - Hm/Tm) \times (U + (Tm - U) \times (1 - A^{-Um/Hm}))$$

where Hm is the maximum building or adjacent face height
Tm is the maximum height of disturbed flow over building T = H+1.5 K
K is the lesser of the building height or width
U is the uncorrected stack height the lesser of Um and Ub . 4.74
A is Um/Ub A = 1.16

Building	Distance	Height	Width *	K	1.5k	T	
Elevator	8	36	1.5	1.5	2.25	38.25	
Screenhouse	11	26	9.0	9	13.5	39.5	
Screen unit	5	30	4	4	6	36	
RAP dryer unit	13	35	9	9	13.5	48.4	*Lattice structure*
Hot storage	5	14	8	8	12	26	
Bitumen tanks	19	14	6	6	9	23	
Filler silos	5	30	6	6	9	39	

Thus Hm = 36.0
Tm = 48.4
Thus C = 37.4

Final corrected chimney height 38m.

Effective width of open lattice structure of RAP dryer equal to 22m x 40% CSA as D1 calculation section 5.4.3

M2 Recovered fuel oil calculations Ipswich

Addendix 4a

Plant:- 160t/hr Benninhoven plant **Location:-** Tarmac Ltd Ipswich.

Recovered fuel Oil calculation as specified in P.G. 3/15a (04).

Exhaust Volume :- 75,000 **m^3/h** (50806) m^3/hr at 0°C without
Exhaust temperaure :- 130 **°C** Correction for vapour
Exhaust vapour content ;- when appropriate
Maximum Oil Flow:- 1,600 **lt/hr**
Specific Gravity:- 0.89 **Kg/litre**

Pollution Constant = Max. Oil Flow (Litres/hour) x S.G. / Exhaust Volume = 0.028 (b)

(a) (c) = (a x b) (d) (e) = (c) (100-d) /100

Oil Spec.	mg/Kg Maximum analysis	Theoretical Emission (mg/m^3)	Abatement % from site tests	Actual Emission (mg/m^3)	P.G. 3/15a(04) Limit	
Lead	25	0.70	99	0.007	5	✓
Mercury	5	0.14	95	0.007		
Nickel	5	0.14	95	0.007	1	✓
Chromium	5	0.14	95	0.007	)	
Copper	30	0.84	95	0.042	) 1.5	0.056 ✓
Vanadium	5	0.14	95	0.007	)	
Zinc	300	8.41	95	0.420		→ Not required.
Cadmium	5	0.14	95	0.007	0.5	✓
HCL	1000	28.03	85	4.204	100	✓
HF	10	0.28	85	0.042	5	✓
$SO2_{corrected}$	8000	448.4	75	112.1		

The arising of sulphur dioxide can be calculated using the equation given in the chimney heights memorandum 1956 ;

$$R = 0.02\ WS$$

where R denotes the rate of discharge in Kg/h
W denotes the maximum firing rate of the burner Kg/h
S denotes the Sulphur % in the fuel = 0.8

therefore R = 22.78 Kg/hr = 6.33 g/s

	mg/kg	mg/m3	abatment %	mg/m3		
Sulphur	8000	448.45	75	112.1		

All parameters to be proved from extractive emisssion test on commissioing.