MIBAAA
MANUFACTURERS OF IBA AGGREGATES ASSOCIATION

A

CODE OF PRACTICE

for the production and sale of

Incinerator Bottom Ash Aggregates (IBAA)

processed from Municipal Solid Waste incinerator bottom ash and used in bound and unbound applications in construction

Version 9 (incl. RPS option)

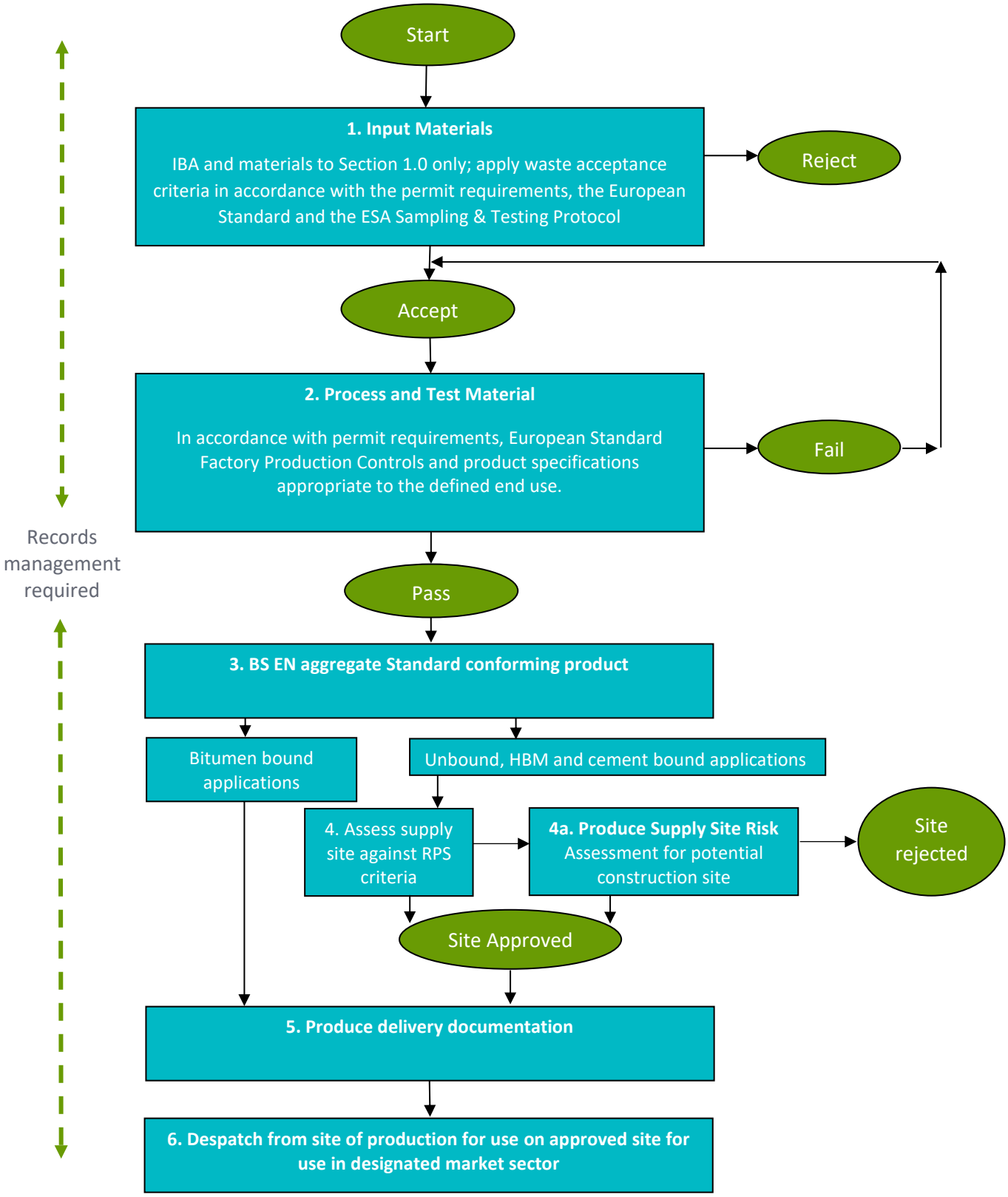
Introduction

The Quality Protocols Project to determine a generic end of waste procedure for aggregates produced from Municipal Solid Waste incinerator bottom ash (IBAA) was unable to achieve its objective for the use of such aggregates in unbound applications due to an unacceptable level of risk to groundwater if that use was uncontrolled. To facilitate the continued use of unbound, hydraulically bound and cement bound IBAA the Environment Agency has continued to provide Regulatory Position Statements detailing criteria for construction applications suitable for IBAA.

This Code of Practice (CoP) for the production and sale of IBAA is modelled on the same procedures as a Quality Protocol for bound and unbound applications with regards to the control of the acceptance of suitable non-hazardous IBA for processing, and quality management to British/European aggregate Standard Factory Production Control requirements, including product sampling and testing. IBAA conforming to this CoP is suitable for use under the relevant Regulatory Position Statement (RPS) for the use of IBAA in construction activities.

Additionally, to address and manage the risk to groundwater for the unbound use of IBAA, the Code of Practice includes an option for robust procedures for a Supply Site Risk Assessment to ensure that unbound IBAA is only supplied to sites without adverse risk to controlled waters in less sensitive geological environments than modelled for the Quality Protocols Project.

Figure 1: Main stages and control mechanisms of the Code of Practice



1.0 Input materials

1.1 Waste Acceptance Criteria

- To ensure only suitable incinerator bottom ash (IBA) can be accepted for treatment, the producer must develop 'acceptance criteria' specific to each site/location. These criteria must be followed at all times.

- The acceptance criteria must incorporate all statutory requirements relating to the receipt of IBA. These requirements include those arising from an environmental permit, or a waste exemption, and the duty of care.

- The acceptance criteria must also include:
  - the type of IBA that is accepted (limited to non-hazardous waste code 19 01 12);
  - source/place of origin of the IBA;
  - supplier and transporting agent (if applicable); and
  - method of acceptance.

- The acceptance criteria must include relevant procedures from the ESA 'Sampling and Testing Protocol' to ensure that only non-hazardous IBA is processed.

- A procedure for dealing with non-conforming incoming IBA must be set up, for example, rejection of loads, or quarantine. Records must be kept of how the procedure has been implemented.

1.2 Natural and Recycled Aggregates

- This CoP is also applicable to IBAA blended with other natural and recycled aggregates to meet a geotechnical specification.

- Non waste natural and recycled aggregates conforming to BS EN 13242 may be incorporated with IBAA to produce a blended aggregate product.

- Blended products must be processed in accordance with section 2 of this Code of Practice.

2.0 Processed in accordance with an approved BS EN aggregates standard including a Factory Production Control system

2.1 The producer must comply with all the requirements of the relevant BS EN aggregates product standard appropriate for the use for which the IBAA is destined, at the time it is produced, to comply with this Code of Practice. Table 1 below details the BS EN aggregates product Standards and the specifications and applications linked to each Standard.

2.2 Producers should be aware that BS EN standards may be subject to regular review and must ensure they comply with the latest revision. Changes to the standards should take immediate and automatic effect.

2.3 Producers must set up and produce the IBAA under a system for Factory Production Control as set out in the BS EN aggregates product Standards (see Appendix A)

2.4 The inspection and testing regime for the production of IBAA is defined within Factory Production Control procedures. Testing of IBAA should be carried out in accordance with the standard and the specified test methods. (see Table 2)

2.5 The IBAA must require no further processing, including size reduction, for the use for which it is destined at the time it is produced to comply with this Code of Practice.

2.6 IBAA shall meet CE conformity marking requirements contained in the Construction Products Regulations, which apply to all aggregates placed on the market to harmonised European Aggregates Standards.

2.6 General points about the Factory Production Control (FPC) procedures:

- An FPC manual must be produced which documents how the FPC is implemented and sets out procedures for establishing the approval, issue, distribution and administration of documentation and data for internal and external use.
- A management representative must be nominated as responsible for ensuring the FPC is implemented.
- The FPC must be reviewed periodically by management to ensure its continuing suitability and effectiveness. Records of such reviews must be kept.

2.8 A third party accreditation system to ISO 9001 or ISO 14001 must be adopted by the ibaa processor to monitor their production control management systems.

Table 1: Standards, specifications and quality controls for the use of bound and unbound IBAA

	Product and Application	Product Standard	Application Specification	Quality controls
1	Unbound IBAA: Pipe bedding	BS EN 13242: Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction	Highways Agency Specification for Highway Works (SHW): Series 500	Evaluation of Conformity and FPC to BS EN 13242 with Level 4 attestation of conformity
2	Unbound IBAA: Granular fill General fill Capping	BS EN 13242: Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction	Highways Agency Specification for Highway Works: Series 600 BS EN 13285: Unbound mixtures: Specifications	Evaluation of Conformity and FPC to BS EN 13242 with Level 4 attestation of conformity
3	Unbound IBAA: sub base	BS EN 13242: Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction	Highways Agency Specification for Highway Works: Series 800 BS EN 13285: Unbound mixtures: Specifications	Evaluation of Conformity and FPC to BS EN 13242 with Level 4 attestation of conformity
5	Bound IBAA: aggregate for concrete	BS EN 12620: Aggregates for concrete	Highways Agency Specification for Highway Works: Series 1000 BS 8500-2: Concrete	Evaluation of Conformity and FPC to BS EN 12620 with Level 4 attestation of conformity
6	Bound IBAA: aggregate for asphalt	BS EN 13043: Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas	Highways Agency Specification for Highway Works: Series 900	Evaluation of Conformity and FPC to BS EN 13043 with attestation of conformity for high safety applications at Level 2+ and for other applications Level 4
7	Bound IBAA: aggregate for hydraulically bound mixtures	BS EN 13242: Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction	Highways Agency Specification for Highway Works: Series 800 BS EN 14227-1,2,3&5 Hydraulically Bound Mixtures: Specifications	Evaluation of Conformity and FPC to BS EN 13242 with Level 4 attestation of conformity

Table 2: Summary of aggregate testing requirements associated with particular end uses and standards (Note: Testing frequencies should be increased where variability is identified through Factory Production Control and where the measured value is close to the specified limit.)

IBAA End Use	Product Standard	Test	BS Test Reference	Minimum test frequency
Unbound applications and HBMs	BS EN 13242	Particle size Distribution Fines content Particle density and water absorption	EN 933-1 EN 933-1 EN 1097-6	1 per week 1 per week 1 per year
Bound applications: aggregates for concrete	BS EN 12620 BS EN 13043	Resistance to fragmentation (Los Angeles Coefficient) Magnesium sulfate soundness	EN 1097-2 EN 1367-2	2 per year 1 per 2 years
Bound applications: aggregates for asphalt		Sulfur containing compounds	EN 1744-1	1 per year

- Tests listed are not exhaustive and reference should be made to relevant standards and specifications for additional requirements.
- Test frequencies are defined in terms of 'production week' or similar and/or 'production day'. These periods should be defined by the producer depending on the throughput of the plant/equipment.
- Production week can be defined as the period of seven consecutive days comprising at least five production days or the period taken to complete five production days, whichever is longer.

3.0 Supply Site Risk Assessment (SSRA) for unbound, hydraulically bound and blended IBAA

3.1 Under this CoP each enquiry to supply IBAA for use in construction will be assessed against the relevant Regulatory Position Statement (RPS). If the conditions of the RPS are met the supply can be made. In other circumstances the supply will be rejected unless it can be shown that IBAA can be used without adverse impact on controlled waters.

Where the conditions of an RPS are not met, IBAA may be supplied to construction sites provided that a SSRA has demonstrated that the use of IBAA does not present an unacceptable risk to controlled waters (surface water and groundwater). This may be the case, for example, where low permeability strata underlie the site and no surface water is at risk.

3.2 The competent person responsible for producing an SSRA must be adequately trained and experienced in the interpretation of (hydro)geological data and in the use of the modelling tools widely used for assessment of risks to controlled waters that are used to support permit applications.

3.3 An audit of a random selection of enquiry decisions will be carried out annually by an independent, third party specialist for each of the IBAA producer sites. The auditor will assess the quality of decisions being made, and make recommendations on further training and development needs if necessary.

3.4 Where an SSRA indicates that the use of unbound IBAA is suitable, and IBAA is supplied, the supplier will maintain a record of the SSRA and the information supporting the decision to supply.

3.5 Each SSRA will be allocated a unique reference number and for approved sites this reference number must be shown on delivery documentation.

4. Documentation required for compliance with the IBAA CoP

IBA processors who choose to use this Code of Practice must be able to demonstrate compliance with its requirements.

4.1 Some of the records specified below may already be required as part of the processor's environmental permit conditions.

4.2 The obligation on processors to comply with their environmental permit conditions is a minimum requirement of this Code of Practice.

4.3 The record-keeping requirements of the Code of Practice are additional to any statutory record-keeping obligations. However, some records may be used to fulfil both a regulatory obligation and to demonstrate compliance with the Code of Practice.

4.4 Records Management

4.4.1 In order to be able to demonstrate compliance with the Code of Practice, processors must retain delivery documentation for every load of IBAA dispatched.

4.4.2 The records must at least include:

- Date of supply;
- Customer's name and contact details
- Delivery site address
- Delivery Site: either:
  - a) conformity to RPS requirements
  - b) SSRA reference number
- Processor's name and contact details (including the address of the processing site);
- Product description to aggregates standard and customer specification;
- Quantity supplied by weight; and
- A statement that the product was produced in compliance with this Code of Practice.

4.5 Retention of Records

4.5.1 For the purposes of this Code of Practice the processor must:

- Keep and retain all the above specified records for a minimum of two years; and
- Make them available for inspection by the regulator (if requested).

4.6 Further Documentation

4.6.1 Where requested by the purchaser further documentation should also include:

- Test results in accordance with the standard or specification in Table 1 and for any further tests required to assess suitability for a particular end use
- Outline details of the Factory Production Control manual; and
- Information on good practice relating to the storage, transportation and handling of ibaa (as set out in Appendix B)

Appendix A

Factory production control from BS EN aggregate product Standards

1.0 General

The producer shall have in place a system of factory production control that complies with the requirements of this clause.

The records held by the producer shall indicate what quality control procedures are in operation during the production of the aggregate.

The performance of the factory production control system shall be assessed according to the principles used in this clause.

NOTE The form of control applied to any aggregate depends upon its intended use and the regulations relating to that use.

2.0 Organisation

2.1 Responsibility and authority

The responsibility, authority and the interrelation between all personnel who manage, perform and check work affecting quality shall be defined, including personnel who need organizational freedom and authority to:

a) initiate action to prevent the occurrence of product non-conformity;

b) identify, record and deal with any product quality deviations.

2.2 Management representative for factory production control

For every aggregate producing plant a person with appropriate authority to ensure that the requirements given in this European Standard are implemented and maintained shall be appointed.

2.3 Management review

The factory production control system adopted to satisfy the requirements of this European Standard shall be audited and reviewed at appropriate intervals by management to ensure its continuing suitability and effectiveness. Records of such reviews shall be maintained.

3.0 Control procedures

3.1 FPC manual

The producer shall establish and maintain a factory production control manual setting out the procedures by which the requirements for factory production control are satisfied.

3.2 Document and data control

Document and data control shall include those documents and data that are relevant to the requirements of this standard covering purchasing, processing, inspection of materials and the factory production control system documents.

A procedure concerning the management of documents and data shall be documented in the production control manual covering procedures and responsibilities for approval, issue, distribution and administration of internal and external documentation and data; and the preparation, issue and recording of changes to documentation.

3.3 Subcontract services

If any part of the operation is sub-contracted by the producer a means of control shall be established. The producer shall retain overall responsibility for any parts of the operation sub-contracted.

3.4 Knowledge of the raw material

There shall be documentation detailing the nature of the raw material, its source and, where appropriate, one or more maps showing the location and extraction plan.

It is the producer's responsibility to ensure that if any dangerous substances are identified their content does not exceed the limits in force according to the provisions valid in the place of use of the aggregate.

Additionally for recycled aggregates there shall be a documented input control of raw material to be recycled.

The input control procedures for recycling should identify:

- nature of the raw material,

- source and place of origin,

- supplier and transporting agent.

3.5 Management of production

The factory production control system shall fulfil the following requirements:

a) There shall be procedures to identify and control the materials;

NOTE: These can include procedures for maintaining and adjusting processing equipment, inspection or testing material sampled during processing, modifying the process during bad weather, etc.

b) There shall be procedures to identify and control hazardous materials identified in 3.4 to ensure that they do not exceed the limits in force according to the provisions valid in the place of use of the aggregate;

c) There shall be procedures to ensure that material is put into stock in a controlled manner and the storage locations and their contents are identified;
d) there shall be procedures to ensure that material taken from stock has not deteriorated in such a way that its conformity is compromised;
e) the product shall be identifiable up to the point of sale as regards source and type.

4.0 Inspection and tests

4.1 General

All the necessary facilities, equipment and trained personnel to perform the required inspections and tests shall be made available.

4.2 Equipment

The producer shall be responsible for the control, calibration and maintenance of inspection, measuring and test equipment.

Accuracy and frequency of calibration shall be in accordance with EN 932-5.

Equipment shall be used in accordance with documented procedures.

Equipment shall be uniquely identified.

Calibration records shall be retained.

4.3 Frequency and location of inspection, sampling and tests

The production control document shall describe the frequency and nature of inspections. The frequency of sampling and the tests when required shall be carried out for the relevant characteristics as specified in Tables 1 and 2. All samples used in factory production control shall be representative of the material in question and shall be taken in accordance with EN 932-1.

NOTE 1 Test frequencies are generally related to periods of production. A period of production is defined as a full week, month or year of production working days.

NOTE 2 The requirements for factory production control can introduce visual inspection. Any deviations indicated by these inspections can lead to increased test frequencies.

NOTE 3 When the measured value is close to a specified limit the frequency may need to be increased.

NOTE 4 Under special conditions the test frequencies can be decreased below those given in Tables 1 and 2. These conditions could be:

a) highly automated production equipment;

b) long-term experience with consistency of special properties;

c) sources of high conformity;

d) running a Quality Management System with exceptional measures for surveillance and monitoring of the production process.

The producer shall prepare a schedule of test frequencies taking into account the minimum requirements of Tables 1 and 2.

Reasons for decreasing the test frequencies shall be stated in the factory production control document.

5.0 Records

The results of factory production control shall be recorded including sampling locations, dates and times and product tested with any other relevant information, e.g. weather conditions.

NOTE 1 Some characteristics can be shared by several products, in which case the producer, based on his experience, can find it possible to apply the results of one test to more than one product. This is particularly the case when a product is the combination of two or more different sizes.

Where the product inspected or tested does conform to the relevant requirement specified in the product standard, or if there is an indication that it will not do so, a note shall be made in the records of the steps taken to deal with the situation.

Example: Such a note could report carrying out of a new test and/or putting in place measures to correct the production process.

The records required by all the clauses of this European Standard shall be included.

The records shall be kept for at least the statutory period.

NOTE 2 Please note the existence of local legislation regarding the length of time that such records are kept for.

“Statutory period” is the period of time records are required to be kept in accordance with regulations applying at the place of production.

6.0 Control of non-conforming product

Following an inspection or test that indicates that a product does not conform to a relevant requirement the affected material shall be:

a) reprocessed; or

b) diverted to another application for which it is suitable; or

c) rejected and marked as non-conforming.

All cases of non-conformity shall be recorded by the producer, investigated and if necessary corrective action shall be taken.

NOTE: Corrective actions can include:

a) investigation of the cause of non-conformity including an examination of the testing procedure and making any necessary adjustments;

b) analysis of processes, operations, quality records, service reports and customer complaints to detect and eliminate potential causes of non-conformity;

c) initiating preventive actions to deal with problems to a level corresponding to the risks encountered;

d) applying controls to ensure that effective corrective actions are taken;

e) implementing and recording changes in procedures resulting from corrective action.

7.0 Handling, storage and conditioning in production areas

The producer shall make the necessary arrangements to maintain the quality of the product during handling and storage.

NOTE These arrangements should take account of the following:

a) contamination of product;

b) segregation;

c) cleanliness of handling equipment and stocking areas.

8.0 Transport and Packaging

8.1 Transport

The producer's factory production control system shall identify the extent of his responsibility in relation to delivery.

NOTE When aggregates are transported in bulk it can be necessary to cover or contain aggregates to reduce contamination.

8.2 Packaging

If aggregates are packaged the methods and materials used shall not contaminate or degrade the aggregate to the extent that the properties are significantly changed before the aggregate is removed from the packaging.

Any precautions necessary to achieve this during handling and storage of the packaged aggregate shall be marked on the packaging or accompanying documents.

9.0 Training of Personnel

Procedures for the training of all personnel involved in the factory production system shall be established and maintained. Appropriate records of training shall be maintained.

Appendix B

Good practice for the transportation, storage and use of IBAA

B1 Pollution prevention and environmental good practice

Follow the pollution prevention guidance developed in partnership with industry to help businesses to prevent pollution.

- Pollution Prevention for Business Guidelines: https://www.gov.uk/guidance/pollution-prevention-for-businesses

B2 Health and safety

- All applications of aggregates should comply with recommendations from the Health and Safety Executive (HSE) such as using appropriate personal protective equipment (PPE) and dust suppression measures.

B3 Transportation, storage and handling

As with all aggregates;

- IBAA should be handled and stored and transported to minimise the creation of airborne dust.
- Engineering control measures such as sprays or other suppression means should be used where there is a risk of airborne dust creation.
- Open conveyor handling systems should be provided with wind boards or other protection to prevent wind-whipping.
- Manual handling of the IBAA should be minimised through the use of mechanical aids wherever possible. Account should be taken of the Manual Handling Regulations and care should be taken when lifting by hand.
- Dust and fine particles should be prevented from entering watercourses and drains. Deposition of dust on vegetation and surrounding property should be avoided by controlling the release of dust at source.