Chapter 8

Bitumen – Natural and Rock

The terms bitumen and asphalt are interchangeable and both refer to black or dark-coloured solids or very thick liquids that have been distilled from crude oil. The distillation process may occur within a refinery, resulting in processed bitumen/asphalt. It may also happen naturally, either when crude oil is exposed to heating and/or biological activity within the deposit, or when it undergoes weathering at or near the earth’s surface. Either way, the distillation process separates the heavy molecular weight hydrocarbons, such as bitumen, from the lighter ones, such as methane and petroleum products.

Bitumen is extensively used in roadway construction as a ‘glue’ or binder in the production of asphalt concrete. To produce asphalt concrete, the sticky bitumen is heated and mixed with aggregates, such as rock chips, and it is then laid and rolled to form the road surface. Asphalt/bitumen may also be referred to as ‘tar’ or ‘pitch’. These liquid bitumens, or ‘natural’ bitumens, are carried in tankers.

8.1 Bitumen Rock

With the need to heat bitumen to enable mixing with aggregates during road construction, some companies have decided to exploit alternatives to refined
bitumen. One alternative is utilisation of natural asphalt/bitumen deposits where the ‘glue’ is already mixed into the rocks.

At Buton Island in South-East Sulawesi, Indonesia, natural bitumen/asphalt is found at the surface in association with limestone. These deposits are locally referred to as Aspal Buton or asbuton rock asphalt and can be utilised directly (or mixed with traditional roading materials but with much less processing). This avoids the need for excessive heating of the bitumen to enable its mixing with aggregates during road construction. While the Indonesian deposits have been known since 1920, and it is estimated there are 300 million tonnes available, it is only recently that they have been extensively exploited and offered for shipment.

The asbuton deposits consist of about 20 to 30% bitumen/asphalt integrated into about 70 to 80% limestone and can be divided into several types, based on their physical characteristics. The two main deposits currently being exploited are:

- Kabungka (since 1980) – these are hard deposits (the softening point is about 100°C) with relatively low asphalt content. They break easily when crushed but do not release the asphalt without extensive heating
- Lawele (since 2003) – these are soft deposits (the softening point is about 60°C) with relatively high asphalt content. They require slightly lower temperatures and readily deform during processing, such that the asphalt coats the grains of limestone. This makes the grains better able to stick to other aggregates during the production of asphalt concrete. This variety is the main variety being exported to date.

Figure 8.1: Bitumen rock.
When asbuton rock asphalt is dried and crushed to form a granular material, it is referred to as Buton Rock Asphalt (BRA), and it is this name that may be included on cargo documents when the product is presented for ocean carriage in bulk. Shippers may also refer to the product using the name of the source and then add BRA, for example ‘Lawele BRA’. Alternatively, they may simply describe it by the general name ‘natural bitumen/asphalt’.

![Figure 8.2: This cargo is often loaded from barges.](image)

### 8.2 Application of the IMSBC Code (Reference 17)

Shippers tend to describe their cargo with respect to its intended use, so bitumen rock may be described as ‘natural bitumen’. This may cause shipowners, charterers of bulk carriers and P&I Clubs to query the nature of the cargo because natural bitumen is a product carried in a tanker. Even more confusing, it appears that this product is more than 50% ‘rock’, which means it would be a solid cargo. All this tends to ring alarm bells with owners and P&I Clubs.

Natural bitumen/asphalt or bitumen/asphalt rock is not listed in Appendix 1 (the individual schedules section) of the *International Maritime Solid Bulk Cargoes Code* (IMSBC Code), but advice is to treat this cargo like any other bulk cargo that is not listed in Appendix 1.

The IMSBC Code makes provision for the carriage of new and unlisted cargoes in Section 1.3. This section describes the processes shippers should undertake to gain certification from the load port competent authority (CA). IMO Circular MSC.1/Circ.1453/Rev.1 details guidelines for dealing
with cargoes not listed in the Code and assists with implementation of the requirements of the IMSBC Code. This circular may be found in the Supplement to the IMSBC Code, 2016 (Reference 17).

Section 1.3 of the IMSBC Code states that, for any bulk cargo not listed in Appendix 1, the shipper must provide the IMO CA of the load port with details of the cargo characteristics and properties prior to loading. Based on this information, the CA of the load port will assess the acceptability of the proposed cargo for safe shipment.

- If no specific hazards are identified, the load port CA can authorise shipment, and the flag state CA and disport state CA should be informed of this authorisation.
- If hazards have been identified by the load port CA, the flag state CA and disport state CA should confer to agree the appropriate carriage conditions.

In either case, the load port CA should provide to the Master a certificate that states the cargo characteristics and required conditions for carriage and handling. Cargoes that are not listed in the IMSBC Code and non-IMSBC Code cargoes without a CA certificate should not be accepted.

To complete the procedures for dealing with unlisted cargoes, the IMO requires the CA of the load port to submit an application to the Organization, within one year from the issue of the certificate, to incorporate the new solid bulk cargo into Appendix 1 of the IMSBC Code. This mandatory requirement is detailed in Section 1.3.2 of the IMSBC Code, with the format covered in Section 1.3.3.

One of the major problems is that not every state that ships this type of product actually has a CA. Shipowners are advised not to carry insufficiently certified bulk cargoes.