

# Safety Alert

SA 010

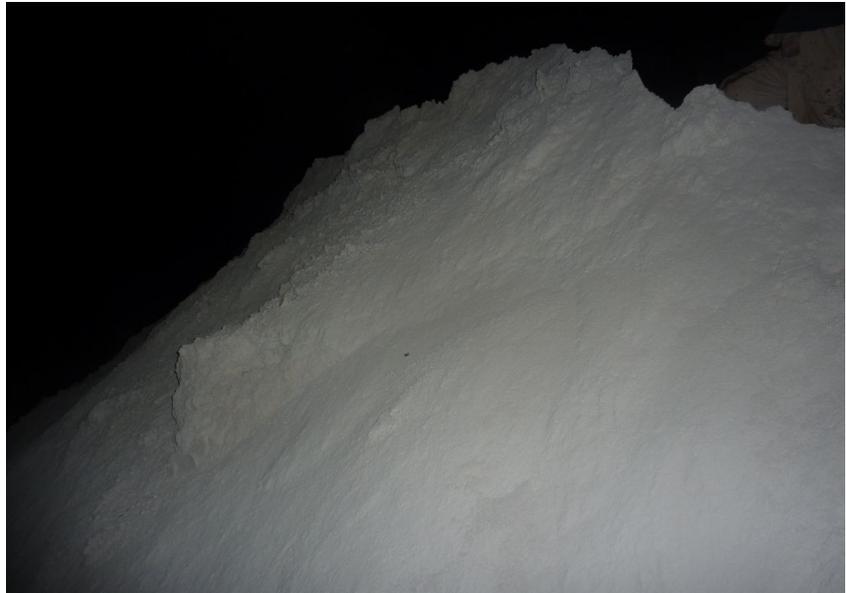
## Barytes - Danger of Liquefaction

A Member's vessel recently called at a port in China to load a cargo of barytes. Barytes (which may also be described as barites or barium sulphate) is a principal source of barium and is commonly used in drilling operations. The International Maritime Solid Bulk Cargoes (IMSBC) Code classifies barytes as Group C which applies to cargoes which are not liable to liquefy and do not possess chemical hazards. The IMSBC Code also describes barytes as having a particle size of "80% lumps: 6.4mm to 101.6mm, 20% fines: less than 6.4mm".

The shipper provided cargo documentation for two separate parcels, "Drilling Grade Barite" and "Floatation Chemical Grade Barite". However, contrary to the requirements of the IMSBC Code, neither declaration specified the applicable cargo Group.

On arrival the "Drilling Grade Barite" was found to consist of predominantly medium to large grey lumps, broadly as described in the IMSBC Code. Conversely, the "Floatation Chemical Grade Barite" proved to be a fine white powder which appeared to be damp. The Master decided to carry out can tests on samples of the latter in accordance with Section 8.4 of the IMSBC Code which indicated that the "Floatation Chemical Grade Barite" had the propensity to liquefy.

Although the shipper's declaration failed to state the cargo Group,



**Floatation Chemical Grade Barites** (Courtesy: Brookes Bell)



**Drilling Grade Barites in Lump Form** (Courtesy: Brookes Bell)

# Barytes - Danger of Liquefaction



**Collapse of Flootation Chemical Grade Barites below the Flow Moisture Point (FMP)** (Courtesy: Brookes Bell)



**Liquefaction of Flootation Chemical Grade Barites above the Flow Moisture Point (FMP)** (Courtesy: Brookes Bell)

reference was made to the product having a moisture content of 6.6% and a Transportable Moisture Limit (TML) of 6.86%. This signified that the "Flootation Chemical Grade Barite" was a Group A cargo as it is not possible to obtain a TML in the case of Group C cargoes. However, the test for moisture content had not been carried out within 7 days of loading, contrary to the requirements of the IMSBC Code.

A local surveyor and an expert were appointed to assist the master, and samples of the "Flootation Chemical Grade Barite" were sent to an independent laboratory for analysis. The test results confirmed that the parcel was indeed Group A and indicated that the TML and moisture content figures provided by the shipper were accurate. However, since the moisture content was very close to the TML, the moisture content of

the cargo was monitored very closely throughout loading.

When the samples were tested by the independent laboratory, the appearance and flow properties of the cargo were found to be closely similar to those of fluorspar. As with fluorspar, there was a sharp transition between "no flow" and "flow" states, and once the Flow Moisture Point (FMP) was exceeded by even a relatively small amount, the sample flattened and spread greatly. This suggests that, as in fluorspar, liquefaction may occur rapidly and without warning if the cargo is loaded too wet, by even a relatively small margin.

In view of the above, Members who may be offered a cargo of barytes/ barites should ensure that the shippers provide the necessary cargo declaration beforehand which clearly states the cargo Group. The main indicator that a barytes cargo

may be prone to liquefaction is the particle size, therefore when the cargo consists either mostly or exclusively of fine particles it is likely that the material is a Group A cargo. Although in this case "Drilling Grade Barite" was presented for shipment in lump form, the product is eventually ground down for use in drilling, and may be presented for shipment as fine particles.

The IMSBC Code schedule for "Mineral Concentrates" should be followed if:

- The cargo is declared as being Group A, or
- The cargo declaration includes details of TML and moisture content, or
- The cargo description contain any of the following words: "Flotation", "Flootation", "Concentrate", "Ground" or "Powder", or
- Samples of the cargo exhibit signs of free moisture or fluid conditions following can tests, or
- The cargo consists either mostly or exclusively of fine particles

In such an event, all IMSBC Code requirements for cargoes which may liquefy should be observed and loading should not commence until the shipper has provided the vessel with a valid test certificate stating the moisture content and TML. The moisture content must be determined not more than seven days prior to loading (and repeated if significant rain is experienced between testing and loading) and must be lower than the TML. Regular can tests should also be carried out. However, the suitability of the cargo for safe shipment must not be based on the results of can tests alone. If the shipper fails to provide the required cargo documentation prior to loading or if any concerns arise regarding the condition of the cargo, the Club should be contacted immediately as expert advice may be required.

Although China is the world's foremost producer of barytes, all vessels scheduled to load this product are advised to follow these recommendations regardless of location.

Members requiring further guidance should contact the Loss Prevention department.