Insight Article

Bauxite liquefaction risk in Guyana

A vessel loading a cargo of cement grade bauxite at Linden in Guyana, arrived at the discharge port in the US with parts of the cargo consisting of fine particles showing significant signs of high moisture content.

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A Gard Member recently experienced an incident of cargo failure involving Bauxite loaded in Guyana. The cargo was declared as Group C in the shipper's declaration. The vessel arrived at the port of discharge in the US with one cargo hold showing significant liquefaction.

The bauxite cargo was showing serious signs of instability when loaded at Linden, Guyana. When the vessel arrived at the discharge port in North America, the cargo in one hold had flattened into a fluid state. The cargo consisted of fine particles and showed significant signs of high moisture content. The cargo was described as "cement grade bauxite", which is a fine grained washed by-product used in cement production.

As Gard reported in January 2021 , following the tragic 2015 loss of the *Bulk Jupiter* and 18 of her crew, IMO acknowledged that bauxite cargoes may suffer instability due to an elevated moisture content. As such, the IMSBC Code individual schedule for bauxite was recently revised and the revised schedule entered into force on 1 January 2021. The individual schedule for bauxite now includes a Group A category for bauxite fines meant for fine-particulate cargoes liable to liquefy or experience dynamic separation.

The cargo in this case was declared as Group C despite apparently consisting of primarily sand sized particles with a high proportion of silt and clay size fractions. The declaration also listed a Transportable Moisture Limit (TML) of 10%. The TML for Bauxite Fines (using the Modified Proctor/Fagerberg test procedure) is calculated as the critical water content at either 80% or 70% saturation, subject to determining the point at which a material is approaching full saturation, known as the optimum moisture point (OMC). There is no flow moisture point (FMP) determination using this TML test method.

Any cargo that has an inherent propensity to retain moisture and reach a point of saturation will demonstrate an FMP/TML if tested correctly. These cargoes can, by definition, "flow" like a viscous fluid and should be classified as a Group A cargo. No testing certificates were provided in the recent Guyana case.

Local conditions

Gard's local correspondent Cariconsult has advised that there are no independent testing facilities for moisture content and no Competent Authority in the region with the requisite skills to assess the suitability of a cargo for safe shipment, which makes independent confirmation by ship's interests difficult and time-consuming. Therefore "can tests" are frequently performed as a check test prior to and during loading. It is critical to remember that can tests cannot confirm if a cargo is safe; they can only give an indication that a cargo may be unsafe and additional laboratory testing is required before the cargo is accepted for loading. Gard has been advised by materials experts Roxburgh that fine particulate bauxite, when approaching the point of saturation, will have a natural tendency to retain water. As such, a can test that does not expel water is unlikely to raise any concerns for a ship's Master, even when the cargo is potentially dangerously unsafe.

Seasonal rains in Guyana have only made the situation more precarious. Guyana has traditionally had two well-defined rainy seasons in December/January and again in May/June. These seasons have become less predictable recently, and this year the

country has had almost continuous rainfall since December 2020. The rain showers are frequent and usually very heavy, and come with little warning, giving crews insufficient time to respond with the closing of hatch covers. Bulk carriers with chain-pull hatch covers are not recommended during the rainy season.

Recommendations

Shipowners are advised to consider the following when loading bauxite in Guyana:

• Bauxite that is primarily a fine-particulate composition (appearance similar to a silty sand) should be assumed to be Group A unless proven otherwise by independent testing and reflected as such in the cargo declaration.

• Group A cargoes must be accompanied by a TML and moisture content test certificate that should reference the specific IMSBC Code test method and/or ISO standard employed.

• Moisture content must be tested within seven days of loading or any time there is a change in moisture condition such as rain.

• Sampling and testing for moisture content must be representative of the cargo as a whole and declared as an average of the cargo. Any variability in the composition of the cargo, finer and/or wetter portions for example, should be sampled and tested for moisture content separately and clearly documented on the Shipper's Declaration on a hold-by-hold basis.

• Any anomalies in the cargo declarations and test certificates should be questioned and brought to the attention of the Club. Red flags include fine particles cargo declared as Group C, Group C cargo with a TML listed, and moisture certificates dated more than seven days before loading.

• The cargo should not be loaded during rain and hatch covers should be closed during rain waiting periods if partially loaded

• Certain bauxites, such as the low grade washed by-product fines in Guyana, retain moisture remarkably well when increasingly saturated. This means that when a can test is performed on moist material there may be no free moisture visible. This is not a sign the cargo is safe to load.

Gard encourages its Members to have a low threshold for contacting the Club if they are fixed or are considering fixing a bauxite cargo from Guyana, and alert the Club if there are any signs of misdeclaration, fine grained or overly wet cargo. Owners should use caution and be familiar with the IMSBC Code requirements and loss prevention materials.

Gard Loss Prevention material on bauxite:

Bauxite – new Group A and revised Group C IMSBC Code schedules are now mandatory

Dynamic separation in Group A bauxite cargoes

Update on Group A bauxite that can cause vessel instability

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