



SUB-COMMITTEE ON DANGEROUS
GOODS, SOLID CARGOES AND
CONTAINERS
13th session
Agenda item 4

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AMENDMENTS TO THE IMSBC CODE, INCLUDING EVALUATION OF PROPERTIES OF SOLID BULK CARGOES

Direct Reduced Iron (DRI)

Submitted by INTERGARGO and the International Group of P&I Associations

SUMMARY

<i>Executive summary:</i>	This document details INTERCARGO's and the International Group of P&I Associations' (IG) research into the hazards associated with the carriage of Direct Reduced Iron (DRI)
<i>Strategic direction:</i>	5.2
<i>High-level action:</i>	5.2.3
<i>Planned output:</i>	5.2.3.1
<i>Action to be taken:</i>	Paragraph 9
<i>Related documents:</i>	DSC 12/4/14 and DSC 13/4/1

Introduction

1 Further to submissions made by the Republic of the Marshall Islands, Malta and INTERCARGO to the work of DSC 12 and the subsequent report of the correspondence group established at that meeting (DSC 13/4/1), further concerns from the shipping industry are evidenced below, strongly suggesting that the "Safety First" approach of the Sub-Committee including the inerting of DRI (C) is the only feasible solution for safe carriage.

2 This paper also evidences further examples of previously unpublished DRI-related incidents additional to those mentioned in the formal correspondence group report (DSC 13/4/1).

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Shipping industry experiences

3 A survey of INTERCARGO's shipowning members taken in June 2008 and separately the 13 P&I Club members of the IG gives a broad indication of the general concerns that owners and masters have with this commodity. These concerns have increased significantly since the loss of life on the **Ythan** and in respect of the **Adamandas**.

% of owners who have NOT carried DRI since 1.1.2005	95 %
% of owners prohibiting carriage of DRI through Charterparty clauses	86 %
% owners supporting tougher stance including inerting DRI C	89 %

Sample size – 37 owners, representing 339 Bulk Carriers

4 Those INTERCARGO members that have carried this commodity in the recent past have done so only with recourse to the conditions laid down in the BC Code supplemented by information from technical experts and competent authorities of the countries exporting DRI. Of particular concern are the differing standards of shore-based operational competency.

Shipping industry experiences – generic

5 In respect of the competence required to make informed choices about whether to accept or reject a DRI shipment, given that Masters are not trained to make choices taking into account the scientific analysis or sampling techniques of chemical properties, it is clear that such responsibilities must remain with the cargo interests and the Competent Authorities of the country of loading, complementing clear safety guidance in the IMSBC Code.

6 The following arguments have also been evidenced as generic issues of great concern to the shipping industry:

- .1 uncertain, misdeclared or unscientific cargo description with adverse parallels drawn between rigorous scientific names used for packaged dangerous goods and occasionally ill-defined nomenclature including *ad hoc* regional definitions such as “Indian Sponge Iron” create confusion and potential hazards;
- .2 the problems when two or more stems of cargo are blended (or co-loaded), creating in some circumstances, a product with different chemical characteristics and a higher proportion of hazardous fines than the original sampling and shipment note referenced;
- .3 an assumption that Masters and/or chartering departments are fully aware of subtle scientific differences between the types of DRI;
- .4 unclear responsibilities of shippers/Competent Authorities, together with a total ship-side reliance on sampling techniques;
- .5 in some cases, a variance between the scientifically stated characteristics of the commodity given by the shipper/Competent Authority prior to loading and the proven performance on board; and

- .6 in some cases, irrespective of the professionalism of owners who currently carry DRI, lessons learnt from the incidents listed in annex 1 suggest that DRI should always be carried under the most exacting conditions utilising the most stringent risk-reduction measures available.

Shipping industry experiences – specific

7 The primary concern expressed in feedback from the industry and evidenced in unpublished accident reports is whether DRI (C) grade material should be carried in conditions of inerting or ventilation.

8 INTERCARGO and the IG believe that the evidence suggests that inerting is the only conceivable option for DRI (C), a product with more hazardous characteristics than DRI (B). In support of this view, it is noted that:

- .1 of the two options mentioned in the **Ythan** Casualty Report, paragraph 5.2 notes, *inter alia*, that “forced ventilation may contribute to or exacerbate such [unsafe] conditions”;
- .2 also in the **Ythan** report, it is suggested in paragraph 5.4 that “forced ventilation is another solution “... provided that the fan drives are intrinsically safe”. It should be noted that natural or forced ventilation will deliver moist salt laden air to the cargo holds. The resulting condensation on the hold structures will create a reaction of DRI with salt water, releasing hydrogen and initiating heating of the DRI. This element of risk can be removed if inerting is used.

In document DSC 12/INF.5 it is accepted that finely divided DRI (C) is more reactive than DRI (B). Further, with regard to ventilation, under paragraph 10.3 it states “(d) some kind of filters should be installed in the ducts in order to “dry” the salty air that may ingress into the holds” and “(e) some kind of “water traps” should be installed in the ducts to avoid ingress of water into the holds during ventilation, particularly under rough sea conditions”. The co-sponsors assert that these are impractical aspirations, rather than realistic measures that could be effectively employed in practice; and that in line with a safety first approach the salty moist air should not be introduced to the hold in the first instance (in concurrence with paragraph 10.4.2 of DSC 12/INF.5 “The utmost important rule is not to let either fresh or sea water get inside the cargo holds”); and

- .3 finally, and again with the evidence of the **Ythan** in mind, it must be remarked that an accident with loss of life occurred after the hatch covers were partially opened – an extreme ventilation option.

In summary, all of these points suggest the most exacting risk reduction measure should be used during the carriage of DRI (C) – that is, by the inerting of cargo holds.

Action requested of the Sub-Committee

9 The Sub-Committee is invited to note the information provided and to take action as appropriate.

ANNEX

**TABLE OF PREVIOUSLY PUBLISHED INCIDENTS, UNPUBLISHED INCIDENTS
AND CONNECTIVITY WITH DISCUSSIONS ON THE DRAFT SCHEDULES**

Incident details	Outcome	Conclusion and implications for schedules
Name not published, DRI ex Russia Black Sea / Ukrainian port	Fires	Became wetted with seawater – passivation does not work in these conditions; nor is a dispensation on the grounds of short-voyages logical
Karteria , 1999	2 seafarers killed, 1 seriously injured	Explosion in cargo holds. Uncertain form of DRI
Otello Manship , 2001	Overheating after wetting	
Federal Maas , 2002	Fire	Build up of fines under loading belt
Cargo Enterprise , 2002	Overheating	
Blumarlin , 2003	Explosion	Auto-ignition
California , 2003		Explosion in 4 holds, injuries
Adamandas , 2003	Temperature rose and vessel scuttled by the French authorities	Under investigation
Ythan , 2004	Six deaths in an explosion. Vessel sank	Crew had no access to shoreside loading material
Sea Cresta , 2004	Fire on Board	
Capaz Duckling , 2004	Explosion on board vessel. Serious injuries suffered by a number of crewmen	
Swift Fair		Excessive generation of hydrogen
Post 2005; unpublished data – vessel not identified	Additional hydrogen generation	Charterers and Competent Authority did not anticipate the chemical reaction which occurred
Others		
Lake Erie , 2005		Auto-ignition during discharge
Mare , 2007		Explosion, spontaneous ignition
Tiger , 2007		Auto-ignition
Sea Pearl , 2008, disch : Charleston	DRI (B) – overheated; fire in holds. Temperature rose to over 900° C. Fire started when hatches opened at discharge port.	Alleged that commodities from different producers had been mixed to fulfill shipment and monitoring problems encountered