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**COMMITTEE OF EXPERTS ON THE TRANSPORT OF
DANGEROUS GOODS AND ON THE GLOBALLY
HARMONIZED SYSTEM OF CLASSIFICATION
AND LABELLING OF CHEMICALS**

Sub-Committee of Experts on the
Transport of Dangerous Goods

Thirty-fourth session
Geneva, 1-9 December 2008
Item 4 of the provisional agenda

LISTING, CLASSIFICATION AND PACKING

Classification of Sour Crude

Transmitted by the Dangerous Goods Advisory Council¹

1. At its thirty-third session, the Sub-Committee provisionally adopted, on the basis of a proposal by Canada in ST/SG/AC.10/C.3/2008/12, two new proper shipping names for sour crude oil (UN 3494 and UN 3495; see changes to Part 3 in Annex 1 of ST/SG/AC.10/C.3/66/Add.1). These new proper shipping names are intended to communicate a toxicity hazard due to the presence of hydrogen sulphide (H₂S).

2. The Dangerous Goods Advisory Council (DGAC) appreciates the effort by Canada to communicate the risks posed by sour crude but would ask the Sub-Committee to reconsider the adopted proper shipping names in the light of the discussion that follows.

¹ In accordance with the programme of work of the Sub-Committee for 2007-2008 approved by the Committee at its third session (refer to ST/SG/AC.10/C.3/60 para. 100 and ST/SG/AC.10/34, para. 14).

Background

3. Sulphur is a common element in crude oil when extracted from the earth and is largely present in complex organic molecules. Hydrogen sulphide is produced in crude oil by sulphate-reducing bacteria unintentionally introduced during or after extraction. The evolution of H₂S from the breakdown of sulphur compounds in crude oil depends on the complex interaction of a number of physical and chemical factors including the nature of the sulphur-containing compounds, the extent to which bacteria are present, the temperature of the lading, the duration of the transport journey, and transport conditions which affect the extent to which oxygen is dissolved in the crude oil, including the type of packaging used, the packaging's liquid surface area, and the amount of sloshing that takes place in transport. Given these variables it should be recognized that even crude oils that contain high concentrations of sulphur compounds may not generate dangerous levels of H₂S under conditions of transport and conversely some "sweet" crudes may produce high concentrations of H₂S under "favourable" conditions. Classification of any one crude oil formulation as a Division 6.1 substance, as suggested by the newly adopted proper shipping names, would have to take into account the intended transport conditions. Clearly, such a classification would not be on the basis of "intrinsic properties" as specified by the GHS.

4. The toxicity hazard posed by crude oil is not like that of other substances that are classified as having an inhalation toxicity hazard and the presence of a toxic placard may provide emergency responders an erroneous indication of the hazard they are dealing with in the event of an incident. The hazard of crude oil is first and foremost flammability - even for crude oils which produce H₂S. The H₂S evolution rate in sour crudes is relatively slow and in an incident in which a transport vehicle containing crude oil is breached, the H₂S vapour concentration is only likely to be high in the immediate vicinity of the tank opening immediately after rupture. This H₂S released from the headspace of a tank will rapidly dissipate and thereafter the H₂S evolution rate will be dependent on the rate at which bacteria produce H₂S in the crude oil and the rate at which it is released into the atmosphere. If such a tank were to bear a toxic placard, it would likely erroneously signal the possibility of a large toxic vapour cloud, distracting emergency responders from addressing the real flammability risks.

5. In summary, DGAC's concern with the addition of the new proper shipping name entries for sour crude oil are as follows:

- (a) Whether a crude oil, even a sour crude oil, will produce "hydrogen sulphide in sufficient concentration to produce... an inhalation hazard" as suggested by the provisionally adopted SP 343 will depend on transport conditions not necessarily known to the consignor.
- (b) It is not possible to use existing UN classification criteria for division 6.1 in classifying crude oils as inhalation hazard substances. The saturated vapor concentration from liquid crude oil will not predict the H₂S concentration in the headspace during transport. Hence, there is no way to determine the packing group or the primary hazard.

- (c) There is a real potential for miscommunicating the hazard of some crude oils to emergency responders in the event of an incident. Noting a Division 6.1 placard, emergency responders may be inclined, as a first priority, to initiate procedures to mitigate a toxic hazard that has dissipated long before their arrival on-scene.
- (d) Exposure to high concentrations of H₂S is most likely when the tank is opened and as such the concern raised by Canada is more of a work place hazard than a transport hazard and it may be more appropriate to refer this issue to the GHS Subcommittee for consideration on how such a hazard should be taken into account. In fact evolution of H₂S is not unique to crude oil. The problem is common for wastes which contain sulphur compounds and even for well water when the water has a high sulphur content. In addition there are other petroleum products that pose similar risks.
- (e) DGAC notes that the concern raised by Canada is largely limited to large transport units such as tank trucks which are used to move crude oil recovered from wells to processing plants. Such transport does not normally involve international transport. Nevertheless, the new proper shipping names have the potential of jeopardizing oil exploration activities such as the transport of crude oil samples taken from wells for analysis where samples may need to be transported internationally by air.

Proposal

6. DGAC recommends that in place of the provisionally adopted UN3494 and 3495 proper shipping names provided in the annex to the report of the 33rd session, the Subcommittee adopt the following new special provision against UN 1267, Petroleum Crude Oil:

XXX –For a crude oil with the potential of evolving dangerous concentrations of hydrogen sulphide in the vapour space of a transport packaging with a capacity of more than 3000 litres, the following statement shall be entered on a transport document

“This package may contain a dangerous concentration of hydrogen sulphide gas in the vapour space. Respiratory protection should be worn when opening the package.”
