TP 5761 E

Canadian Code of

Safe Practice for

Solid Bulk Cargoes

FOREWORD

Millions of tonnes of solid bulk cargoes are shipped every year across the world's oceans. While the vast majority of these shipments are made without incident, there have unfortunately been serious casualties that resulted not only in the loss of ships, but also in loss of life.

This revised Code is intended to set a standard for the safe stowage and carriage of solid bulk cargoes, excluding grain which is dealt with under the *Grain Cargo Regulations*. It supersedes the Canadian Code of Safe Practice for Solid Bulk Cargoes 1984, and hereby incorporates all the recommendations contained in the latest edition of the **International Maritime organization (IMO) Code of Safe Practice for Solid Bulk Cargoes BC Code**, together with specific Canadian requirements especially as regards concentrates.

This revised Code is a recommended guide for shipowners, shippers and masters and shall apply to all shipments of bulk cargoes to which the relevant sections of the Canada Shipping Act apply, as well as the Act respecting the offices of Port Wardens in Quebec. It sets the standards of "approved practice" and "proper stowage' as envisaged by these Acts.

The list of products appearing in the Appendices of the BC Code, however, is by no means exhaustive. Consequently, before any bulk cargo is loaded, it is essential to ascertain (normally from the shipper) the current physical and chemical properties of the cargo, this is also now required in IMO SOLAS Chapter VI.

This revised code has been prepared to be used in conjunction with the IMO BC Code, in order to avoid duplication where possible, and to facilitate its use by industry. The material contained in the addendum, although not considered part of this Code, has been included for reference as well for the above reason.

Individuals and organizations who feel that their acquaintance and experience with solid bulk cargoes may be of specific value, and could contribute to a general knowledge of the subject, are cordially invited to contribute their opinions to the Ship Safety Branch of the Canadian Coast Guard. Information relating to bulk cargoes that have proven hazardous is particularly welcome.

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SECTION 1 - SAFETY OF PERSONNEL

1.1 General requirements

1.1.1 Before and during loading, transport and unloading of bulk cargoes, all necessary safety precautions including any regulations or requirements should be observed, including the following:

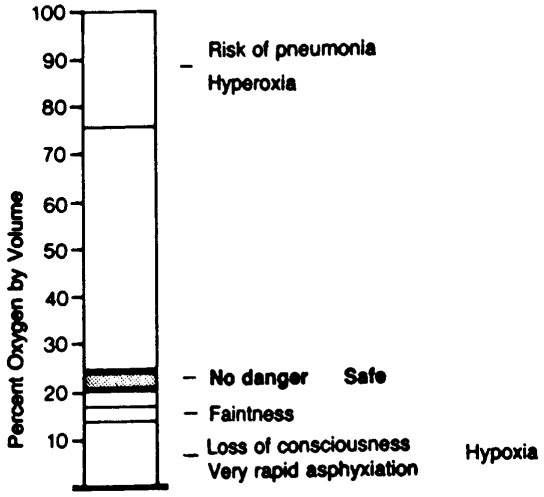
1. Dangerous Bulk Material Regulations
2. Safe Working Practices Regulations
3. International Maritime Dangerous Goods Code (IMDG Code)
4. Emergency Procedures For Ships Carrying Dangerous Goods
5. Medical First Aid Guide for Use in Accidents Involving Goods (MFAG)
6. IMO BC Code - Code of Safe Practice for Solid Bulk Cargoes
7. Notice to Shipmasters Loading Coal (TP 10944E)

1.2 Poisoning and asphyxiation hazards

1.2.1 Certain bulk cargoes are liable to oxidation, which in t urn may result in oxygen depletion, emission of toxic fumes and self-heating. Other bulk cargoes may not oxidize but may emit toxic fumes.

1.2.2 It is important therefore that the shipper inform the master before loading of the existence of any chemical hazards. The master should refer to **Appendix B of the BC Code** and take the necessary precautions, especially those pertaining to ventilation.

1.2.3 Ships' masters are warned that cargo spaces and adjacent spaces may be depleted of oxygen or may contain toxic or asphyxiating gases. This may be due to oxidation, other chemical reactions or the evolution of contained gases. An empty cargo space that has remained closed for some time may have insufficient oxygen to support life. Oxygen accounts for 21% by volume of the air we breathe, the remainder consisting of nitrogen, argon, etc. Entry into a space without self-contained breathing apparatus should not be permitted unless there is a minimum of 20% and a maximum of 23% oxygen present. Serious consequences can result from entry into oxygen-depleted atmospheres (less than 17% oxygen by volume), and death by asphyxiation can result if the oxygen content becomes excessively low (less than 12% by volume) . The following table summarized the physiology of oxygen at atmospheric pressure.



This table should be treated cautiously as the limits vary for different individuals.

1.2.4 Unless adequate ventilation and air circulation throughout the free space above the cargo have been effected, personnel should not be permitted entry until tests have been carried out, and it has been established that the oxygen content has been restored to normal levels throughout the space and that no toxic gas is present. Instruments are available to determine the degree to which cargo spaces may be depleted in oxygen content or may contain toxic or asphyxiating gases. Some measure oxygen content only, whereas others can measure both oxygen and combustible gas levels. Most toxic gas concentrations are determined using a specific instrument as the gas type must be known and matched with an appropriate detector tube. A competent authority must have approved any instrument used. (See also requirements in Regulation 3, SOLAS Chapter VI)

1.2.5 Certain cargoes may emit toxic gases when wetted. In these cases the ship should be provided with the appropriate gas detection equipment (see 1.2.4).

1.2.6 A flammable gas detector is only suitable for testing the explosive nature of gas mixtures.

1.2.7 Emergency entry into a cargo space should be undertaken only by trained personnel wearing self-contained breathing apparatus, and protective clothing if considered necessary, always under the supervision of a responsible officer.

1.2.8 In the event of emergency entry into a cargo space, in addition to the requirement in 1.2.4, spare self-contained breathing apparatus, safety belts and safety lines should be readily available.

1.2.9 For entry into enclosed spaces safety procedures, refer to **Appendix F of the BC Code.**

1.3 Health hazard from dust

1.3.1 To minimize the chronic risks from exposure to the dust of certain materials carried in bulk, a high standard of personal hygiene for those exposed to the dust cannot be too strongly emphasized. The precautions should include not only the use of appropriate protective clothing and barrier creams when needed but also adequate personal washing especially before meals, and laundering of outer clothing. Although these precautions are good standard practice, they are particularly relevant in the presence of those materials identified as toxic by the BC Code.

1.4 Flammable atmosphere

1.4.1 Dust created by certain cargoes my constitute an explosion hazard, especially, during loading, unloading and cleaning. This risk can be minimized at such times by ensuring that ventilation is sufficient to prevent the formation of a dustladen atmosphere and by hosing down rather than sweeping.

1.4.2 Some cargoes may emit flammable gases in sufficient quantities to constitute a fire explosion hazard. Where this is indicated in the entries in **Appendix B of the BC Code**, the cargo spaces and adjacent enclosed spaces should be effectively ventilated at all times. It may be necessary to use combustible gas indicators to monitor the atmosphere in such spaces. In general, combustible gas measuring instruments are not suitable for checking an atmosphere for the presence of toxic gases.

1.5 Ventilation systems

1.5.1 Where cargoes are carried that may emit toxic or flammable gases, the cargo spaces should be provided with effective ventilation.

1.6 See also section of the BC Code - Safety of personnel and ship.

1.7 Grain under fumigation

1.7.1 In-transit fumigation of grain cargoes is not permitted on ships registered in Canada.

1.7.2 For in-transit fumigation of grain cargoes, refer to the Canadian fumigation Regulations. These Regulations are based on the IMO Recommendations on the Safe Use of Pesticides in ships.

1.7.3 A copy of these Recommendations for use by ships, personnel shall be on board each ship undergoing in transit fumigation.

SECTION 2 - CARGOES THAT MAY LIQUEFY

2.1 See also section 7 of the BC Code.

2.2 Properties, characteristics and hazards

2.2.1 Cargoes that may liquefy include concentrates, certain coals and other materials having similar physical properties. **Appendix A of the BC Code** contains a list of such cargoes, which generally consist of a mixture of small particles in contrast with natural ores that include a considerable percentage of large particles or lumps.

Fish in bulk can act as a cargo that may liquify; for their containment reference should be made to the Large Fishing Vessel Inspection Regulations.

For cargoes such as Peatmoss in bulk that may liquify it is essential to obtain currently valid information about general .safety precautions from the shipper or any restrictions that the Canadian Coast Guard Ship Safety may have, the nearest ship safety office may be consulted for this.

It should be noted that the above mentioned list is not exhaustive.

2.2.2 At a moisture content above that of the transportable moisture limit, shift of cargo may occur as a result of liquefaction.

2.2.3 The major purpose of the sections of this Code dealing with these cargoes is to draw the attention of masters and others to the latent risk of cargo shift, and to describe the precautions deemed necessary to minimize this risk. Such cargoes may appear to be relatively dry and granular when loaded, but may contain sufficient moisture as to become fluid under the stimulus of compaction and the vibration that occurs during a voyage.

2.2.4 In the resulting viscous fluid state, cargo may flow to one side of the ship when it rolls one way, but not completely return when it rolls the other. Thus, the ship way progressively reach a dangerous heel and capsize.

2.2.5 To prevent subsequent shifting, and also to decrease the effects of oxidation of material with a predisposition to oxidize, these cargoes should be trimmed reasonably level on completion of loading, irrespective of the angle of repose (See also Section 5 of the BC Code - Trimming Procedures).

2.3 Concentrates and other bulk cargoes possessing similar properties

2.3.1 The importance of trimming concentrate cargoes cannot be overestimated as an effective measure to reduce both shifting of the cargo and the effects of oxidation. In addition trimming will distribute the weight of the cargo better over the tank top and improve a ship's stability and seakeeping by winging out the weights.

2.3.2 The BC Code in section 5 trimming procedures gives guidance on trimming, in addition to this advise, trimming of concentrates is now required by **SOLAS Chapter VI Regulation 7 "Stowage of Bulk Cargo"**. Circumstances may occur where the degree of trimming is determined by the properties of the material , and these circumstances would be established from the documented history of shipments of such materials. For vessel loading concentrates and similar materials in Canadian Ports, the load installations have in general achieved the following trimming requirements, which should be used as a guideline.

i) Iron ore concentrates and similar types of cargoes shall be trimmed , so as to reach all boundaries of each compartment and levelled within the square of the hatch so that the height difference between peaks and troughs do not exceed 5% of the ship's breadth.

The cargo shall slope uniformly from the hatch boundaries to the bulkheads and no shearing faces should remain to collapse during the voyage.

ii) The trimming of sulphide concentrates of lead; copper or zinc should be such that in addition to (i), the height difference between the peaks and troughs of the cargo should not exceed 5% of the ship's breadth in the athwartship direction for the full width of the hold.

iii) The above and in particular (ii) applies especially to smaller ships, i.e., 100m long or less, and consequently the loading of smaller ships requires careful supervision. In such ships the aim should be to distribute the cargo so as to eliminate the formation of wide, steeply sloped voids beyond the trimmed surface within the area of the hatch square.

In some ports beltloading is supplemented by trimming with front endloaders or bulldozers due to the configuration of the holds of a ship or where due to the design of the shiploader adequate trimming cannot be achieved by the chute alone, in such cases cargo may be compacted which may cause difficulties during the discharge. Trimming in the fore and after ends of the holds is generally required to avoid excessive loads on the tanktop however less emphasis may need to be placed on this area for the above reasons since a ship pitches through a smaller angle than rolling. Athwartships trimming is in the majority of cases most beneficial.

2.3.3 When concentrates are loaded that have a moisture content in excess of the transportable moisture limit, the whole surface area of each cargo space shall be trimmed level. (See 2.6)

2.3.4 It should be noted that the above trimming requirements under the Canada Shipping Act (543) apply to all ships departing a Canadian port, bound for an overseas destination and carrying a cargo of concentrates, regardless of where the cargo was loaded. This has in some instances resulted in a ship having to do additional trimming of such cargoes even though the cargo originated from a port outside of Canada.

2.4 Precautions

2.4.1 Adequate precautions to prevent liquids entering the cargo space in which these cargoes are stowed should be maintained during the voyage. Such precautions are of paramount importance for some of these cargoes where contact with sea water could lead to serious problems or corrosion to either the hull or machinery items.

2.4.2 Masters are cautioned about the possible danger in using water to cool a shipment of these cargoes while the ship is at sea, since the admission of water in quantity may well bring the moisture content of these cargoes to a flow state. Water is most effectively applied as spray.

2.5 Loading requirements

2.5.1 Section 540 of the *Canada Shipping Act* states:
"The master or agent of any ship intending to load concentrates consigned to any place outside Canada and not being a place within the limits of an inland voyage shall make application to the port warden, who shall survey and approve stowage according to approved practice, when the quantity of concentrates proposed be carried exceeds eighteen per cent of the total carrying capacity of the ship; and the port warden shall enter in his books a statement showing the manner of stowage and securing, and issue a certificate accordingly".

The loading of concentrates and similar materials is therefore subject to **routine survey** and **certification** before the ship in which they are carried puts out to sea; **this Code will be considered, to set the standards of "approved practice" as envisaged by the Act**. See also 2.3.4 and Addendum "Port Wardens".

2.5.2 Ships other than specialist suited ones (see 2.6) shall carry only those cargoes having a moisture content that is not in excess of the transportable moisture limit as defined in this Code.

2.5.3 Cargoes having a moisture content in excess of the flow moisture point shall not be carried in bulk.

2.5.4 Cargoes that contain aqueous liquid, other than packaged canned goods or the like, shall not be stowed in the same cargo space above or adjacent to a consignment of these cargoes. This category includes logs that are loaded directly from the water and other cargoes covered with ice or snow.

2.5.5 Loading of concentrates shall be suspended during continuous or heavy rain or snow and the cargo spaces, hatches are to be closed.

2.6 Specially suited ships

2.6.1 Specially suited ships may carry concentrates having a moisture content in excess of the transportable moisture limit if the ship possesses a valid document of approval from her administration, accompanied by such stability information as her administration may require. The document of approval must clearly state "For carriage of concentrates having a moisture content in excess of the transportable moisture limit".

2.6.2 Such a ship shall possess a statement from her Administration or load line Assigning Authority indicating her structural suitability for the carriage of such cargoes.

2.6.3 The Ship Safety Branch of the Canadian Coast Guard may similarly approve a ship upon request of the ship's national Administration.

2.6.4 In any event, to be allowed to carry concentrates having a moisture content in excess of the transportable moisture limit, the ship shall prove compliance with the stability requirements (see 2.7.1).

2.7 Submission of data

2.7.1 When the Canadian Coast Guard is requested to approve a ship to carry concentrates having a moisture content in excess of the transportable moisture limit, such request shall be accompanied by:

a) scale longitudinal and transverse section drawings together with relevant structural drawings:

b) a statement from the ship's load line Assigning Authority confirming that she is structurally suitable for the carriage of such cargoes and indicating the maximum quantity that way safely be loaded in any cargo space;

c) a stability information booklet indicating that the ship has sufficient stability to cope with an assumed shift of the concentrate cargo to 20^0 from the horizontal when carrying a full normal service load of concentrate. The stability shall be deemed adequate, if at every stage of the intended voyage:

1) The angle of heel due to shift of cargo shall not exceed 65% of the angle at which the deck edge immerses in still water.

2) Residual dynamic stability measured to 30° beyond the angle of heel is not less than 0.10 metre radians.

3) Heeling moments of other cargo aboard the ship which is liable to shift shall be taken into account;

d) any other information that may assist assessment of the submission.

2.8 Exemptions

2.8.1 When engaged upon a regular specific trade, ships in possession of valid documents of approval may be authorized to load without the direct supervision of a port warden. Such authorization, will be issued subsequent to the approval documents detailed in 2.6.2 and 2.6.3 after inspection by the Canadian Coast Guard, and provided that the original approval is for a vessel to carry a full cargo of concentrates having a moisture content in excess of the transportable moisture limit.

2.8.2 In this case, the port warden shall be present during the first occasion of loading. If the loading method remains unchanged and the ship stays in regular employment in such trade, the port warden may endorse the certificate for a specially built ship approved for the carriage of concentrates from Canadian ports, issued under section 540 of the Canada Shipping Act, approving the stowage for future similar voyages. The validity of this certificate shall be one year from the date of issue. The port warden shall retain the right to spot check loading procedures during this period, but shall not charge a fee for such inspections unless he is required to intervene.

2.8.3 Nothing shall interfere with the provisions of section 543 of the Canadian Shipping Act concerning the final certification of the ship as being fit to proceed to sea after having loaded concentrates.

SECTION 3 - THE ASSESSMENT OF ACCEPTABILITY OF CONSIGNMENTS FOR SAFE SHIPMENT

3.1 Provision of information

3.1.1 Before shipment, the shipper shall provide details regarding the nature of the cargo.

3.1.2 Before loading, the shipper or his appointed agents shall provide to the master and the port warden, if requested, details, as appropriate, of the characteristics and properties of any material constituting bulk cargo, such as flow moisture point, stowage factor, moisture content, angle of repose, chemical hazards, etc. so that any necessary safety precautions can be put into effect.

3.1.3 To do this the shipper shall arrange, possibly in consultation with the producers, for the cargo to be properly sampled and tested. Furthermore, the shipper should provide the ship's master and the port warden, if requested, with the appropriate certificates of test, as applicable for a given cargo.

3.2 Certificates of test

3.2.1 A certificate (s) , stating the relevant characteristics of the material to be loaded, should be provided at the loading point to the master and the port warden if requested.

3.2.2 Certificates of moisture content shall state, or be accompanied with a statement by the shipper, that the moisture content specified in the certificate of analysis is, to the best of his knowledge and belief, the average moisture content of the cargo at the time the certificate is presented to the master. When cargo is to be loaded into more than one cargo space of a ship the certificate of moisture content shall certify the moisture content of each type of finely grained material loaded into each cargo space. If sampling according to the approved procedures recommended in this Code, however, indicates that the moisture content is uniform throughout the consignment, then one certificate of average Moisture content for all cargo spaces shall be acceptable. Figure 3.1 is a recommended format of a Certificate of Analysis required to comply with this requirement.

CERTIFICATE OF ANALYSIS

Date _____

We hereby certify that we have sampled and analysed the cargo described and report as follows:

Cargo _____ concentrates in stockpile

Earmarked for loading on the _____

Date sampled _____

Stockpile located at _____

We drew samples from various points of the stockpile described above, earmarked for loading to designated vessels, as of

_____

An average composite sample was prepared and dried to constant weight.

Total moisture in % is _____

Transportable moisture limit in % is _____

This transportable moisture limit was determined in accordance with the method described in the Code of Safe Practice for Solid Bulk Cargoes on

_____

The samples used to determine these results were obtained by sampling methods at least equal to those recommended by the Canadian Coast Guard.

_____
Signature and Title

copies: Master of vessel
Port warden
Any other officials

Figure 3.1

3.2.3 Where **Appendix B of the BC Code** requires certification for materials possessing chemical hazards, the certificate should contain, or be accompanied by, a statement from the shipper that the chemical characteristics of the material are, to the best of his knowledge, those existing at the time of the ship's loading.

3.2.4 The requirements of Appendix B do not apply to solvent extracted rapeseed meal, soya bean meal and linseed meal (including their pelletized forms) containing not more than 4% oil , 15% oil and moisture combined and being substantially free from inflammable solvent. A certificate from an authority recognized by the competent authority of the country of shipment should be provided by the shipper, stating that the requirements for the exemption are met.

3.3 Sampling procedures

3.3.1 It is evident that any physical property tests on the bulk cargo material will be meaningless unless they are conducted on test samples established as truly representative of the consignment, before loading.

3.3.2 Sampling should be conducted only by persons suitably trained in sampling procedures and who are under the supervision of someone who is fully aware of the properties of the material and also the applicable principles and practices of sampling.

3.3.3 Before samples are taken, and within the limits of practicability, a visual inspection should be carried out of the material that is to form the ship's cargo. Any substantial portions of material that appear to be contaminated or significantly different in characteristics or moisture content from the bulk of the consignment should be sampled and analyzed separately. Depending upon the results obtained in these tests, it may be necessary to reject as unfit for shipment those particular portions.

3.3.4 Representative samples should be obtained by employing techniques that take the following factors into account:

- the type of material;
- the particle size distribution;
- composition of the material and its variability;

- the manner in which the material is stored, i.e., in stockpiles, rail wagons or other containers, and transferred or loaded by material handling system such as conveyors, loading chutes, crane grabs, etc.;
- the characteristics to be determined: moisture content, flow moisture point, bulk density/stowage factor, angle of repose etc.;

- variations in moisture distribution throughout the consignment, which way occur owing to weather conditions, natural drainage (e.g. to lower levels of stockpiles or containers) or other forms of moisture migration.

3.3.5 Throughout sampling procedures, the utmost care should be taken to prevent changes in quality and characteristics. Samples should be immediately in suitable containers that must be sealed and properly marked.

3.3.6 The Canadian Coast Guard has established a standard sampling procedure for sampling open stockpiles. It is described in Appendix E. Any samples of concentrate must be taken by such method or its equivalent, and certificates of analysis shall be endorsed in the following manner: “The samples used to determine these results were obtained by sailing methods at least equal to those recommended by the Canadian Coast Guard”.

3.4 Frequency of sampling and testing for “flow moisture point” and “moisture content” determination

3.4.1 A competent independent laboratory shall at regular intervals conduct a test to determine the “flow moisture point” of cargoes that may liquefy. This test shall be conducted at least once every six months, even for materials of consistent composition. Where the composition or characteristics are variable for any reason, more frequent testing is necessary. In such cases, testing at least once every three months, and possibly more frequently, is essential as such variations could have a significant effect on the value of the flow moisture point. In certain cases it will be necessary to test every shipment. The concentrate producer shall provide a copy of the certificate of analysis from the laboratory to the Canadian Coast Guard, and, at the time of shipment, to the port warden at the loading port.

3.4.2 Sampling and testing for “moisture content” should be conducted as near as possible to the time of loading, but, in any event, the time interval between sampling/testing and loading should never be more than seven days, unless the consignment is adequately protected to ensure no increase in its moisture content. Furthermore, whenever there has been significant precipitation between the time of taking samples from a stockpile. exposed to the weather and the time of loading, further representative samples shall be taken and analysed for moisture content before loading. A qualified chemist or laboratory shall conduct these analyses.

3.4.3 Where the stockpile is situated at a place remote from the berth and shipment is made from the stockpile by rail, road or barge for direct loading into the ship, representative samples taken form the stockpile may be used it the cargo has not been exposed to rain or other wetting during transfer from stockpile to ship. Similarly, a concentrate to be loaded from railway cars, trucks or barges should be adequately protected.

3.4.4 Where the cargo is known to have been wetted during transfer or is held in trucks, railcars, or barges for some time before loading, representative samples shall be taken before loading from approximately one truck in every five, or the equivalent in railcars or barges, at the surface and at half depths.

SECTION 4 - CARGOES THAT MAY LIQUEFY: TEST PROCEDURES

4.1 **Appendix D of the BC Code** gives the recommended test procedures for the laboratory determination of:

- the moisture content of representative samples of the cargo to be loaded;

- the flow moisture point and the transportable moisture limit of the cargo.

4.2 Before and during loading, auxiliary check tests of the moisture content may be carried out using instruments designed specifically for that purpose, such as the “SPEEDY MOISTURE TESTER”. Tests conducted with this instrument indicate a precision of ±1% compared with the laboratory method, i.e., with a laboratory reading of 10%, the “SPEEDY” reading could range from, 9% to 11%. If the readings obtained by this method are consistently higher than those shown on the certificate (see 3.2.2), loading of the cargo should cease and a further laboratory test be conducted.

4.3 If the master has doubts as regards the appearance of condition of the cargo for safe shipment, the following auxiliary method may be used on board ship or at the dockside to perform a check test for approximately determining the possibility of flow:

4.3.1 Half fill a cylindrical can or similar container (0.5-1 litre capacity) with a sample of cargo. Take the can in one hand and bring it down sharply from a height of about 0.2m to strike a hard surface such as a solid table. Repeat the procedure twenty-five times at one or two second intervals. Examine the surface for free moisture or fluid conditions. If free moisture or a fluid condition appears, make arrangements to have additional laboratory tests on the cargo conducted before it is accepted for loading.

4.4 The recommended test procedures given in Appendix D of the BC Code reflect the majority opinion of those countries having participated in its preparation. However, other methods may be used which have been approved by the appropriate authorities as being equally reliable.

APPENDIX E
Sampling Procedures for concentrates' Stockpiles

E.1 These standards have been designed to establish uniform procedures for sampling of open stockpiles in order that the values of "Flow Moisture Point" and "Moisture Content" way be more accurately established.

E.1.1 They are not intended to replace sampling procedures that achieve equal or superior accuracy of either Flow Moisture Point or Moisture Content for the purposes of the certificates required by the Canadian Coast Guard prior to loading.

E.2 Sub-samples should be taken in a reasonably uniform pattern. A plan of the stockpile should be drawn and divided into areas, each of which contains approximately 125, 250 or 500 tonnes dependent on the amount of concentrate to be shipped. Such plan will indicate to the sampler the number of sub-samples required and from where each is to be taken. Each sub-sample taken should be drawn from the centre of the designated area.

E.2.1 The number of sub-samples required is to be determined in accordance with the following scale:

Consignments of less than 15,000 tonnes

One 200 gram sub-sample should be taken for each 125 tonnes to be shipped.

Consignments of more than 15, 000 tonnes, but less than 60, 000 tonnes

One 200 gram sub-sample should be taken for each 250 tonnes to be shipped.

Consignments in excess of 60,000 tonnes

One 200 gram sub-sample should be taken for each 500 tonnes to be shipped.

E.2.2 Sub-samples should be obtained by using an auger or sample probe, manually or power operated, as appropriate to the stockpile size. Such sub-samples should be placed in hermetically sealed containers immediately on withdrawal for conveyance to the testing laboratory, where they shall be thoroughly mixed in order to obtain a fully representative sample. Where testing facilities are not available in the immediate vicinity, such mixing shall be done at the stockpile and the representative sample only shipped to the test laboratory.

E.3 Basic procedural steps are therefore:

1. Identification of consignment to be sampled;

2. Determination of the number of individual sub-samples and representative samples as described in 3.3.3 and E.2.1 which are required;

3. Determination of the positions from which to obtain sub-samples and the method of combining such sub-samples to arrive at a representative sample;

4. Gathering of the individual sub-samples and placing them in sealed containers;

5. Thorough mixing of sub-samples to obtain a representative sample; and

6. Placing the representative sample in a sealed container if it has to be shipped to a test laboratory.

ADDENDUM
Port Warden's Responsibilities

As indicated in Section 2. 5 under the Canada Shipping Act mandatory inspections are to be carried out by Port Wardens who are generally marine surveyors of the Canadian Coast Guard Ship Safety Branch appointed to carry out functions, such as steamship inspection, Port Warden, Pollution Prevention Officer, and other safety related functions. The following will form part of and may not be limited to, the inspections carried out for ships loading or carrying concentrates.

Prior to Loading

a) Appropriate Convention certificates will be verified for validity.

b) Cargo holds will be inspected for water-tight integrity and structural damage.

c) Holds to be dry with bilges both clean and grain (ore) tight. (The latter can normally be accomplished by wrapping the bilge strainer-perforated plate - with a double layer of burlap and replacing the plate over the rose box, or by cementing, double burlap over the strainer and overlapping ±20 cm on each side.

d) Ventilation systems and ventilators to be closed.

e) All hatchcovers will be sighted to ensure water-tight capability.

f) The Master shall be in possession of the BC Code and this Code and be fully familiar with the sections covering concentrate oxidation and dangers of entering unventilated enclosed spaces.

g) The vessels loading instruments will be checked to verify that the proposed arrangement is within allowable limits (bending moments/shearforce). In the absence of instruments the ensured conditions shall closely equate to one in the vessel's approved stability book.

h) When the above conditions are met to satisfaction the port Warden will issue a certificate of readiness to load.

During Loading

i) The Port Warden will verify that cargo is loaded so as to reach all boundaries of each compartment and levelled to the requirements of the Canadian Code of Safe Practice for solid bulk cargoes. See 2.3.

j) In general consultation and proper overseeing the loading and trimming by shore and ship's staff will ensure adequate trimming. failure to do so may necessitate use of trimming machinery, a costly and time consuming unnecessary procedure.

Final Survey

k) A final survey will be carried out to see that the vessel is not overloaded, cargo has been adequately trimmed and all hatches are securely closed, upon completion a certificate of fitness to proceed will be issued.

EXPLANATORY BROCHURE
Port Wardens and Port State Control

When your vessel visits a Canadian port, one or more inspectors from the Ship Safety Branch of the Canadian Coast Guard may visit the vessel. One of these could be a Port Warden, and the other a Port State Control inspector. This brochure is to help you understand the responsibilities of these inspectors.

Port Wardens

When loading a cargo of either grain timber on deck or concentrates, the Port Warden will inspect the holds and cargo securing arrangements, to make sure the cargo can be safely loaded and carried. He will also check the stability calculations, to ensure they are accurate and appropriate for the type of cargo to be carried.

The Port Warden may also visit your vessel from time to time during loading. He will check that the loading complies with standards, and to help you or the dock workers when problems arise.

When all is in order, the Port Warden will issue the “Certificate of Readiness to Load” and the “Certificate of Fitness to Proceed to Sea” as appropriate. He may issue another certificate, known as the “S.I.7”, should a problem arise. This will describe any defects found on board and their remedial action.

Port State Control

A Port State Control inspector may visit your vessel to check all relevant certificates and documents carried on board. he may also inspect your vessel to check that her condition meets international standards. When the inspection is completed, the inspector will issue a “Report on Inspection”.

The inspector has the authority to detain any vessel with deficiencies affecting seaworthiness from sailing until remedial actions are taken.

A more detailed inspection with emphasis, on **structural defects** may be carried out on **bulk carriers** of more than ten years old that intend to load in any Canadian ports.

Tackle Inspector/Safety Officer

A Tackle Inspector/Safety Officer may board your vessel to help you solve problems regarding cargo gear and occupational safety and health.

NOTE: All these functions may be carried out by the same inspector. This Brochure is also available in Spanish, Korean, Japanese and Chinese on request.

11/94

1994.09.02

CARRIAGE OF CARGOES "SOLID BULK AND GENERAL"

1. Amendments to the International Convention for the Safety of Life at Sea (1990/91 amendments) entered into force on 1 January 1994.

2. SOLAS Chapter VI was replaced completely by expanded provisions covering all cargoes which may pose a hazard to ships or personnel excepting only those already covered by other chapters. The detailed provisions concerning the carriage of grain in bulk originally contained in an associated mandatory "International Grain Code" adopted by Resolution MSC.23/59 and the provisions of the revised chapter VI are further supplemented by associated codes as identified in the footnotes to the regulations concerned.

3. The Board of Steamship Inspection has recently ruled that, effective immediately, the provisions of SOLAS Chapter VI, adopted on 15 May 1990 and 23 May 1991, would become mandatory for any loadline vessel carrying a cargo in Canadian waters. This will mean, inter alia, that the provisions of the BC Code (Code of Safe Practice for Solid Bulk Cargoes) concerning cargo stowage, the passage of cargo information from the shipper to the Master on concentrates or other cargoes which may liquify, or possess hazards so as to be classed "materials hazardous only in bulk" (MHB) will become mandatory. The attached sample "form of cargo information" may be used to convey such information.

4. For information, a copy of the text of SOLAS Chapter VI is attached. The various International Maritime Organization (IMO) documents referred to in Chapter VI may be purchased from:

Publications Section - IMO
4 Albert Embankment
London SE1 7SR ENGLAND
Telephone: 011-071-735-7611
Facsimile: 011-071-587-3210

Cargoes
Bulk
Information

AMSFB

Chapter VI

The title and text of chapter VI are replaced by the following:

"CARRIAGE OF CARGOES

PART A - GENERAL PROVISIONS

Regulation 1
Application

1 This chapter applies to the carriage of cargoes (except liquids in bulk, gases in bulk and those aspects of carriage covered by other chapters) which, owing to their particular hazards to ships or persons on board. may require special precautions in all ships to which the present regulations apply and in cargo ships of less than 500 tons gross tonnage. However, for cargo ships of less than 500 tons gross tonnage, the Administration, if it considers that the sheltered nature and conditions of voyage are such as to render the application of any specific requirements of part A or B of this chapter unreasonable or unnecessary, may take other effective measures to ensure the required safety for these ships.

2 To supplement the provisions of parts A and B of this chapter, each Contracting Government shall ensure that appropriate information on cargo and its stowage and securing is provided, specifying, in particular, precautions necessary for the safe carriage of such cargoes.[*]

[*] Reference is made to:

.1 the Code of Safe Practice for Cargo Stowage and Securing adopted by Organization;

.2 the Code of Safe Practice for ships Carrying Timber Deck Cargoes adopted by the Organization; and

.3 the Code of Safe Practice for Solid Bulk Cargoes (BC Code) adopted by the Organization by resolution A.434(XI), as amended. by resolution A.434(XI), as amended.

Regulation 2

Cargo information

1 The shipper shall provide the master or his representative with appropriate information on the cargo sufficiently in advance of loading to enable the precautions which may be necessary for proper stowage and safe carriage of the cargo to be put into effect. Such information shall be confirmed in writing[**] and by appropriate shipping documents prior to loading the cargo on the ship.

2 The cargo information shall include:

.1 in the case of general cargo, and of cargo carried in cargo a general description of the cargo, the gross mass of the cargo or of the cargo units, and any relevant special properties of the cargo;

.2 in the case of a bulk cargo, information on the stowage factor of the cargo, the trimming procedures and, in the can of a concentrate or other cargo which may liquefy, additional information in the form of a certificate on the moisture content of the cargo and its transportable moisture limit;

.3 in the case of a bulk cargo not classified in accordance with the provisions of regulation VII/2, but which has chemical properties that way create a potential hazard. in addition to the information required by the preceding subparagraphs. information on its chemical properties.

3 Prior to loading cargo units on board ships, the shipper shall ensure that the gross mass of such units is in accordance with the gross mass declared on the shipping documents.

[**] Reference to documents in this regulation does not preclude the use of electronic data processing (EDP) and electronic data interchange (EDI) transmission techniques as an aid to paper documentation.

Regulation 3
Oxygen analysis and gas detection equipment

1 When transporting a bulk cargo which is liable to emit a toxic or flammable gas or cause oxygen depletion in the cargo space, an appropriate instrument for measuring the concentration of gas or oxygen in the air shall be provided together with detailed instructions for its use. Such, an instrument shall be to the satisfaction of the Administration.

2 The Administration shall take steps to ensure that crews of ships are trained in the use of such instruments.

Regulation 4
The use of pesticides in ships[*]

Appropriate precautions shall be taken in the use of pesticides in ships, in particular for the purposes of fumigation.

Regulation 5
Stowage and securing

1 Cargo and cargo units carried on or under dock shall be so loaded, stowed and secured as to prevent as far as is practicable, throughout the voyage, damage or hazard to the ship and the persons on board, and loss of cargo overboard.

2 Cargo carried in a cargo unit shall be so packed and secured within the unit as to prevent, throughout the voyage, damage or hazard to the ship and the persons on board.

3 Appropriate precautions shall be taken during loading and transport of heavy cargoes or cargoes with abnormal physical dimensions to ensure that no structural damage to the ship occurs and to maintain adequate stability throughout the voyage.

[*] Reference is made to the IMO Recommendation the Safe Use of Pesticides in Ships, as amended.

4 Appropriate Precautions shall be taken during loading and transport of cargo units on board ro-ro ships, especially with regard to the securing arrangements on board such ships and on the cargo units and with regard to the strength of the securing points and lashings.

5 Containers shall not be loaded to more than the maximum gross weight indicated on the Safety Approval Plate under the International Convention for Safe Containers (CSC).

PART B — SPECIAL PROVISIONS FOR BULK CARGOES OTHER THAN GRAIN

Regulation 6

Acceptability for shipment

1 Prior to loading a bulk cargo, the master shall be in possession of comprehensive information on the ship's stability and on the distribution of cargo for the standard loading conditions. The method of providing such information shall be to the satisfaction of the Administration*

2 Concentrates or other cargoes which may liquefy shall only be accepted for loading when the actual moisture content of the cargo is less than its transportable moisture limit. However, such concentrates and other cargoes may be accepted for loading even when their moisture content exceeds the above limit. provided that safety arrangements to the satisfaction of the Administration are made to ensure adequate stability in the case of cargo shifting and further provided that the ship has adequate structural integrity.

* Reference is made to:

.1 the Recommendation on Intact Stability for Passenger and Cargo ships under 100 Metres in Length, adopted by the Organization by resolution A.167(ES.IV) and amendments to this Recommendation, adopted by the Organization by resolution A.206(VII); and

.2 the Recommendation on a Severe Wind and Rolling Criterion (Weather Criterion) for the Stability of Passenger and Cargo Ships of 24 Metres in Length and Over, adopted by the Organization by resolution A.562(14).

3 Prior to loading a bulk cargo which is not a cargo classified in accordance with the provisions of regulation VII/2 but which has chemical properties that may create a potential hazard, special precautions for its safe carriage shall be taken.

Regulation 7
Stowage of bulk cargo

1 Bulk cargoes shall be loaded and trimmed reasonably level, as necessary, to the boundaries of the cargo space so as to minimize the risk of shifting and to ensure that adequate stability will be maintained throughout the voyage.

2 When bulk cargoes are carried in 'tween-decks, the hatchways of such 'tween-decks shall be closed in those cases where the loading information indicates an unacceptable level of stress of the bottom structure if the hatchways are left open. The cargo shall be trimmed reasonably level and shall either extend from side to side or be secured by additional longitudinal divisions of sufficient strength. The safe load-carrying capacity of the 'tween-decks shall be observed to ensure that the deck-structure is not overloaded.

PART C — CARRIAGE OF GRAIN

Regulation 8
Definitions

For the purposes of this part, unless expressly provided otherwise:

1 *International Grain Code* means the International Code for the Safe Carriage of Grain in Bulk adopted by the Maritime Safety Committee of the Organization by resolution MSC.23(59) as any be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than chapter 1.

2 The term *grain* includes wheat, maize (corn), oats, rye, barley, rice, pulses, seeds and processed forms thereof whose behaviour is similar to that of grain in its natural state.

Regulation 9

Requirements for cargo ships carrying grain

1 In addition to any other applicable requirements of the present regulations, cargo ship carrying grain shall comply with the requirements of the International Grain Code, and hold a document of authorization as required by that Code. For the purpose of this regulation, the requirements of the Code shall be treated as mandatory.

2 A ship without such a document shall not load grain until the master satisfies the Administration, or the Contracting Government of the port of loading on behalf of the Administration, that the ship will comply with the requirements of the International Grain Code in its proposed loaded condition."

FORM OF CARGO INFORMATION
(Recommended layout)

Note: This form is not applicable if the cargo to be loaded requires a declaration under the requirements of SOLAS 1974, chapter VII, regulation 5; MARPOL 73/78, Annex III, regulation 4; and the IMDG Code, General Introduction, section 9 or the BC Code.

<table>
<tr><td colspan="2">Shipper</td><td>Reference number (s)</td></tr>
<tr><td colspan="2">Consignee</td><td>Carrier</td></tr>
<tr><td>Name/means of transport</td><td>Port/place
of departure</td><td rowspan="2">Instructions or other matters</td></tr>
<tr><td colspan="2">Port/place of destination</td></tr>
<tr><td colspan="2">General description of the cargo__
(type of material/particle size)*

*For solid bulk cargo</td><td>Gross mass (kg/tonnes)
☐ General cargo
☐ Cargo units
☐ Bulk cargo</td></tr>
<tr><td colspan="3">Specifications of bulk cargo*
Stowage factor
Trimming procedures
Chemical properties ** if potential hazard
Angle of repose

*If applicable
**e.g. IMO class, UN number or BC number and EmS number</td></tr>
<tr><td colspan="2">Relevant special properties of cargo</td><td>Additional certificate*
☐ Certificate of moisture content and transportable moisture limit
☐ Weathering certificate
☐ Exemption certificate
☐ Other (specify)
*if required</td></tr>
<tr><td colspan="2">DECLARATION
I hereby declare that the consignment is fully and accurately described and that the given test results and other specifications are correct to the best of my knowledge and belief and can be considered as representative for the cargo loaded.</td><td>Name/status, company/ organization of signatory

Place and date

Signature on behalf of shipper</td></tr>
</table>

This form meets the requirements of SOLAS 1974, Chapter VI, regulation 2.