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The Use of Nucleonic Gauge JTTX in the Port of Nantes Saint Nazaire

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There is a continuous sedimentation in harbour basins and access channels. Therefore maintenance dredging is necessary.

The depth necessary for sailing includes the free space between the keel and the bed of the channel called keel-clearance .

Tests on physical models indicated that free movement of ships in the harbour is possible upto silt density 1.2 g/cm³. The layer of fluid mud (silt) where the density equals 1.2 g/cm³ is defined as "sea bed". This layer shifts upwards with time due to deposition resulting in decrease in the "nautical depth". To keep the required nautical depth it is necessary to measure the depth periodically

The depth is usually measured using an echo sounder. The upper trace recorded by the echo sounder is taken as the bottom of the channel. It is misleading in the case of channels with muddy bottoms. In these conditions the echo sounder readings cause excessive dredging adding extra cost. This can be avoided by the measurement of sediment density at different depths.

To effectively determine when and how dredging operations must be undertaken, the underwater sediment and mud layers must be monitored and analysed. This paper presents an innovative vertical profiling technique measuring the density versus depth of the sediment layer. The instrument uses X-ray to measure the sediment density and has been developed by the French Atomic Energy Commission and ALTAIX Cie.

The information is used for two important aspects.

1. the quality control of dredging works where the data is used to determine the dry matter content of the dredged material and to know precisely the real solid matter removed during the dredging operation
2. In combination with echo-sounding survey methods, it is used for optimizing the dredging works based on the concept of navigability depth limit. Ships can operate through loose mud layers if the physical characteristics of the mud stay below a critical limit. Nowadays the measured physical characteristic in many ports is density. The navigability depth limit is usually corresponding to the density 1.2. The proposed measurement technique allows visualization of density and enables ports to evaluate nautical depth criteria. Dredging only when the navigability depth limit is above the navigation depth allows very important savings.

The paper will present the operation of the gauge in the Port of Nantes Saint-Nazaire (France).

Country/Organization invited to participate

IAEA

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