



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

Know the Earth... Show the Way... Understand the World

Underkeel Clearance Management (UKCM) Systems in S-49 (Standardization Of Mariners' Routeing Guides), M-3 (IHO Resolutions), and S-32 (IHO Hydrographic Dictionary)

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Agenda

- Background on S-49.
- Information categories.
- Underkeel clearance information.
- Definitions and concepts.
- S-49 overtaken by events.
- Future work items.
- Potential benefits and impacts.



Standardization of Mariners' Routeing Guide (S-49)

- Information on complex routeing systems composed of:
 - multiple related routeing measures.
 - lengthy special provisions.
 - recommendations on navigation which apply to vessels using the system.
- Edition 2.0.0 (2010 edition) prepared by the Chart Standardization and Paper Chart Working Group (CSPCWG), now known as the Nautical Cartography Working Group (NCWG), in 2009.



S-49 Information Categories

- **ESSENTIAL (E)**—Major importance to the safety of navigation.
- **USEFUL (U)**—Important to safe navigation in a particular geographic area, helpful to the mariner, and collected in a single document to facilitate its use.
- **NOT APPROPRIATE (N)**—Does not contribute to the safety of navigation or its inclusion may reduce safety by obscuring essential information or by enticing the mariner to use the Mariners' Routing Guide as a nautical chart.



S-49 Underkeel Clearance Information

- Underkeel clearance information considered ESSENTIAL.
- Designated as Item No. E2.3.
- Defined as “Underkeel clearance criteria and specific advice to deep draught vessels.”
- Connected with other S-49 items:
 - Item No. E2.1—IMO-approved rules or recommendations on planning a passage through the area.
 - Item No. E2.2—Specific advice, extracted where necessary from national Sailing Directions, on planning a passage through the area.
 - Item No. U6.1—Tidal height as shown by co-tidal diagrams or other suitable methods as appropriate, negative surges, and swell.
- **Note.**—Unable to find an example of Item No. E2.3 in a Routeing Guide.



Definitions and Concepts

- **Underkeel Clearance (UKC)**—The distance between the lowest point of the ship's hull, normally some point on the keel, and the sea floor. (IHO Hydrographic Dictionary)
- **Underkeel Clearance Management (UKCM) System**—(1) A contemporary *Aid to Navigation* (AtoN) which enhances navigational safety. (AMSA)
(2) A real-time and nowcast/forecast model system, in conjunction with the vessel response prediction systems, giving the vessel's master the information need to effectively manage the vessel's underkeel clearance. (Adapted from *Modern Underkeel Clearance Management* published in the *International Hydrographic Review*, Monaco LXXV(2), September 1998)



Definitions and Concepts (continued)

- **Static Systems**—Vessels use pre-calculated information to determine their underkeel clearance, with no shore or web-based interactions. (NIPWG)
- **Dynamic Systems**—Vessels monitor their underkeel clearance in real-time using either a web-based system (vessel must pre-register to participate in the system) or a hardware/software-based system (vessel must purchase an approved system loaded with appropriate software to obtain real-time information concerning its underkeel clearance). (NIPWG)



S-49 Edition 2.0.0 Overtaken by Events

- S-49 Edition 2.0.0 was prepared in 2009 and released in 2010.
- Dynamic UKCM Systems did not exist at time of latest release of S-49 Edition 2.0.0:
 - Australia—Underkeel Clearance Management System in the Torres Strait (2011).
 - Canada—St. Lawrence Seaway Draft Information System (2012).
- Need for new definitions for UKCM System, Static UKCM System, and Dynamic UKCM System?
- Need for a current review/update of S-49?



Future Work Items?

- Update E2.3 to reflect Static vs. Dynamic UKCM Systems.
- Develop new definitions for UKCM System, Static UKCM System, and Dynamic UKCM System (with S-100WG Underkeel Clearance Management Project Team (UKCMPT) and/or Hydrographic Dictionary Working Group (HDWG) input).
- Proper location for new definitions:
 - IHO Hydrographic Dictionary (S-32)?
 - New M-3 Resolution?
- Review/update S-49 (with NCWG input)?



Potential Benefits and Impacts

- Upgrade the Hydrographic Dictionary, S-49, and/or M-3 with up-to-date information concerning UKCM Systems.
- Review of S-49 to ensure all requirements are pertinent.
- All work done by correspondence.
- Liaison with S-100WG UKCMPT, HDWG, and/or NCWG.
- Based on past experience, the time frame would be:
 - HDWG process—2 to 3 years.
 - M-3 process—1 to 2 years.
- Medium priority.



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