

SAFETY OF NAVIGATION IN DEEP-WATER FAIRWAY DANUBE – BLACK SEA IN THE CONTEXT OF THE INTERNATIONAL TRANSPORTATION DEVELOPMENT

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Deep-water fairway Danube – Black sea (DWF) is a complex area for navigation. The fairways established by the regulations due to administrative, navigational, hydrographic and meteorological reasons pose a danger to navigation and are subject to review and change. Ensuring the safety of navigation is a necessary condition for the development of international transport on inland waterways of Ukraine. The DWF passes through the estuaries of Bystre, Starostambulske and Kiliyske in the Danube Delta as well as through the Danube Biosphere Reserve. The length of the fairway in natural channels is 172.36 km, the length of the artificial sea approach channel is 3.4 km. The width of the canal is from 85 m to 100 m, depending on the area. The maximum design draft for ships is 5.85 m and depends on the regularity of dredging works. The canal route consists of sections: Reni port - Cape Izmail Chatal (44.1 km), Cape Izmail Chatal - Vilkov port (98 km), Vilkovo port - Black Sea (17 km) [4].

The project "Construction of deep-water fairway of the Danube - Black Sea on the Ukrainian section of the delta. Phase I was approved by the order of the Cabinet of Ministers of Ukraine dated 12.05.2004 №83-P. The Ministry of Infrastructure of Ukraine has identified the Delta-Pilot branch of the AMPU State Enterprise as the customer for the design and construction of the Danube-Black Sea GSC through the Bystre estuary, with a total budget value of UAH 543.5 million. The transport project for the development of the canal is essential for the creation of a national network of international transport corridors and its integration into the transport system of Europe, Asia, the Baltic and Black Sea regions. The project includes optimizing the capacity of the Ukrainian part of the Danube Delta, reducing costs as well as improving the safety of navigation when passing vessels on the Danube-Black Sea connection. The main advantages would include:

- competitive tariffs;
- two-way vessel traffic 24/7 all year round (unlike Romanian canals, where traffic is one-way and during daylight hours).
- condition of compliance of maritime safety management systems with international EU standards and other international norms.
- development of navigation on the Ukrainian section of the Danube as one of the measures of the European integration course announced by Ukraine.

The development of DWF contributes to the expansion of logistics capabilities and strategies for the direction of cargo flows in the vector "East - West" Full development " developed in 2004 by the order of "Delta-pilot" design and survey and construction and technological institute of river transport "Richtransproekt" on the basis of:

- Tasks for the development of a working project approved by the State Enterprise "Delta Pilot";
- Decree of the President of Ukraine of June 10, 2003 №502 / 2003;
- Order of the Cabinet of Ministers of Ukraine dated 13.10.2003 № 598-R "On approval of the working design and title of the GSC structure;
- Decree of the President of Ukraine of February 2, 2004 № 117/2004 "On the expansion of the Danube Biosphere Reserve";
- Architectural and planning task, approved by the Department of Urban Planning and Architecture of the Odessa Regional State Administration on August 25, 2004 [1].

The following parts took part in the development of the working project: Delta Pilot Branch, Danube Hydrometeorological Observatory, NOOSPHERE Research Center, Ukrrybproekt Institute, State Hydrography State Enterprise, Institute of Hydromechanics of the National Academy of Sciences of Ukraine, Ukrainian Research Institute of Environmental Problems.

Construction on this project lasted from May 2004 to May 2005 (with breaks during storms and fish spawning periods). The project was considered by the state ecological examination from August 10, 2004 to April 19, 2006, which was the reason for the delay in preparing the project for approval. Despite the fact that in July 2005 the ban of the Ministry of Environment was lifted, the construction of the first stage of the ship's course did not continue. Due to the cessation of construction works, as well as hydrometeorological conditions in July-September 2005, there was intensive siltation of the incomplete fairway, which made it impossible to navigate [2].

In 2007, according to the first stage of the project, DFW managed to permit vessels with a draft of up to 5.85 m. The construction of a dam in 2008-2009, which provided a complete closure of the north-eastern ravine, increased the flow velocity through the sea approach channel and reduced soil subsidence on it. In other words, this fact relieved the canal from storm silt and sand, which helped to preserve the sediment. The second stage (by the Order of the Cabinet of Ministers of 31.05.2007 №351-r - for full development.) Aims to increase the draft of vessels to 7.20 m.

In November 2007, Ukraine made the final decision on the implementation of the project "Creation of GSC Danube - Black Sea in the Ukrainian part of the delta. Full development. ". The second stage (by the Order of the Cabinet of Ministers of 31.05.2007 №351-r - for full development.) Aims to increase the throughput of vessels to 7.20 m. alternative to the Sulina Canal in Romania. Vessels with such a draft make up about 80% of the total number of seagoing vessels and vessels of mixed (river-sea) navigation, which enter the ports of the lower Danube.

This decision was taken with an incomplete implementation of a number of procedures provided by the Espoo Convention (Convention on Environmental Impact Assessment in a Transboundary Context). As a result, it became the main reason for the adoption at the 4th meeting of the parties to the Espoo Convention (19-21.05.2008, Bucharest) certain recommendations to limit the implementation of Phase II (Decision IV / 2), which remains in force today. In addition to these restrictions, the obstacle to development is the position of the Romanian side, which prevents dredging in border areas. Romanian side is adamant in its decision and refuses to jointly monitor the Danube Delta.

In 2019, the Minister of Infrastructure of Ukraine announced the active work on the restoration of DWF, emphasizing the importance of the Danube for the economic and transport infrastructure of Europe.

In the context of the development of international transportation on the inland waterways of Ukraine, DWF "Danube - Black Sea" is a very important artery of international economic relations and maritime transport infrastructure of our country. There are such Ukrainian ports on the Danube as Reni, Izmail and Ust-Dunaisk, the development of which contributes to the development of Ukraine's economy by strengthening cargo turnover and strengthening international trade. The EU strategy for the Danube region is a significant project in the implementation of which Ukraine is strengthening its participation. All countries participating in the EU strategy benefit from the development of the Danube-Black Sea DWF, which is included in the List of Inland Waterways of international importance (category E 80-09) of the European Agreement on the Most Important Inland Waterways of International Importance. The creation of multimodal terminals at Danube ports is one of the main tasks of the EU strategy, so the country needs to focus on the most effective measures in terms of the DWF project [3].

The development of the Danube-Black Sea waterway includes appropriate modifications and construction works to increase the capacity of the canal, which also requires an analysis of the navigation system and safety of navigation.

In the framework of consideration and analysis of the shortcomings of the current state of the shipping system in the region, it is necessary to indicate areas for improvement. Regarding cartographic support, it should be noted that it is insufficient and outdated and needs to be modernized. Modern ships use electronic navigational charts (ENC), which should be implemented and agreed with the Romanian counterparts, in order to eliminate discrepancies and errors.

The aids to navigation (AtoN), both floating and shore-based, should be upgraded, expanded and constantly monitored to ensure the safety of navigation at the current level, as well as for timely technical control.

Unlike the Romanian part of the canal, Ukraine does not have the satellite station differential correction (GPS) stations needed to improve its positioning accuracy. Signal coverage areas should be surveyed to install differential correction stations.

Vessel traffic control systems with AIS need to be improved to increase efficiency. It is necessary to draw up rules in accordance with the regular reports of vessels while sailing in different areas, as well as advice from the operators of the vessel traffic control center, regarding the navigational safety of navigation.

It is necessary to establish emergency areas in case of emergencies, where vessels will be able to stay temporarily until the problem is resolved.

The rules on fishing vessels should be revised and amended to ensure safe navigation so as not to interfere with fishing in the water area.

The state of the river's water level is an important issue, as the required water supply under the keel (UKC) is a critical basis for maintaining seaworthiness and safety during the passage of the canal. For this purpose, it is advisable to install automatic depth measurement stations, with a permanent transfer to a single center of the vessel traffic control system.

The above-mentioned areas of improving the navigational safety of navigation at the DWF "Danube - Black Sea" have prospects for development and implementation. Thus, the Basic Provisions for Navigation on the Danube (OOPD) should be adapted accordingly.

Summarizing the information provided in the article, it is necessary to emphasize the importance of the Danube as a leading route for Ukraine's international trade. DWF "Danube - Black Sea" is subject to deep development, research and reforms. Furthermore, amendments should be adopted to the relevant regulatory framework by the responsible parts in order to publish an updated version of the "regime of navigation in the Black and Azov Seas". In addition, the same should be applied to the edition of the "Danube River Lotion", as well as to the introduction of educational programs in the preparation of the merchant staff in higher educational institutions of Ukraine.

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