



“NETWORK OF DANUBE WATERWAY ADMINISTRATIONS”
South-East European Transnational Cooperation Programme

STATUS QUO REPORT OF WATERWAY MAINTENANCE

RO – AFDJ

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1 LIST OF ABBREVIATIONS

ABBR.	Abbreviation
AFDJ	River Administration of the Lower Danube
APPD (EAEMDR)	Executive Agency for Exploration and Maintenance of the Danube River
Hm	Hectometre
Nm	Nautical mile
rkm	River kilometre
PLOVPUT	Directorate for Inland Waterways Serbia
SVP	Sound Velocity Profile

2 SCOPE OF DOCUMENT

Activity 4.1 is related to the waterway maintenance activities on the Danube.

According to description of work Act. 4.1 (Task 4.1.1) every partner shall identify and describe the status quo on waterway maintenance and what are the problems. The status quo report shall contain relevant information about:

- hydrology,
- survey,
- fairway axis,
- limits and gauge,
- floating and coastal signalization,
- signalization for high and low level,
- dredging works,
- maintenance works and hydro technical construction,
- fairway information, ENC, tracking and tracing centre, skippers,
- report on the prevention and restoration of flood damages,
- feasibility studies for the sustainable removal of bottlenecks,
- exchange know-how and planning for lock maintenance and repair,
- action plan for cross-border projects like joint marking system (inland navigation traffic signs),
- responsibility on the fairway,
- waterway maintenance in the ice, lowest and highest period.

3 INTRODUCTION

3.1. Responsibility for waterway, institutions – manage the navigations conditions

The section of the Danube in Romania is an important section of the Pan-European Transport Corridor number VII.

The Romanian stretch of the Danube River is from the border line - km 1075 to the river mouth in the Black Sea, on Sulina branch, in Sulina roadstead, on the shipping branches of the Danube, Borcea, Bala, Macin, Valciu, Caleia, on Chilia branch with its secondary branches, on Sfantu Gheorghe channel with the rectifications channels and on the secondary branches of the Sulina Channel, named the Old Danube.

The assurance of navigation conditions on Danube by means of dredging works, topo-hydrographical survey, coast and floating signalization, piloting on the maritime Danube sector between Sulina roadstead and Braila and in the Danube maritime ports, special transport on the river and maritime Danube, internal and international tugging as well as carrying out are the obligations of the Romanian state according to the international conventions and agreements to which Romania is part, which were entrusted to it by the Ministry of Transports, Constructions and Tourism in accordance with the law in force.

At the Romanian sector are the two dams Iron Gates 1 (km 943) and Iron Gates 2 (863), which were both designed to produce the hydroelectric power and to improve the navigation on the Danube. These both dams are managing by the Hidroelectrica, and they have the responsibilities for the maintenance of the locks. Both dams are equipped with the locks at Romanian and Serbian side. Locks are situated aside the dam and the dimensions are 310 x 34 x 5 m.

The AFDJ is responsible for:

- from km 1075 and km 845+500, waterway maintenance for the left coastal and floating signalization of the waterway, border with Serbia;
- from km 845+500 till km 610, the Romanian Administration is responsible for the all floating signalization for the waterway and for coastal signalization on the left bank, border with Bulgaria;
- from km 610 till km 375, the AFDJ is responsible for the coastal signalization of the left bank, border with Bulgaria
- from km 375 till Nm 72.432, the maintenance of the waterway is responsibility of AFDJ,
- from Nm 72.432 till Nm 43, the floating maintenance of the waterway and the coastal signalization of right bank;
- from Nm 43 - Nm 0 till – Hm 99+70 in the Sulina Bar, the maintenance of the waterway is responsibility of AFDJ,

The following agreements were concluded:

- Bilateral agreement between the governments of Romania and the Soviet Union, Moscow 1953 - as to the functioning of the River Administration of the Lower Danube of Galati, for the maintenance of the fairway and the accomplishment of hydrotechnical works on maritime Danube sector (Sulina - Braila);
- Bilateral agreement between the governments of Romania and the People's Republic of Bulgaria, Sofia 1955 - as to the maintenance and improvement of the navigation fairway on the Romanian - Bulgarian sector of Danube between km 375 and 845.5;

-
- Bilateral agreement between the governments of Romania and the Federative Socialist Republic of Yugoslavia, Belgrade 1976 with regard to the establishment and control of application of navigation rules, maintenance and improvement of navigation conditions on the sector where Danube is border line between the two states from km 845.5 to km 1075.

4 CHARACTERISTIC OF WATERWAY

4.1. River stretch characterisation

Regarding several criteria the Romanian stretch can have next characterisation.

The Romanian river stretch is along the left bank of the river from the border line km 1075 to the km 375, and for both river bank between km 375 till Nm 72.432, and from Nm 72.432 till Nm 43 only right bank and from Nm 43 till Black Sea the both river bank.

A second criteria "geo-political" can divide the Romanian stretch in next sections:

- border with Serbia, km 1075 till km 845+500;
- border with Bulgaria, km 845+500 till km 375;
- border with Ukraine, Nm 72.432 till Nm 43.

Third criteria about free flow can divide, thus:

- km 1075 till Iron Gates 1 – is reservoir (lake);
- Km 943 (Iron Gates 1) till km 863 (Iron Gates 2) – is the same reservoir (lake);
- km 863 (Iron Gates 2) till –Hm 99+70 is free flow section.

The main tributaries to the Danube, in the Romanian stretch are as following : Jiu at the km 691, Olt at the km 604, Arges at the km 432, Siret km 155 and Prut Nm 72.432.

The Romanian Danube stretch attains at the maximum class rating of Class VII, that allowing transit of nine pushed barges.

4.2. Waterway parameters (depth, wide, etc.)

Fairway is the navigable part of the waterway and is defined by 3 parameters depth, width and radius of curvature.

The recommendations of the Danube Commission for the Romanian stretch are following:

Minimal depth in the fairway H

- Sections with free flow $H \geq 2.5$ m
- Sections under the influence of the backwater $H \geq 3.5$ m

Minimal width of the fairway B

- Sections with free flow

Sections with easily scouring bottom $B \geq 180$ m

Sections with easily scouring bottom in meander $B \geq 200$ m

Sections with rock bottom $B \geq 100$ m

Shoals with easily scouring bottom $B \geq 150$ m

- Sections under the influence of the backwater $B \geq 200$ m

Minimal radius of curvature (along the fairway axis) R

- $R \geq 1000$ m
- Sections with unfavorable geomorphologic conditions $R \geq 750$ m

Fairway with B, with regard to the radius of curvature, in accordance to the Danube Commission recommendations is:

- $B = 180.0$ m for $R > 4000$ m (straight section)

- B = 200.0 m for R < 4000 m (curvature - meander)

A. River Danube rkm 1075 Baziaş - rkm 175 Brăila

Minimal Dimension FAIRWAY	rkm 1075 – 863 retention	rkm 863 – 175 FREE FLOW
Width of fairway	180	150 – 180
Depth of fairway	3,5	2,5
Vertical clearance	16,5	19
Radius of curvature	1000	1000

B. Sea Danube rkm 175 Brăila – rkm 0 Sulina

Minimal Dimension FAIRWAY	rkm 175 – 0
Width of fairway	180
Depth of fairway	7,30
Vertical clearance	38 - 39
Radius of curvature	750 - 1000

5 WATERWAY MAINTENANCE

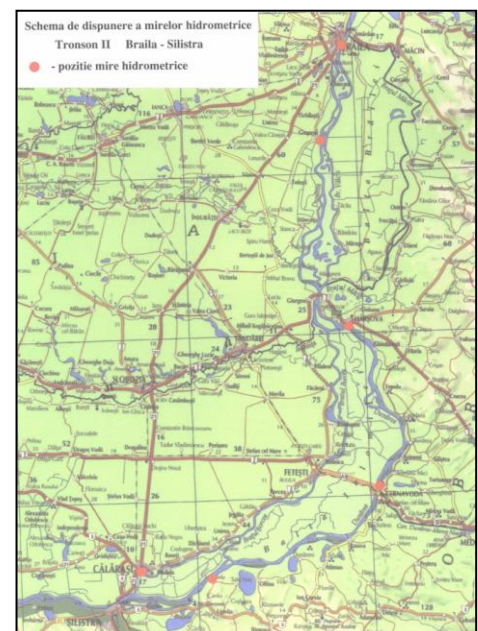
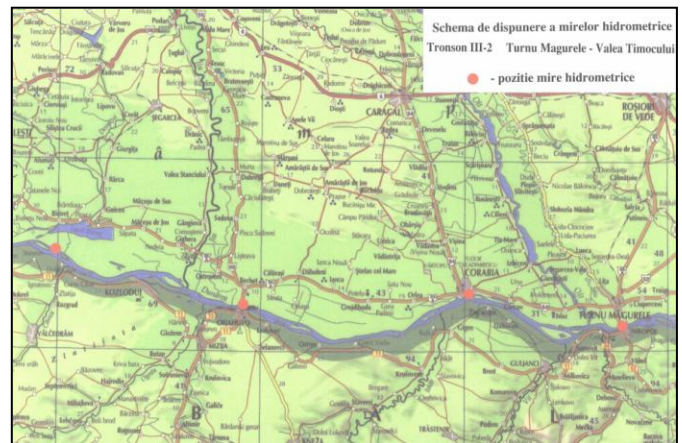
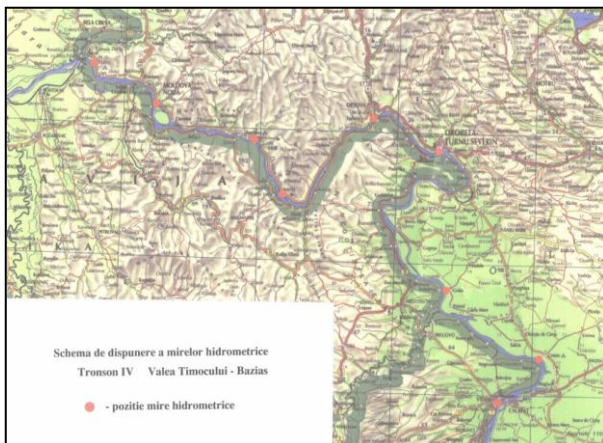
5.1. Main activities for waterway maintenance – hydrology, survey, signalization

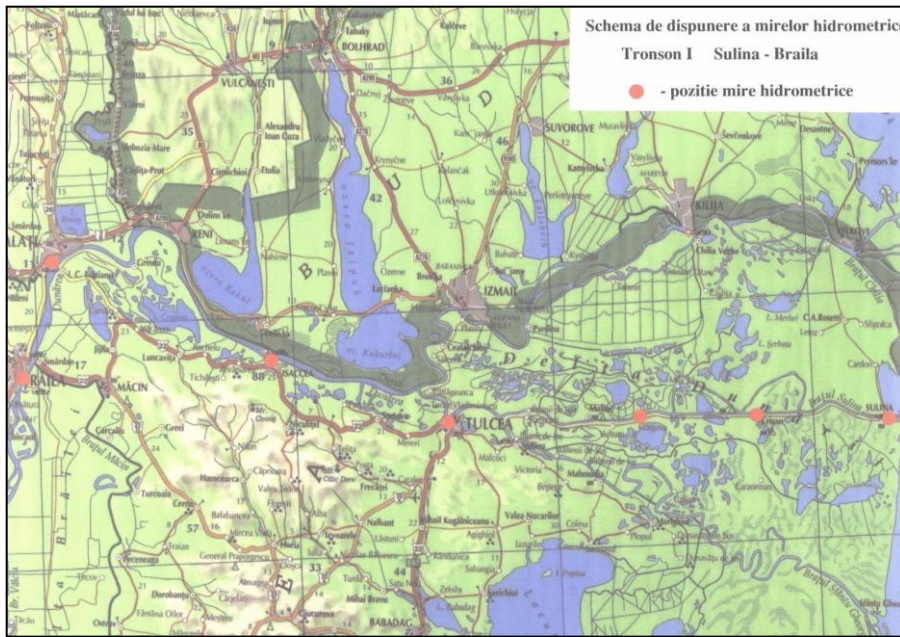
5.1.1. Hydrology

In Romania, there are 23 hydro-meteorological stations managed by the River Administrations of the Lower Danube. Daily are gathering information about level, temperature, pressure, etc. All these information are available to the AFDJ website, to the sections levels. Data, forecasts and warnings are presented in special bulletins and transmitted to the Ministry of Transport.

In Romania, the Romanian Water Authority, have in special sections installed tide gauges that are in close cooperation with the AFDJ tide gauges.

For waterway maintenance is very important to know the level and forecast. These two parameters are in close cooperation with the position of the buoy and the fairway.





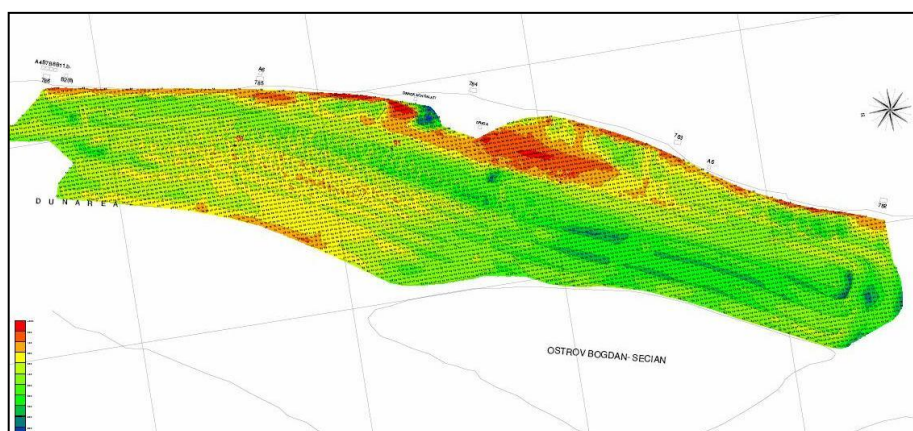
5.1.2. Survey

Topo-hydrographical surveys represent the gathering method of the raw data from field. After processing of these data, the result will be the basis for establishing the fairway, the position of the buoys, in respect of the gauges of the Danube Commission.

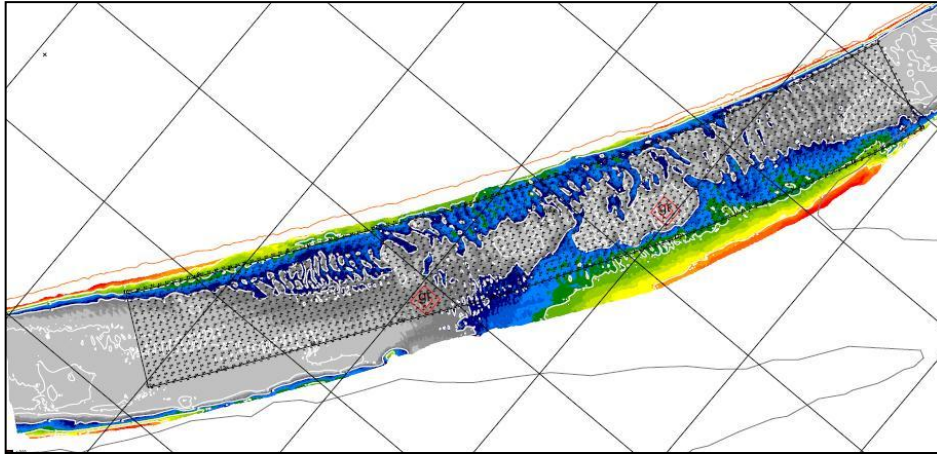
The AFDJ have 3 survey ships, 2 with river classes and one with maritime class, that use the equipment, like multibeam sonar – Atlas fansweep 20, singlebeam Atlas 350, GPS Trimble 750S, SVP Atlas and motion sensor TSS 3-05. These 3 survey ships are located in Giurgiu branch, in Galati and the last one in Sulina, for Sea Danube.



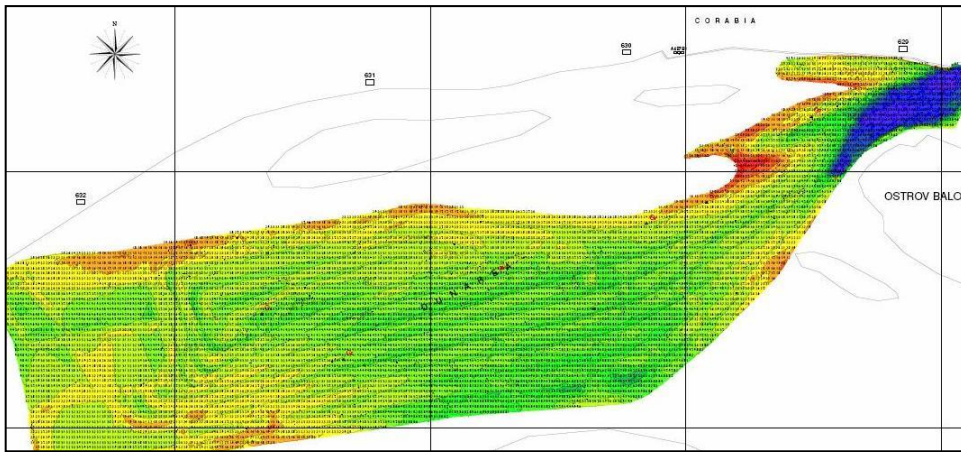
Results in critical points after survey with Donaris, on the river Danube and Sea Danube:



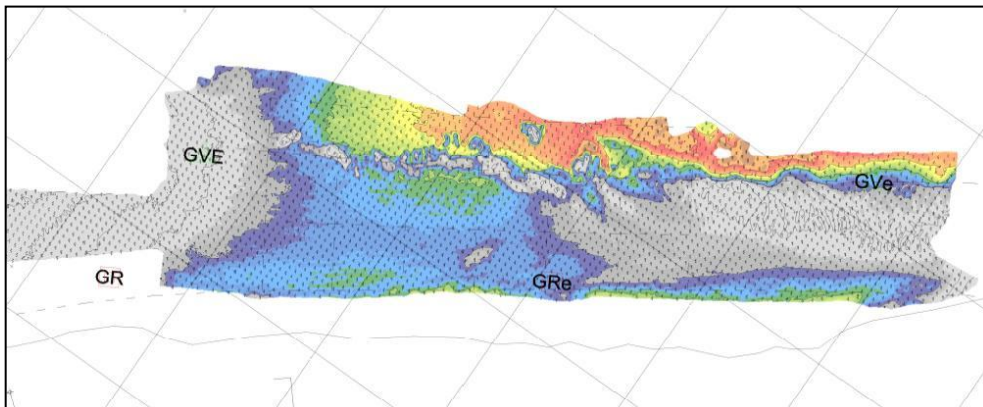
Bogdan-Secian km 785



Albanesti km 276



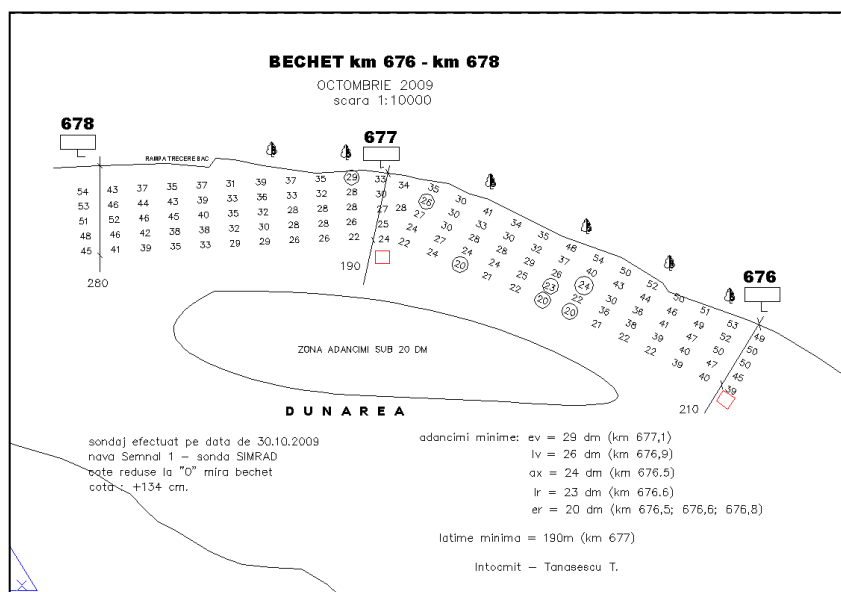
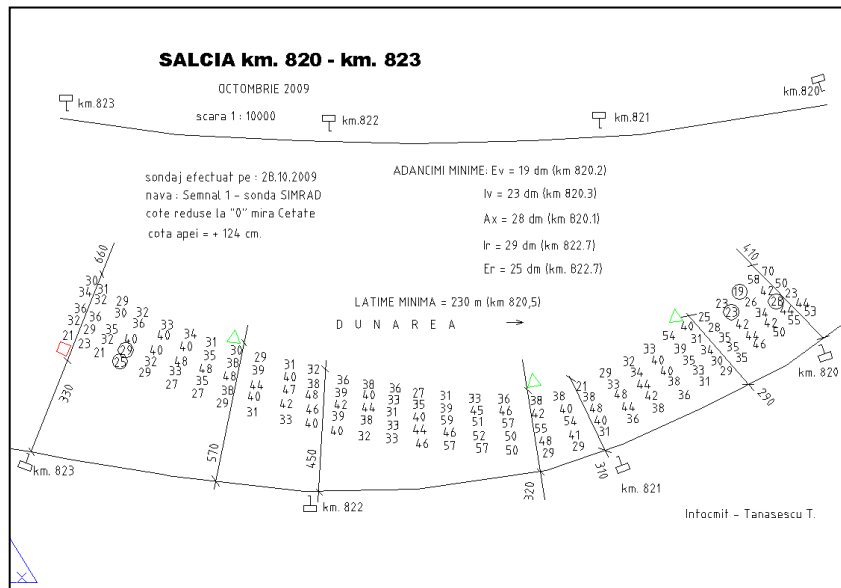
Corabia 630

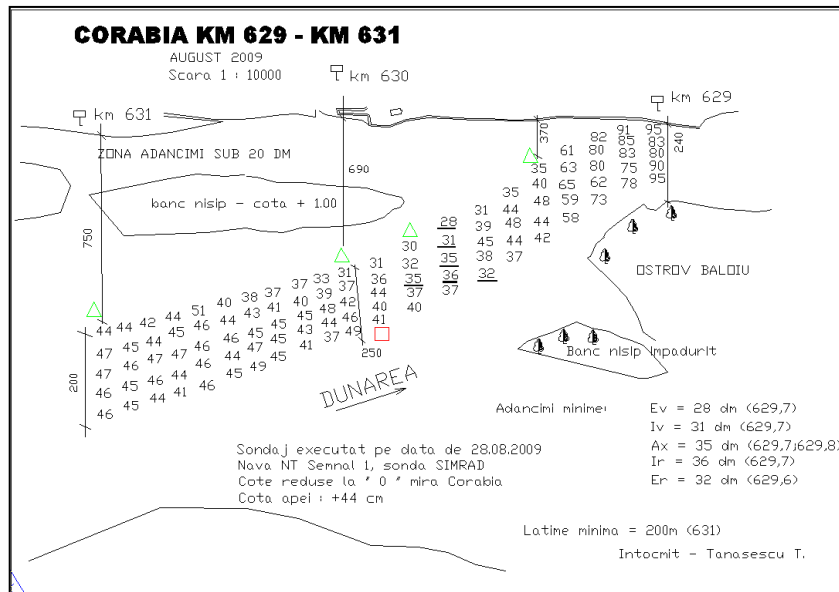


Seimeni km 292

5.1.3. Bottlenecks

In the Romanian stretch of the Danube, there are a lot of bottlenecks in the next points: Salcia km 824, Bogdan-Secian km 785, Pietrisu-Dobrina km 759, Linovo km 738, Bechet km 677, Corabia km 630, Turcescu km 345, Carageorghie km 344, Lebada km 337, Marleanu km 326, Fermecatut amonte km 322, Fermecatut aval km 318, Cernavoda aval km 297, Seimeni km 292, Albanesti km 276, Harsova aval km 251, Giurgeni Vadu Oii km 243.





On the second arms there are identified a few critical points:

Borcea arm at Borcea km 99, 97, 93 and Bordusani km 24.

Macin arm at Piatra Frecatei km 63, Bedeloiu km 43 and Carcaliu km 26

Chilia arm at Tatanir, km 75

Saint George at Ada Marinescu km 103

5.1.4. Signalization

All coastal and floating signalization is built in our workshops. Their location is carried out by field personnel. Signalling sailing line on the Danube is carried out by ship-type specific signalling. Every month, signalling races are conducted.

Floating signs for winter is replaced with special signals for the winter (more resistant to winter conditions). Maintenance is signalling coastal whenever needed and consists of cleaning, painting, straightening, clearing the area, etc.. Signalling coast is composed of indicators kilometres or nautical miles and coastal signals about Rules of Navigation. Signalling floating buoys consists of large (which may be electric or not) and low during winter signals from metal.



Also, the signs change (replace) if there is damage, the loss of the signal, and when sailing line changes (narrowing, widening, change from one bank to another), or depending on necessity to navigation consistent with the variation of the Danube.

The types of signals used as DFND (Danube Commission) are:

coastal (with or without light), indicator panels, lights (with white light, yellow, red or green)

Floating: sea buoys (with or without light), river buoys (with or without light), kilometres mark (without light), nautical miles (without light).



For modernization of the activities in support to ensure optimal conditions for the smooth navigation, AFDJ Galati approved and implemented on a modern program efficiency phase of this work.

Thus, in 2004 have been purchased and have made the following:

- 30 buoys made the type SHIP DESIGN mm 2 - Sulina;
- 15 buoys at sea made Mm Workshop 2 - Sulina;
- 7 lamps with solar panel purchased from Tehnoton Iasi, which were placed on 7 lights on Sulina channel, replacing legacy systems that work with acetylene cylinders;
- 1 lamp with solar panel in a buoy type testing SHIP DESIGN;
- 2 lamps purchased from PHARE MARINE England, which were placed in Ceatal Izmail (MM 43) and fog St. George (MM 34);
- were put into service two input lights - out of the mouth of the Sulina Canal;
- sandblasting and painting their buoys with reflective paint;
- placement of reflective film on coastal panel signals, headlamp and epiu the Sulina channel to increase visibility at night;
- monitoring and coastal signs floating in the sea and Danube river Danube was done by boat range and later with the three American boats Nautics type;
- reduce the number of strokes of signaling and resource efficiency by establishing specific problems resulting from racing boats sector verification inspection;
- have been purchased and is operating two programs:

5.1.5. Dredging

Danube shipping, work is carried out with their machines by:

- Topohidrografice measurement analysis and prioritization of performance at each critical point;
- Provisions of dredging;
- Opinions by seafarers;
- Coordinating implementation of dredging work;
- Regular checks of the activity measurements topohidrografice, field trips aboard the dredging equipment;
- Tracking topohidrografice efficiency measurements, establishing objective measures of business performance by geomorphological evolution of the area, levels, indicating optimal dredging sites;
- Follow the work of dredging quality measurements, quantities achieved certification;
- Checking reports weekly, monthly, coming from departments / agencies, the dredging work at the indicator, targeting them and advance the achievements of the service plan;



5.2. River engineering constructions and execution;

‘Technical Assistance for the Improvement of the Navigation Conditions on the Danube’, reference EUROPEAID/114893/D/SV/RO, The contract is endorsed for co-financing in accordance with the Limits of the Financing Memorandum ISPA 2002/RO/16/P/PA/011 by the European Commission.

The specific objectives for this service contract are, in accordance with the ISPA Financing Memorandum 2002/RO/16/P/PA/011;

1. The study of three possible measures along the Danube;
2. The completion of an ISPA application for one measure, which shall improve the navigation conditions between Calarasi and Braila;
3. Design and completion of the necessary works tender dossier(s) for this measure.

Subsequent completion of the works shall promote sustainable mobility, more efficient and low-cost and environmentally friendly inland waterway transport on the Danube, notably through improved navigation conditions on the Calarasi-Braila Section. The distribution of the discharges between the Lower Old Danube and the Bala branch shows that for medium to high daily discharges about 50 % flows into the Lower old Danube before 1970, but this percentage has dropped to only 40% nowadays. For low discharges in Silistra (usually in summer-autumn), in the 1970's about 30% continued into the Lower Old Danube. Nowadays, only about 20% continues into the Lower Old Danube, but remaining constant for the last 10 years. It can be concluded that there is a decreasing trend for the discharge in the Lower Old Danube.

Present navigation conditions on the Danube

For the Danube between Calarasi and Braila, the design guidelines as established by the Danube Commission recommend a channel depth of 25 dm below the reference level ENR. Upstream of the Iron Gates I and II, the recommended water depths are 35 dm below the minimum retention levels of the 2 respective dams.

According to the Danube Commission recommendations, for the free flowing stretches of the Danube between rkm 1791.00 and km 62.97, the width of the fairway is as follows (next text in French):

- a) sur les sections à lit
à terrain meuble au moins 180 m
- b) sur les sections à lit
ou à seuils rocheux au moins 100 m
- c) sur les sections de seuils
à terrain meuble au moins 150 m”

Thus, the recommended channel width is 180 m at ENR – 25 dm, but for sections with sandbars a channel width of 150 m can be considered. The channel radius of 1000 m has been recommended, or 750 m when unfavorable from a geomorphological point of view.

Based on the actual bathymetry and the existing navigation fairway, several site visits and discussions with local authorities an assessment was made of critical locations. Navigation problems can occur because of several reasons. Most frequently, insufficient navigation channel depth and/or width, or a too high navigation channel curvature cause these navigation problems.

Some of the most important critical locations are: Carageorghe sand bar(km 345-342), Lebada (km 341-336), Mirleanu (km 329-325), Fermecatu island (km 323-318); Cochirleni (km 310-307), Cernavoda (km 300-296), Fasolele island (km 292), Alvanesti (km 276), Hirsova (km 251-250), Giurgeni-Vadu Oii (km 245-242) and Ostrovo Lupu (km 196).

-Bala branch: The proposed solution for the Bala branch consists of a bottom sill in combination with a guiding wall. One of the development strategies consists of relocating the sill to a location more upstream on the Bala branch. The reason for this is a possible reduction in the construction costs of the guiding wall. The necessary quantities for the construction of the bottom sill will probably remain almost the same when the sill is moved up to 300 m more upstream. Because of this, the guiding wall part downstream of the sill can also be reduced with 300 m, which results in a major reduction of the necessary quantities of materials and therefore also a major cost-reduction.

-Carageorghe sand bar(km 345-342): The solution for this bottleneck is to dredge the navigation channel between rkm 345 and 343. The dredge material can be used to construct the guiding wall and to fill up the scour hole behind the existing parts of the sill.

-Lebada (km 341-336). Dredging of the shallow locations at rkm 340 and between rkm 338-337 is the main solution for solving this bottleneck. From a technical point of view, disposal of the dredged material can be done in the Turcescu branch or in the Epurasul branch, both solutions ensuring the further closing of these branches. If necessary the Epurasul can further be closed by constructing a bottom sill on the entrance of the branch. Some bank protections will also be necessary to protect the upstream end of the Epurasul island.

-Mirleanu (km 329-325), The navigation bottleneck at Mirleanu is situated just at the downstream end of Seica island or branch. The solution for this bottleneck consists of dredging the shallow sections at km 328 and 326 and disposing the material in the Seica branch. Furthermore, it can be necessary to further close the side branches forming the Seica island by bottom sills or to direct the flow away from Seica Island by constructing groins.

-Fermecatu island (km 323-318); Navigation problems (insufficient water depth) also occur at Fermecatul Island, as well upstream as downstream. This is certainly due to the presence of several, rather large, side branches near the island. The solution for this bottleneck consists of dredging the main channel and disposing the material in the other branches. Furthermore, some measures for flow regulation to reduce the influence of Tiu and Ceaciru (groins, bottom, sills) can be constructed if necessary.

-Cochirleni (km 310-307), the navigation bottleneck at Cochirleni is situated near rkm 309. at the upstream and of the island. The proposed solution consists of dredging at the up- and downstream end of the island. Disposal of the material can be done in the side branch on the right bank. A possible 2nd phase measure is to close the side branch on the right bank even further by constructing a sill.

-Cernavoda (km 300-296), Near rkm 29 there is a small navigation bottleneck, which in extreme conditions can become a real problem. Solution for this problem is to dredge the critical section to a sufficient depth.

-Fasolele island (km 292), Near Fasolele island navigation problems can occur near the upstream end of the island because of insufficient navigation depth and because of a to high channel curvature. Dredging the critical location can solve the problem of insufficient depth. The dredging material can be disposed in the side-branch. A more drastic solution for the problem, both solving problems with depth and curvature, is to close the current navigation channel and create a new navigation channel in the side branch, thus straightening the navigation channel. The dredged material can be used for closing the other branch. The further closure of the old navigation channel will have to be done by constructing sill.

-Alvanesti (km 276), Because of the widening of the river cross section near rkm 275-276. the cross section get shallower and navigation problems might occur. The solution for this problem is to dredge the navigation channel to sufficient depth and dispose the material in a nearby side branch (Balaban branch).

-Hirsova (km 251-250), Near Hirsova, navigation problems might occur due to shallow cross-sections near rkm 250, resulting in insufficient width of the navigation channel. The proposed solution is to dredge the critical location and to dispose the material in the Celea Mica branch upstream the critical location or in the nearby shallow section on the right bank.

-Giurgeni-Vadu Oii (km 245-242) Because of the bend of the river between rkm 245 and 242 river cross sections get wider and shallow causing possible navigation problems because the available channel width is not sufficient. The solution for this bottleneck is to dredge the navigation channel. Disposal of the material in the river close to the critical location is difficult. possibly a few kilometers upstream.

-Ostrovo Lupu (km 196) If navigations to go back through the Danube instead of through the Caleia branch. Some flow regulation works and dredging works are necessary for ensuring navigation again. The dredging works have to be concentrated on the area in the Danube just downstream of the splitting with Caleia branch. Furthermore. Flow regulation works are necessary to direct the flow back into the main Danube. Flow regulation works can include: constructions of a bottom sill at the upstream end of the Caleia branch, construction of groins near the confluence of the Valciu branch, construction of groins on the Danube just upstream the split with the Caleia branch.

Current issue	Position kilometer	Bank: Left/ Right	Naming	Technical description
1	Sector 1:km1075-km863		Gura Nerei-Ostrovol Mar	Depth : 3.5m Sailing line width :180m Length area:212km Haulage length :174km
2	Sector 2:km863-km170(includes shipping arms)		Mar-Braila islet	Depth : 2.5m Sailing line width :150-180m Length area:693km Haulage length :652km
3	Km 225	left	Borcea Arm	Depth : 2.5m Sailing line width :150-180m Length area:102km Haulage length :84km
4	Km 226	left	Bala Arm	Depth : 2.5m Sailing line width :150-180m Length area:10km Haulage length :10km
5	Km 228	left	Macin Arm	Depth : 2.5m Sailing line width :150-180m Length area:97km Haulage length :88.5km
6	Km 230	left	Valciu Arm	Depth : 2.5m Sailing line width :150-180m Length area:42km Haulage length :30km
7	Km 235	left	Caleea Arm	Depth : 2.5m Sailing line width :150-180m Length area:11km Haulage length :10km
8	Km 238	left	Landing place	12.50m reinforced concrete,reinforced

				concrete beams at the rate + 2m. (Mattress fascinated by 1m)
9	Km 238	left	Landing place	Destroyed 90%.
10	Km 237	left	River landing place	50% of work is covered by a pumping station platform.
11	Km 237	left	River landing place	Destroyed 90%.
12	Km 238	left	Mal defense left	Defense mattresses left bank of fascinated by 1m thick and 30 m wide.
13	Km 239	left	Defense mal left to upstream.	Mattresses fascinated with 1m thick and 30 m wide.
14	Km 239	left	Mal defense left	Fascinated by 1m thick and 30 m wide.
15	Km 239	left	Mal defense left	Mattresses fascine 30 m wide and 0.75m thick.
16	Km 239	left	Mal defense left	Mattresses fascine 30 m wide and 0.75m thick.
17	Km 239+300	left	Mal defense left	Inverse filter bank slope of 25 cm thickness of ballast and crushed stone.
18	Km 242+250-km 242+650	left	Mal defense left	Mattresses fascine 0.75m thick and 25m wide.
19	Km 240+28- km240+480	left	Mal defense left	Mattresses fascine 0.75m thick and 25m wide.
20	Km 243+650-km 243+800	left	Mal defense left	Mattresses fascine 0.75m thick and 20m wide.
21	Km 242+900-km 243+342.	left	Mal defense left	Mattresses fascine 0.75m thick and 30m wide.
22	Km 242+720- km242+900	left	Mal defense left	Prism rockfill and filter head opposite mattress 25 cm thick.
23	Km 242+750-km 242+650	left	Mal defense left	Prism rockfill and filter head opposite mattress 25 cm thick.
24	Km 243	left	Pitching the Danube downstream and upstream	Salt fascine, piles of wood and rockfill.
25	Sector III Km 170 Mm 34 (navigable arm).	left		Depth: 7.32m Sailing line width :150-180m Length area:107km Haulage length :84.5m
26	Km 170	left	Chilia Arm	Depth: 2.5m Sailing line width :150-180m Length area:96km Haulage length :85m
27	Berth IV maritime -bank head(110m)	left	pitching of Danube	Made of raw stone with cement mortar in the thickness of 30cm.
28	Berth 34 river, 108 m	left	pitching of Danube	Mats fascinated by 40m wide, rough stone rockfill based.
29	Berth 35 river	left	pitching of Danube	Rockfill of raw stone at the base, mattress fascinated by 40 m wide.
30	Berth 34 river	left	pitching of Danube	Mats fascinated latime.Coronament to share 40 m 6, rockfill basis.
31	Km 150 downstream – Berth 16(150m lenght)	left	Pitching over river vessels berthing	Rockfill of raw stone at the base. Fascine mattress thickness of 1m.
32	Berth V-VI, former berth VII	left	Pereu la Dunare	Coronament la cota +6. Zidarie din piatra bruta cu mortar de ciment.
33	Head upstream - downstream of the ferry berth 3	left	pitching of Danube	Canopy to +4.5 share, rockfill at the bottom, a bottom appliance mattress fascinating.

34	Downstream of profile 6 - 4 berth river.	left	pitching of Danube	Mats fascinated by 12 m long canopy at an average rate, based on rough stone rockfill.
35	Downstream profile 12-15, berth 7.8	Left	pitching of Danube	Rough stone masonry with cement mortar, mattress fascinated by 40 m wide and massive rockfill.
36	Station river - boating Vadul	left	Keys down the Danube.	Rough stone masonry.
37	Sector IV km 62.37 – km0	right	Navigable arm	Depth: 2.5 m Sailing line width: 150-180m Length area:63km Haulage length :52.97km
38	Km 62	right	Sf.Gheorghe Arm	Depth: 2.5 m Sailing line width: 150-180m Length area:100km Haulage length :100km
39	Mm 30+1000- Mm 30+300.	left	Defense bank Papadia	Mattresses fascine type Danube, geotextile filter, prism rockfill, clothing the stone block.
40	Dike nord=1.338m Dike Sud= 370m	left	Parallel dykes	Channel Sulina Est si Vest – dams.
41	Km 60 L=275m	left	Groin guard	Dikes
42	Km 58	Left/right	Groin stone	Made of raw stone from the shore to deep to keep the banks for erosion.
43	Km56 S=11.800mp	right	Pitching	Stone masonry laid on a layer of filter reverse.
44	Km54 S=115.20mp	left	Sulina channel pitching	Stone masonry laid on a layer of filter around. = 30cm thick stone masonry.
45	Km52 S=254.80mp	left	Sulina channel pitching	Stone masonry laid on a layer of filter around. = 30cm thick stone masonry.
46	Km 50 S=4650mp	left	Sulina channel pitching	Stone masonry laid on a layer of filter around. = 30cm thick stone masonry.
47	Km48 S=70.109mp	right	Sulina channel pitching	Stone masonry laid on a layer of filter around. = 30cm thick stone masonry.
48	Km46 S=18.231mp	left	Sulina channel pitching	Stone masonry laid on a layer of filter around. = 30cm thick stone masonry.
49	Km 44 L=700m	left	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
50	Km 42 L=1105m	left	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
51	Km 40 L=952m	left	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
52	Km 38 L=800m	left	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
53	Km 36 L=1105m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
54	Km 34 L=1202m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
55	Km 32	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
56	Km 30	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
57	Km 28 L=914m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
58	Km 27 L=1040m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
59	Km 26 L=700m	left/right	Wharf Ceamuraia	Mattress type fascine Danube, clothing

				stone blocks.
60	Km 25 L=752m	left/right	Wharf Obretin	Mattress type fascine Danube, clothing stone blocks.
61	Km 24 L=1032m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
62	Km 23 L=957m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
63	Km 22 L=1205m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
64	Km 21 L=500m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
65	Km 20 L=800m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
66	Km 19 L=950m	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
67	Km 18	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
68	Km 17	left/right	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
69	Km 16	left	Sulina Canal shore protection	Mattress type fascine Danube, clothing stone blocks.
70	Km 15 L=1790m	left/right	Pitching of Sulina channel.	Embroidered stone masonry placed on a layer of filter around.
71	Km 14 L=2280m	right	Pitching of Sulina channel.	Embroidered stone masonry placed on a layer of filter around.
72	Sector V Km 0 Sulina	left/right	Sulina area.	Depth : 7.32m Sailing line width :150-180m Lenght area :11.1km Haulage lenght :11.1km
73	Dike N =1.993m Dike S = 1.115m	left	Old dikes	Raw stone and drivers on 2 strings.
74	Dike Port Sulina L=100m	left	Dike submerged	Built of rough stone.
75	Dike Port Sulina L=100m	left	Dike submerged	Built of rough stone.
76	Dike Port Sulina L=101.2m	left	Dike insubmerged	Built of rough stone.
77	Dike Port Sulina L=78.40m	left	Dike insubmerged	Built of rough stone.
78	Dike Port Sulina L=201.8m	left	Dike insubmerged	Built of rough stone.
79	Dike Port Sulina L=208.3m	left	Dike insubmerged	Built of rough stone.
80	Dike Port Sulina L=208.3m	left	Dike insubmerged	Built of rough stone.
81	Dike Port Sulina L=150m	left	Dike submerged	Built of rough stone.
82	Dike Port Sulina L=203.5m	left	Dike submerged	Built of rough stone.
83	Dike Port Sulina L=100m	left	Dike submerged	Built of rough stone.
84	Dike Port Sulina L=97.10m	left	Dike insubmerged	Built of rough stone.
85	Dike N =4580m Dike S = 4351m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.

86	Dike N =50m Dike S = 50m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
87	Dike N =50m Dike S = 50m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
88	Dike N =100m Dike S = 100m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
89	Dike N =203m Dike S = 203m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
90	Dike N =202m Dike S = 206m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
91	Dike N =358m Dike S = 358m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
92	Dike N =155m Dike S = 197m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
93	Dike N =155m Dike S = 197m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
94	Dike N =125m Dike S = 125m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
95	Dike N =100m Dike S = 100m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
96	Dike N =100m Dike S = 100m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
97	Dike N =100m Dike S = 100m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
98	Dike N =101m Dike S = 101m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
99	Dike N =102m Dike S = 101m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
100	Dike N =84m Dike S = 84m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
101	Dike N =204m Dike S = 204m	left	Dike parallel	Fascine mattress foundation frame of fir pillars.
102	Km 13 L=950m	left	Sulina shore protection.	Mattress type fascine Danube, clothing stone blocks.
103	Km 12 L=2.367km	left	Sulina shore protection.	Mattress type fascine Danube, clothing stone blocks.
104	Km11	left	Download Free Port fishermen.	
105	Km 10	left	Download Pescara - Trap.	

5.3. Common sector, waterway maintenance;

- Bilateral agreement between the governments of Romania and the Federative Socialist Republic of Yugoslavia, Belgrade 1976 with regard to the establishment and control of application of navigation rules, maintenance and improvement of navigation conditions on the sector where Danube is border line between the two states from km 845.5 to km 1075.
- Bilateral agreement between the governments of Romania and the People's Republic of Bulgaria, Sofia 1955 - as to the maintenance and improvement of the navigation fairway on the Romanian - Bulgarian sector of Danube between km 375 and 845.5;
- Bilateral agreement between the governments of Romania and the Soviet Union, Moscow 1953 - as to the functioning of the River Administration of the Lower Danube of Galati, for the maintenance of the fairway and the accomplishment of hydrotechnical works on maritime Danube sector (Sulina - Braila);

Given the special conditions offered by the Danube river, both in terms of navigation corroborated with the route and geographical location (east-west) of ancient times, shipping areas and the mouth of the estuary in the Black Sea constituted an important objective for riparian countries.

Thus, to establish an agreement about the rules of navigation on the Danube and to ensure free navigation on the Danube, on 18 August 1948, the Belgrade regime has signed the Convention on Navigation on the Danube.

Romania is the Danube, the natural border with Yugoslavia (Serbia), Bulgaria, Moldova (1,000 m) and Ukraine.

In the Belgrade Convention and the subsequent agreements signed at the government and the Danube Commission recommendations were established common areas of activity and functions in each coastal State Party to ensure the navigation conditions on the jurisdiction. Thus:

-Between Baziaş (km. 1075) and Gura Timok (km. 845.5), the Danube is common with Serbia. In this sector there is close cooperation between the AFDJ - RA Galati and PLOVPUT Beograd, which resulted in the regular working level meetings of experts, the following joint activities:

- Development, analysis and signal joint plan agreed on common sector of the Danube;
- Control measures (long profile of the sector in km. 1075 - km. 845.5, sections cross);
- Exchange of hydrometeorological data (Hydrometeorological Bulletin, weather, etc..)
- Joint headquarters in the ice;

Sector of Danube river between km. 845.5 (Timoc) - km. 375 (Silistra) is common with Bulgaria. In this area, cooperation between A.F.D.J. - RA Galati and APPD RUSSE, takes place in the Agreement signed between the Government of Bulgaria and Romania, signed in Sofia in 1955 and based Danube Commission

Recommendations.

Thus, regularly held meetings of specialists, Romanian and Bulgarian, which, in the Session of the Mixed Commission, which is conducted annually, or in working groups and where to examine all aspects of providing common navigation conditions on the Danube (km. 375 - km. 845.5).

During these meetings to discuss plan signaling winter - summer are hydrometeorological data exchange, joint measures to establish programs on the Danube, the critical points of the joint.

Annual Joint Technical Committee meets Romanian - Bulgarian, to bridge "Friendship" Giurgiu - Russe, which is presented and analyzed following the results of measurements carried out jointly topohidrografice during periods of low and high levels of the Danube, to trace the morphological evolution of riverbed Danube Bridge in the Giurgiu - Russe.

Also in the cooperation between the two parties in accordance with paragraph 6 of the Intergovernmental Agreement (Sofia 1955) and section 15 of the Regulation, held annual meetings to determine how collaboration for periods with ice.

In the Maritime Danube, between the Danube and Prut River confluence to 71 Mm + ½, Romania has a common border with Moldova. For this short sector, Romania has not signed any agreement with Moldova, as it joined quite late in the Danube Commission (after the Soviet Union collapsed). In this area, maintenance sailing line belongs to Romania.

Sector Maritime Danube between Mm 71 + ½ and Izmail - 43 Mm and 43 Mm Chilia at the km. → 20, is the common border with Ukraine.

In Ukraine there is collaboration, where ice is highlighted meetings where the parties to determine how common intervention in special circumstances winter (ice), the reciprocal exchange of hydrometeorological information and other items necessary to ensure the conditions of navigation in accordance with Danube Commission recommendations.

5.4. Waterway maintenance in the ice period;

During the ice period, the information about ice, water and air temperature, visibility is often collected and sent to seafarers, by own website or special bulletin. It also keep in touch with the Administration Hydroelectric and the Administrations of neighbouring countries, PLOVPUT from Serbia and APPD (EAEMDR) from Bulgaria. It is create an Emergency Command, leading all operations and take any decisions to overcome the period.

If the situation requires it, run and measured critical points, if not, run monthly verification measures. Signaling during this period is specified winter period, and at least monthly to check voyages, and the repositioning or planting buoys.

5.5. Waterway maintenance in the lowest level period;

During low levels period more often information are gathering from the 23 weather stations on the variation of water level of the Danube. This information is submitted to the Ministry of Transport through a special newsletter and are available on the website. It is create an Emergency Command, that is leading all operations and take any decisions to overcome the period. It also keep in touch with the Administration Hydroelectric and the Administrations of neighbouring countries, PLOVPUT - Serbia and APPD (EAEMDR) - Bulgaria. The voyages checking signalling and reposition buoys on the fairway. Vessel measurements remain on the sector to perform periodic verification measures at critical points. Results of daily measurements are transmitted to central station via Internet, and then be provided to seafarers. During low levels period it will perform survey of the flows and measurements are made in sections calibrated, then has changes data with Romanian Waters Administration.

5.6. Waterway maintenance in the highest level period;

During high levels period more often information are gathering from the 23 weather stations on the variation of water level of the Danube. Depending on the levels (attention, hazard and flood) will perform to very often. These information are submitted to the Ministry of Transport through a special newsletter and are available on the website. It is create an Emergency Command, that is leading all operations and take any decisions to overcome the period.

It also keep in touch with the Administration Hydroelectric and the Administrations of neighbouring countries, PLOVPUT - Serbia and APPD (EAEMDR) - Bulgaria. Daily, to keep in touch with Hidroelectrica and receive reports about the situation in the lake. The voyages checking signalling and reposition buoys on the fairway. If the situation requires the rarest signs floating in the sector. Vessel measurements remain on the sector, to perform periodic verification measurement at critical points. It performs measurements of currents Results of daily measurements are transmitted to central station via the Internet, and then be provided to seafarers.

During high levels it will perform survey of flows and measurements that are made in calibrated sections, then data are changes with the Romanian Waters Administration.

5.7. Report about the prevention and restoration of flood damages;

During a flood period the number of gauge stations is increased, where is necessary. The water level observations are performed on an hourly base and at the automatic stations this is a permanent process. Updated information regarding the river water levels is distributed through the AFDJ website, e-mails, fax transmissions and telephone calls.

A permanent connection is maintained with the Local and Central Authorities, Regional institutions, Romanian Water Administration and organizations that are responsible for the dykes maintenance.

5.8. Planning for lock maintenance and repairing;

On the Romanian sector of Danube, there are two dams Iron Gates 1 at km 943 and Iron Gates 2 km 863. At Iron Gates 1, that are 2 locks built, each country manage one (Serbia - Djerdap and Romania - Hydroelectric), with dimensions of 310 x 34 x 4.5 m. The Iron Gates 2, Hydroelectric maintain 2 locks, a normal lock 310 x 34 x 4.5 m, functional and the second, smaller in size 140 x 14 x 2.5 m. In point of Cernavoda, start the Danube - Black Sea canal, and was added to lock the entrance channel. The Danube - Black Sea and White Gate Midia Navodari, all ports and locks are maintained by the Administration of Navigable Channels Constanta.

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