



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

**STATUS QUO REPORT ON HYDROLOGICAL ACTIVITIES**

<b>Document ID:</b>		
<b>Activity:</b>	3.1. - Improve Methods, Processes and Procedures for Hydrographical and Hydrological Activities	
<b>Author / Project Partner:</b>	<b>Date:</b>	<b>Version:</b>
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## 1. SCOPE OF DOCUMENT

This document describes the main hydrological activities of Administration of the Navigable Canals SH, Constantza, Romania on the Danube - Black Sea Canal and Poarta Alba- Midia Navodari Canal.

The relevant content of the status quo report includes the monitoring network system, the hydrological conditions and extreme flows and flood disasters. It deals both with hydrological forecasting and warning.

## 2. LIST OF ABBREVIATIONS

<b>ABBR.</b>	<b>Abbreviation</b>
ACN	Administration of the Navigable Canals SH , Constantza, Romania
DBSC	Danube Black Sea Canal
PAMNC	Poarta Alba- Midia Navodari Canal
mrMB	Meter mark Baltic Sea

### 3. MONITORING NETWORK

#### 3.1. DESCRIPTION OF WATER GAUGE STATION

The information regarding the water level and flow on the Danube, the forecast of the level evolution is collected daily from the site of the National Institute of Hydrology and Water Management. At Administration of Navigable Canals S.H. there is a data basis serving this purpose.

The level measurements on the navigable canals DBSC and PAMNC are made through installations of level measurements completely automated and assisted of existing computers at the four locks, in the following control points:

- Upstream and downstream at the Cernavoda lock;
- Upstream and downstream at the Agigea lock;
- Upstream and downstream at the Ovidiu lock;
- Upstream and downstream at the Navodari lock;

The level measurement system allows the transmission at the Agigea Central Dispatch in a computer, where it will be created a data basis regarding the history of the level variation in the two waterways.

In addition to this, in all the hydro-technical nodes there are located topometry gauges for comparison and as reserve element at the automated installations.

The measurement system completes the following conditions:

- **Measured parameter:** the water level in the downstream points and upstream ones on each lock;
- **The level measurements precision:**  $\pm 1$  cm;
- **Level display frequency:**
  - Locally at lockage: - from 5 to 5 minutes
  - The transmission to headquarter: - once an hour;
- **Data base:** in the computer from the headquarter is created a data base with statistic role which covers the transmitted data from the level measurements installations;
- **Environmental requests:** the installation functions no matter what season, including the case of ice on the canal.

The Water Management – Environmental Protection bureau permanently monitors the water level from the navigable canals, according to which it coordinates the activity of water pumping from the Danube and of water consumption from the canals for the maintenance of the optimum exploitation level in the canals:

Data	Amonte			Sas1			Sas2			Aval		
	medie encoder	medie hidro	nivel	medie encoder	medie hidro	nivel	medie encoder	medie hidro	nivel	medie encoder	medie hidro	nivel
7/7/2007 00:00:56	7.37	7.75	7.56	1.51	1.53	1.52	1.51	1.55	1.53	1.53	1.51	1.52
7/7/2007 00:30:28	7.35	7.70	7.52	1.52	1.53	1.52	1.51	1.55	1.53	1.53	1.51	1.52
7/7/2007 01:00:32	7.28	7.63	7.46	1.52	1.53	1.52	1.51	1.55	1.53	1.53	1.51	1.52
7/7/2007 01:30:37	7.30	7.65	7.48	1.52	1.52	1.52	1.51	1.55	1.53	1.53	1.50	1.52
7/7/2007 02:00:58	7.33	7.71	7.52	1.51	1.53	1.52	1.51	1.55	1.53	1.53	1.51	1.52
7/7/2007 02:30:30	7.30	7.65	7.47	1.52	1.53	1.52	1.51	1.55	1.53	1.53	1.51	1.52
7/7/2007 03:00:35	7.34	7.73	7.54	1.52	1.52	1.52	1.51	1.55	1.53	1.53	1.50	1.52
7/7/2007 03:30:56	7.31	7.67	7.49	1.51	1.52	1.52	1.51	1.55	1.53	1.53	1.50	1.51
7/7/2007 04:00:12	7.37	7.74	7.56	1.51	1.52	1.51	1.50	1.54	1.52	1.53	1.50	1.51
7/7/2007 04:30:33	7.35	7.75	7.55	1.51	1.52	1.52	1.51	1.55	1.53	1.53	1.50	1.52

## WATER LEVEL IN NAVIGABLE CHANNELS – NOVEMBER 2009

date	CERNAVODA LOCK		AGIGEA LOCK		OVIDIU LOCK		NAVODARI LOCK		Average levels Bief II DBSC, Bief I PAMNC
	COTE		COTE		COTE		COTE		
	AMONT	ATLAS	AMONT	ATLAS	AMONT	ATLAS	AMONT	ATLAS	
0	1	2	3	4	5	6	7	8	9
1	4.46	7.41	7.41	-0.10	7.37	1.57	1.64	-0.19	7.40
2	4.63	7.47	7.46	-0.11	7.43	1.57	1.63	-0.18	7.45
3	4.77	7.46	7.39	-0.06	7.39	1.56	1.63	-0.13	7.41
4	4.87	7.38	7.32	0.06	7.31	1.57	1.63	0.01	7.34
5	4.91	7.46	7.43	-0.09	7.43	1.56	1.63	-0.14	7.44
6	4.93	7.56	7.52	-0.06	7.53	1.58	1.63	-0.14	7.54
7	4.95	7.59	7.53	-0.02	7.53	1.56	1.63	-0.10	7.55
8	4.94	7.60	7.60	-0.02	7.56	1.56	1.63	-0.08	7.59
9	4.83	7.56	7.50	-0.02	7.53	1.58	1.64	-0.09	7.53
10	4.77	7.48	7.44	-0.05	7.44	1.58	1.65	-0.10	7.45
11	4.72	7.52	7.51	-0.03	7.50	1.59	1.66	-0.14	7.51
12	4.78	7.57	7.53	-0.03	7.58	1.58	1.66	-0.23	7.56
13	5.08	7.50	7.53	-0.23	7.52	1.58	1.65	-0.23	7.52
14	5.73	7.35	7.34	-0.23	7.33	1.60	1.67	-0.23	7.34
15	6.23	7.49	7.49	-0.16	7.45	1.61	1.68	-0.16	7.48
16	6.52	7.60	7.60	-0.17	7.57	1.64	1.69	-0.17	7.59
17	6.60	7.66	7.63	-0.16	7.62	1.62	1.69	-0.22	7.64
18	6.63	7.73	7.68	-0.16	7.71	1.61	1.69	-0.23	7.71
19	6.61	7.51	7.45	-0.10	7.48	1.61	1.69	-0.21	7.48
20	6.54	7.47	7.48	-0.15	7.46	1.63	1.69	-0.26	7.47
21	6.48	7.55	7.56	-0.16	7.54	1.63	1.70	-0.26	7.55
22	6.30	7.59	7.61	-0.17	7.54	1.63	1.71	-0.22	7.58
23	6.13	7.30	7.27	-0.09	7.28	1.63	1.71	-0.18	7.28
24	5.97	7.39	7.35	-0.10	7.34	1.62	1.71	-0.17	7.36
25	5.83	7.49	7.48	-0.13	7.47	1.62	1.71	-0.23	7.48
26	5.66	7.54	7.51	-0.06	7.51	1.64	1.72	-0.20	7.52
27	5.52	7.58	7.55	-0.05	7.56	1.64	1.71	-0.14	7.56
28	5.37	7.64	7.62	-0.07	7.61	1.63	1.71	-0.14	7.62
29	5.22	7.69	7.68	-0.11	7.67	1.63	1.71	-0.16	7.68
30	5.10	7.74	7.68	-0.08	7.70	1.63	1.72	-0.16	7.71
	<b>5.50</b>	<b>7.53</b>	<b>7.51</b>	<b>-0.10</b>	<b>7.50</b>	<b>1.60</b>	<b>1.67</b>	<b>-0.17</b>	<b>7.51</b>

### 3.2. MEASURING THE WATER VOLUMES AND FLOWS

The water volume taken from the Danube in view of maintaining the exploitation level in the navigable canals on the basis of the functioning hours of the aggregates at

the Complex Pumping Station Cernavoda, and of its flow, set on the basis of the diagram of the pumps and according to the water level of the Danube.

The water volume taken from the navigable canals by the beneficiaries of use is set on the basis of the measurement machines (water meters, flow meters, electric power indicator) installed in the pumping water installations, and which belong to the hydro-technical scheme.

The calculus of the water volume consumed in navigation is made on the basis of the level upstream and downstream at each lock, of the dimensions of the chamber locks and of the number of emptying after each lockage. The water volume consumed is determined automatically by the automatic installations by the measure levels, where it created a data basis regarding the water volume history of waters transited on the waterway.

The water volumes and flows taken from the Danube transited on the Danube - Black Sea Canal and Poarta Alba - Midia Navodari Canal and evacuated in the Black Sea are calculated, registered and centralized daily within the Water Management Bureau, where there is a data basis in this purpose, based on the reports transmitted from the locks and the Complex Pumping Station Cernavoda.

In the data basis of the National Company Administration of Navigable Canals S.H. there can be found relevant information about the "Water balance" (the Water necessary) through which are monitored all the water volumes that enter and go out in/from the navigable canals.

The water volume situations that and go out in/from the navigable canals are monthly transmitted at the Romanian Waters, which represents the invested authority with a unique application of the national strategy in the field of water resources management, on the territory of the hydrographical basin Dobrogea – Seashore, having the following main tasks:

- Hydrological, hydro geologic and quality monitoring of the water resources, as well as the processing of the diagnosis and forecasts;
- The administration and exploitation of the National System of Water Management infrastructure;
- The warning and realization of prevention, fighting and disposal measures of the effects of the floods and the hydro-meteorological dangerous phenomenon , of drought and accidental pollution;
- Applying the national program of implementation of the current laws harmonized with the Directives of the European Union in the field of durative water management.

### **3.3. QUALITY AND QUANTITY MEASUREMENTS**

From a quality measurements point of view we mention that the measurement machinery of the water volumes (water meters, flow meters and electric power indicators) installed in the installations of water pumping which belong to the beneficiaries of the hydro-technical scheme are submitted to periodical meteorological checks, according to the current laws and to the contractual stipulations.

## The quantity management of the waters

1. The quantity and quality management of the waters in the Danube - Black Sea Canal is insured by the Administration through the correct exploitation of the complex hydro-technical scheme of the canal, after a calculus program which answers to some hypotheses characteristic to low, normal and high waters, coordinated to the need of take and download of waters of the beneficiaries of use.

2. When establishing the quantity management system, in low water conditions of the Danube, the following will be taken into consideration:

2.1. the Danube levels of +2,95 mrMB corresponding to an insurance of low waters of 97%, 94%, which there are usually produced in autumn, outside the irrigation season, and up to the levels of +4,30 mrMB, the beneficiaries of use can function in the limit of the parameters characteristically approved with some restrictions.

To ensure the water needs of the uses there are necessary special works on Bala branch.

2.2. At level of the Danube of over +4,30 mrMB corresponding to low waters of 70-80% in summer months, all the beneficiaries of use can function in the limit of the parameters characteristically approved.

3. When establishing the quantity management system, in normal water conditions of the Danube, the following will be taken into consideration:

3.1. Through normal waters at the Danube we understand water whose levels are bigger than +5mrMB and lower than +12mrMB.

3.2. Between these levels the complex hydro-technical scheme of the canal insures the take and download of water of the beneficiaries of use in the limits of the approved parameters in any water download situation of cooling that come from CNE – in the Danube or the canal.

3.3. For all the situations in which the levels from the Danube are found under the levels in the canal, the crossing of waters from canal pool I to canal pool II will be made with the functioning of the complex pumping station Cernavoda, in the measure in which the addition of water in this canal pool cannot benefit from water download and cooling from CNE.

4. The quantity water management system, in normal level conditions in canal pool II will take into consideration the following:

4.1. Through the normal exploiting levels in canal pool II we understand levels bigger than the +7,00 mrMB cote and lower than the +8,50mrMB cote.

4.2. Between these levels, all the beneficiaries of use have insured the conditions of water take from the canal, no matter what the flows and levels of the Danube are, the beneficiaries of use which download water in canal pool II of the canal have insured the water download in the limit of the approved parameters

5. The Quantity management system of the water from the Danube - Black Sea Canal in the periods of flood evacuation, flood created by rainfalls in the hydrographical basin, will take into consideration the following special measures which are taken in an interval of maximum 2 hours from the forecast of the general calculus and check rainfall:

5.1. When occurring the generalized or partially generalized rainfall in the hydrographical basin of the Canal with an insurance of calculus of 1%, which needs the insurance of evacuation towards the sea of a flow of 300m<sup>3</sup>/sec, the complex

hydro-technical scheme of the canal enters in alert state and the satisfaction of the needs of water download of the beneficiaries of use stops.

**5.2. The access in completely stopped in canal pool II of the water taken from the Danube, in this canal pool, the following step being the download through the links of the affluent valleys, only of the waters that come from rainfalls.**

5.3. The flood is transited through the canal towards the sea where is downloaded through the beginning of functioning of the siphoning batteries, of the high water evacuation galleries and if the case of the hydro-electric stations and clamshell downloads.

### **3.4. ELABORATION OF DATA**

Daily the following hydrological parameters are monitored:

- ◆ The water level from the Danube and the waterways through the automatic installation of level measurements;
- ◆ Water flows of the waters consumed from the canals, on the basis of the telephonic communications from the clients and on the basis of the lockage number;
- ◆ The water flow taken from the Danube with SPC Cernavoda.

Monthly the following documents are elaborated regarding the water management:

1. The water volume situation taken from the Danube with the Complex Pumping Station Cernavoda on the basis of the functioning of SPC situation, with working hours of the pumps and flow pumps.

**Pumping stations Complex Situation Cernavoda officers - PUMPING  
IN OCTOBER 2009**

Date	Nivele			PUMP OP-6			PUMP OP-6			TOTAL PUMP		
	Am Cv	Av Cv	Δh	NR. 5			NR. 7					
				Hours	Q	Volume water	Hours	Q	Volume water	Hours	Q	Volume water
	(mrMB)	(m)		mc/s	thousand cm		mc/s	thousand cm		mc/s	thousand cm	
1	4.21	7.48	3.27	0.0	0.00	0.000	8.0	9.95	286.560	8.00	9.95	286.560
2	4.16	7.41	3.25	1.5	9.95	53.730	8.0	9.95	286.560	9.50	9.95	340.290
3	4.12	7.42	3.30	24.0	9.90	855.360	24.0	9.90	855.360	48.00	9.90	1710.720
4	4.06	7.48	3.42	24.0	9.85	851.040	24.0	9.85	851.040	48.00	9.85	1702.080
5	4.00	7.66	3.66	6.5	9.70	226.980	8.0	9.70	279.360	14.50	9.70	506.340
6	3.82	7.64	3.82	0.0	0.00	0.000	8.0	9.55	275.040	8.00	9.55	275.040
7	3.77	7.60	3.83	0.0	0.00	0.000	8.0	9.55	275.040	8.00	9.55	275.040
8	3.59	7.58	3.99	0.0	0.00	0.000	8.0	9.45	272.160	8.00	9.45	272.160
9	3.47	7.52	4.05	0.0	0.00	0.000	8.0	9.40	270.720	8.00	9.40	270.720
10	3.39	7.48	4.09	16.5	9.35	555.390	24.0	9.35	807.840	40.50	9.35	1363.230
11	3.32	7.55	4.23	24.0	9.25	799.200	24.0	9.25	799.200	48.00	9.25	1598.400
12	3.26	7.65	4.39	6.5	9.15	214.110	8.0	9.15	263.520	14.50	9.15	477.630
13	3.26	7.67	4.41	0.0	0.00	0.000	6.5	9.15	214.110	6.50	9.15	214.110
14	3.26	7.64	4.38	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
15	3.26	7.56	4.30	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
16	3.23	7.50	4.27	1.5	9.25	49.950	1.5	9.25	49.950	3.00	9.25	99.900
17	3.28	7.45	4.17	24.0	9.30	803.520	24.0	9.30	803.520	48.00	9.30	1607.040
18	3.38	7.55	4.17	24.0	9.30	803.520	24.0	9.30	803.520	48.00	9.30	1607.040
19	3.47	7.65	4.18	0.0	0.00	0.000	5.5	9.30	184.140	5.50	9.30	184.140
20	3.54	7.64	4.10	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
21	3.57	7.53	3.96	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
22	3.67	7.42	3.75	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
23	3.82	7.49	3.67	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
24	4.03	7.70	3.67	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
25	4.17	7.40	3.23	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
26	4.25	7.24	2.99	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
27	4.32	7.46	3.14	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
28	4.37	7.70	3.33	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
29	4.37	7.66	3.29	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
30	4.35	7.50	3.15	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
31	4.40	7.30	2.90	0.0	0.00	0.000	0.0	0.00	0.000	0.00	0.00	0.000
<b>Total</b>	<b>3.78</b>	<b>7.53</b>	<b>3.75</b>	<b>152.5</b>	<b>9.50</b>	<b>5212.800</b>	<b>221.5</b>	<b>9.50</b>	<b>7577.640</b>	<b>374.00</b>	<b>9.500</b>	<b>12790.440</b>

- The situation of the water consumption for navigational use, on the basis of the levels from the 4 locks, the dimensions of the locks and of the number of water emptying from the locks.

## STATUS OF THE VOLUME OF WATER CONSUMPTION FOR NAVIGATION - November 2009

date	CERNAVODA LOCK					AGIGEA LOCK					OVIDIU LOCK					NAVODARI LOCK					Average levels	SUM		
	COTE		nr sluice		volume	COTE		nr sluice		volume	COTE		nr sluice		volume	COTE		nr sluice		volume		NR	NR	SUM
	AM	AT	ecl	evac	mii mc	AM	AT	ecl	evac	mii mc	AM	AT	ecl	evac	mii mc	AM	AT	ecl	evac	mii mc		ECL	Evac	navig water
1	4.46	7.41	7	5	114.313	7.41	0.10	7	7	407.418	7.37	1.57	0	0	0.000	1.64	0.19	0	0	0.000	7.40	14	12	521.730
2	4.63	7.47	10	7	154.070	7.46	0.11	8	7	410.673	7.43	1.57	1	2	21.330	1.63	0.18	1	1	3.294	7.45	20	17	589.367
3	4.77	7.46	15	11	229.323	7.39	0.06	11	8	461.900	7.39	1.56	2	2	21.221	1.63	0.13	0	0	0.000	7.41	28	21	712.444
4	4.87	7.38	7	5	97.263	7.32	0.06	9	4	225.060	7.31	1.57	1	1	10.447	1.63	0.01	0	0	0.000	7.34	17	10	332.769
5	4.91	7.46	12	7	138.338	7.43	0.09	8	7	407.960	7.43	1.56	1	1	10.683	1.63	0.14	1	1	3.221	7.44	22	16	560.202
6	4.93	7.56	9	9	183.443	7.52	0.06	5	5	293.725	7.53	1.58	5	5	54.145	1.63	0.14	0	0	0.000	7.54	19	19	531.313
7	4.95	7.59	10	10	204.600	7.53	0.02	7	7	409.588	7.53	1.56	1	1	10.865	1.63	0.10	1	1	3.149	7.55	19	19	628.202
8	4.94	7.60	6	6	123.690	7.60	0.02	5	3	177.165	7.56	1.56	0	0	0.000	1.63	0.08	0	0	0.000	7.59	11	9	300.855
9	4.83	7.56	10	8	169.260	7.50	0.02	7	5	291.400	7.53	1.58	2	2	21.658	1.64	0.09	0	0	0.000	7.53	19	15	482.318
10	4.77	7.48	11	8	168.020	7.44	0.05	9	6	348.285	7.44	1.58	7	5	53.326	1.65	0.10	3	3	9.555	7.45	30	22	579.186
11	4.72	7.52	17	11	238.700	7.51	0.03	11	5	292.175	7.50	1.59	4	4	43.025	1.66	0.14	1	1	3.276	7.51	33	21	577.176
12	4.78	7.57	14	9	194.603	7.53	0.03	11	7	410.130	7.58	1.58	0	0	0.000	1.66	0.23	1	1	3.440	7.56	26	17	608.172
13	5.08	7.50	15	9	168.795	7.53	0.23	14	9	541.260	7.52	1.58	1	1	10.811	1.65	0.23	1	1	3.422	7.52	31	20	724.287
14	5.73	7.35	17	14	175.770	7.34	0.23	13	8	469.340	7.33	1.60	8	5	52.143	1.67	0.23	1	1	3.458	7.34	39	28	700.711
15	6.23	7.49	14	10	97.650	7.49	0.16	12	7	415.013	7.45	1.61	0	0	0.000	1.68	0.16	0	0	0.000	7.48	26	17	512.663
16	6.52	7.60	12	8	66.960	7.60	0.17	11	6	361.305	7.57	1.64	4	4	43.170	1.69	0.17	3	3	10.156	7.59	30	21	481.591
17	6.60	7.66	13	10	82.150	7.63	0.16	12	7	422.608	7.62	1.62	0	1	10.920	1.69	0.22	0	0	0.000	7.64	25	18	515.678
18	6.63	7.73	18	13	110.825	7.68	0.16	12	7	425.320	7.71	1.61	3	2	22.204	1.69	0.23	2	2	6.989	7.71	35	24	565.338
19	6.61	7.51	15	9	62.775	7.45	0.10	10	6	351.075	7.48	1.61	2	2	21.367	1.69	0.21	0	0	0.000	7.48	27	17	435.217
20	6.54	7.47	13	8	57.660	7.48	0.15	12	7	413.928	7.46	1.63	3	3	31.832	1.69	0.26	2	2	7.098	7.47	30	20	510.517
21	6.48	7.55	6	5	41.463	7.56	0.16	5	5	299.150	7.54	1.63	1	1	10.756	1.70	0.26	1	1	3.567	7.55	13	12	354.936
22	6.30	7.59	6	4	39.990	7.61	0.17	4	1	60.295	7.54	1.63	1	1	10.756	1.71	0.22	1	1	3.513	7.58	12	7	114.554
23	6.13	7.30	11	7	63.473	7.27	0.09	7	7	399.280	7.28	1.63	4	4	41.132	1.71	0.18	2	2	6.880	7.28	24	20	510.764
24	5.97	7.39	13	11	121.055	7.35	0.10	11	9	519.638	7.34	1.62	5	4	41.642	1.71	0.17	1	1	3.422	7.36	30	25	685.756
25	5.83	7.49	14	9	115.785	7.48	0.13	11	8	471.820	7.47	1.62	6	5	53.235	1.71	0.23	0	0	0.000	7.48	31	22	640.840
26	5.66	7.54	15	9	131.130	7.51	0.06	12	8	469.340	7.51	1.64	3	4	42.734	1.72	0.20	0	0	0.000	7.52	30	21	643.204
27	5.52	7.58	14	11	175.615	7.55	0.05	11	7	412.300	7.56	1.64	3	3	32.323	1.71	0.14	2	0	0.000	7.56	30	21	620.238
28	5.37	7.64	9	6	105.555	7.62	0.07	8	7	417.183	7.61	1.63	0	2	21.767	1.71	0.14	0	0	0.000	7.62	17	15	544.505
29	5.22	7.69	12	8	153.140	7.68	0.11	7	6	362.235	7.67	1.63	1	1	10.993	1.71	0.16	1	1	3.403	7.68	21	16	529.771
30	5.10	7.74	9	7	143.220	7.68	0.08	10	6	360.840	7.70	1.63	8	7	77.332	1.72	0.16	3	3	10.265	7.71	30	23	591.657
<b>T</b>	<b>5.50</b>	<b>7.53</b>	<b>354</b>	<b>254</b>	<b>3928.630</b>	<b>7.51</b>	<b>0.10</b>	<b>280</b>	<b>192</b>	<b>11307.405</b>	<b>7.50</b>	<b>1.60</b>	<b>77</b>	<b>73</b>	<b>781.817</b>	<b>1.67</b>	<b>0.17</b>	<b>28</b>	<b>26</b>	<b>88.106</b>	<b>7.51</b>	<b>739</b>	<b>545</b>	<b>16105.959</b>

3. The situation of water volumes taken from the canals by the beneficiaries, on the basis of the Minutes of consumption monthly signed with the beneficiaries of the hydro-technical scheme.
4. The water volume situation of the water downloaded in the canals by the beneficiaries, on the basis of the Minutes monthly signed.
5. The water volumes situation downloaded in the Black Sea through the valves of the galleries of big waters from Navodari and Agigea Locks.
6. The volumes of fresh water consumed at the work points of the national company.
7. The water balance of all the water volumes that have entered or gone out in/from the waterways with the purpose of creating a data basis, of knowing the necessity of water beneficiaries and to avoid water loss from the canals.
8. The situation of allowance accomplishment regarding the water volumes taken and/or evacuated in the month, which is transmitted to the Romanian Waters.

Annually the “Water balance” and “The water necessary” are elaborated on basis of the written requests of the beneficiaries of use of the water from the canal regarding the take or download of water volumes in the waterways in the following 2 years and is transmitted to the Romanian Waters – Dobrogea Seashore Waters Constanta Directorate.

It is elaborated the Annual Program regarding quantity water management of the Danube - Black Sea Canal and Poarta Alba - Midia Navodari Canal waters on the basis of the water volumes that will be pumped the next year from the Danube in the DBSC through the Complex Pumping Station at Cernavoda, water volumes consumed from the canals and fresh water volumes for the working points of the company.

## 4. HYDROLOGICAL CONDITIONS

### 4.1. Regime and operative data

Quantity and quality management of the waters in the Danube - Black Sea Canal is insured by the Administration through the correct exploitation of the complex hydro-technical scheme of the canal after a program of calculus which answers to some characteristic hypotheses of low, normal and high waters, coordinated with the needs of take and download of waters of the beneficiaries of use.

In the **flow system of current exploitation**, when it is transited constant debits on the waterways the informational flow regarding the quantity and quality water management is realized according to annexes 1 with the following data:

Daily, from 4 to 4 hours the following operative data are monitored:

- ◆ The water level from the Danube and the waterways through the automatic installation of level measurements;
- ◆ Water flows of the waters consumed from the canals, on the basis of the telephonic communications from the clients and on the basis of the lockage number;
- ◆ The water flow taken from the Danube with SPC Cernavoda.

In the high flow system, when it is transited additional debits on the waterways the informational flow regarding the quantity and quality water management is realized according to annexes 1 with the following data:

Permanently, every 2 hours the following operative data are monitored:

- ◆ The water level from the Danube and the Navigable Canals from all the locks, through the “Automatic level measurement installation” from the Central Dispatch Agigea;
- ◆ Water flows evacuated in the Black Sea, through the high waters evacuation from the Agigea and Navodari locks;
- ◆ The water flow used by the Micro-hydro-stations from Agigea lock;
- ◆ The water flow taken from the Danube with SPC Cernavoda, in the situation of high levels in the Danube;
- ◆ Water flows of the waters consumed from the canals, on the basis of the telephonic communications from the clients and on the basis of the lockage number.

On the navigable canals there are transited additional flows in the following situations:

- a) generalized rainfalls in the hydrographic basins of the 2 waterways and quantity signified.
- b) high levels growth in the Danube over the normal level of exploitation of canal pool II DBSC (+7,50 m landmark The Baltic Sea).
- c) the evacuation of the warn water from the Nuclear-Electric Station Cernavoda in canal pool II of the DBSC.

In these circumstances the hydro-technical scheme of the navigable canals enters in alert stage and are put to function the high waters evacuation from Agigea and Navodari locks, as well as the Micro-hydro-stations from Agigea lock (if the case).

The achievement of Danube-Black Sea Canal and Poarta Alba-Midia Navodari Canal with a complex hydro-technical scheme imposed the need to take some measures for the transit of the flow through the canals, so that the beneficial uses could function in the insurance limits admitted without being affected.

The affluent valleys of the waterways have a non-permanent drainage system and a torrential character, fact which made necessary the defense against floods of the canal pool II of the Danube-Black Sea Canal and canal pool I of the Poarta Alba-Midia Navodari Canal, to achieve a number of 24 non-permanent accumulations, of attenuation and 10 accumulations for the retention of the wash.

The floods in the affluent valleys and the direct slopes affect the canal pool II of the Danube-Black Sea Canal and the canal pool I of the Poarta Alba-Midia Navodari Canal located between the twin locks of Cernavoda, Agigea and Ovidiu. For the draining of the floods the Navigable Canals accomplish the function of receiver and evacuator of big waters. Under these circumstances level growths are produced, with partial and temporary water accumulations in the canals section. Canal pool III through which it will be transited the same flows of water that originates from floods in the canal pool II doesn't undergo special influences, because this being connected to the sea, allows the transit of floods without significant level modifications.

Affluent valleys are linked to the waterways through works that foresees the regularization of the valleys on the finishing sector and special constructions at the river mouth which reduces the transversal speeds in the downloading area until the admitted limit for navigation (0,3-0,4 m<sup>3</sup>/s)

At the Agigea locks the constructions which ensure the download to the sea of the flows that originate from the floods are Evacuating Galleries Big Waters, which regulate the maximum flows in the hydrographic sub-basin of the Danube – Black Sea Canal and the transit of the floods through the canal towards the Black Sea.

The evacuating galleries composed of evacuating outlet (siphoning batteries placed upstream), the constructions of enlargement (placed downstream), the discharger with clamshell (placed in the bodies of the hydro-electric stations), are dimensioned at the following flows:

- For the siphoning batteries = 2 pieces (one battery from 4 siphons each) – 150 mc/s x 2 pieces = 300 mc/s;
- Evacuating galleries;
  - ❖ In free leakage system = 150 x 2 = 300 mc/s;
  - ❖ In forced leakage system = 190 x 2 = 380 mc/s;
- Dischargers with clamshell = 2 pieces (40 mc/s x 2 pieces) = 80 mc/s ;
- Hydro-electric stations (CHE) from Agigea - 75 mc/s x 2 pieces, a total of 150 mc/s installed capacity of 2 x 5 Mw, H = 8 - 7 m).

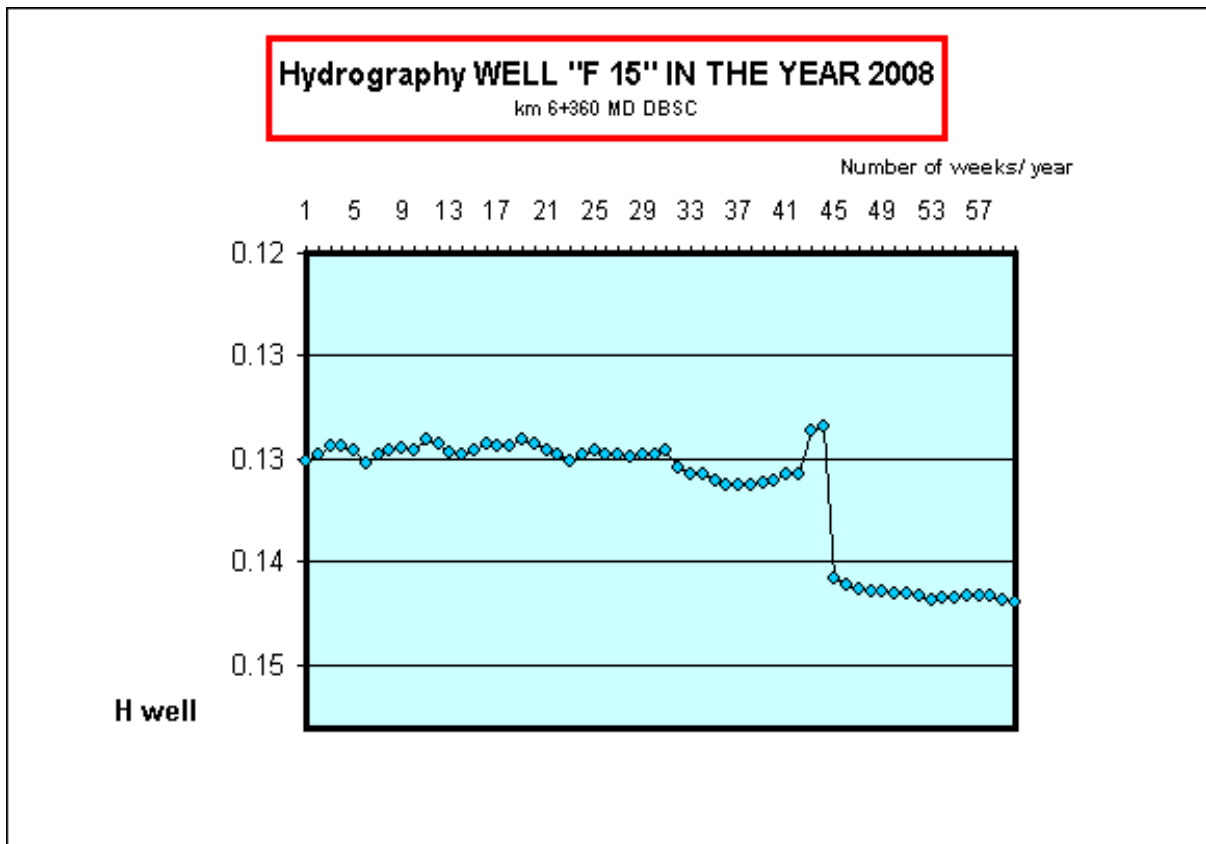
In the periods of big waters (13 mrMB in canal pool I of the Danube – Black Sea Canal) or in draught (2,75 mrMB in canal pool I - Danube – Black Sea Canal), the “Scheme of Operating the Navigable Canals Danube – Black Sea and Poarta Alba – Midia Navodari” goes alert and is coordinated by an interdepartmental quarter.

#### 4.2. Discharge series and designed data

All the data regarding the water flows, levels and volumes are registered at the Water Management and Environmental Protection compartment and are monthly transmitted to the Romanian Waters and to the Transport and Infrastructure Ministry.

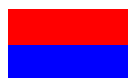
A data basis is created regarding the management of the waters even from the starting to function of the waterways and can be transmitted to the interested factors.

	Water category	Source	Water taken (thousand cm) January 2009
1	<b>Drinking water</b>	<b>R.A.J.A.</b>	<b>1.516</b>
		Agigea	0.652
		Basarabi	0.238
		Ovidiu	0.611
		Navodari	0.015
		<b>Cernavoda</b>	<b>0.250</b>
		<b>Medgidia</b>	<b>0.017</b>
2	<b>Water for navigation</b>	sum	<b>15884.17</b>
		Agigea	11742.18
		Cernavoda	3275.15
		Ovidiu	766.89
		Navodari	99.95
3	<b>Water for beneficiaries</b>	DUNARE	<b>151011.107</b>
		S.C. RAJA C-ta	1839.822
		Rompetrol Rafinare	982.707
		COMPREST UTIL	2.440
		REPEC Ovidiu	5.669
		CNE C-voda - U 1	99353.196
		- U 2	48825.324



**FISA TRACKING WATER QUALITY**  
**SECTION IN CONTROL - Upstream lock Navodari**

Nr. crt.	physico - chemical	UM	NTPA-013/2002	physico - chemical													
				year 2009													
				IAN	FEBR	MART	APR	MAI	IUNIE	IULIE	AUG	SEPT	OCT	NOI	DEC	average/ year	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	TEMPERATURE	*C	max. 25	2.25	1.18	4.05	8.77	21.30	25.40	26.30	25.90	21.40	16.10	10.30	7.00	14.163	
2	pH	unit. pH	5,5-9,0	8.66	8.95	8.82	8.85	8.93	8.87	8.53	8.74	8.91	8.86	8.77	8.84	8.811	
3	ALKALINE	mval	max. 7	6.03	6.44	6.28	6.16	5.66	5.42	5.34	5.21	5.27	5.19	5.17	5.70	5.656	
4	DURITE	grd.durit.	max. 20	16.88	18.04	17.57	17.25	15.84	15.88	14.95	14.60	14.74	14.53	14.47	15.96	15.893	
5	CONDUCTIVITY	μS/cm	1000	1649.5	1737.8	1693.3	1734.3	1618.0	1640.0	1715.0	1683.0	1785.0	1690.0	1697.0	1722.0	1697.8	
6	TDS	mg/l	400	659.5	695.8	677.3	693.7	647.0	657.0	686.0	674.0	714.0	676.0	679.0	688.0	679.2	
7	CLORURI (Cl <sup>-</sup> )	mg/l	max. 200	224.45	209.80	206.60	160.00	182.00	166.30	158.00	192.00	220.50	234.50	232.50	253.20	203.32	
8	AZOT	AMONIAC (NH <sub>3</sub> )	mg/l	max. 0,1	0.034	0.026	0.036	0.040	0.053	0.094	0.059	0.036	0.067	0.122	0.068	0.030	0.055
9		AMONIU (NH <sub>4</sub> )	mg/l	max. 1	0.036	0.028	0.038	0.042	0.056	0.100	0.063	0.044	0.071	0.129	0.071	0.032	0.059
10	Oxygen regime	oxygen diz. titrare	mg/l	min. 6	12.15	13.46	12.94	10.81	10.49	8.66	7.71	9.42	9.88	9.20	11.24	13.67	10.80
11		oxygen diz. aparat	mg/l	min. 6	9.69	10.54	10.17	11.76	8.35	7.58	5.38	7.66	7.38	7.29	9.70	12.15	8.97
12		saturatie in oxygen	%	min. 50	99.35	105.83	105.55	130.60	91.80	87.88	61.40	88.60	80.20	76.80	99.50	119.20	95.56
13		CCO-Mn	mg/l	max. 20	4.377	4.507	5.587	4.703	4.117	5.417	4.197	5.250	6.476	5.826	5.956	5.889	5.192
14	CALCIU	mg/l	max. 150	30.06	22.44	28.14	24.05	20.88	25.93	29.77	31.10	34.27	36.84	33.23	22.55	28.27	



MAXIMUM  
MINIMUM

### 4.3. Concrete data

#### **Beneficiaries of use of the navigable canals Danube-Black Sea and Poarta Alba-Midia Navodari**

Along the work there uses are located, which benefit from the services of the hydro-technical scheme of the navigable canals.

The hydro-technical scheme adapted for the navigable canals has a complex character, being provided to satisfy the need of sampling and it returns the water to a series of other uses, according to the level of insurance standardized for each of them.

#### **1. The water source for ENERGY PRODUCING UNITS**

**1.1. Nuclear-Electric Station** – beneficiary of S.N. NUCLEARELECTRICA S.A., located in Cernavoda at km 60 of the Danube-Black Sea Canal (on the derivational canal), will have in its final phase 5 groups functioning, with a total maximum power of  $5 \times 660 = 3300$  Mw.

Presently, it has only two groups of 660 Mw functioning.

For cooling the aggregates in open circuit, it will be taken, in the final step, from the canal pool I of the Danube-Black Sea Canal, a maximum flow of  $271,5 \text{ mc/s} = 5 \times 54,3 \text{ mc/s}$ , of which when the first group started activity, a flow of  $54,3 \times 2 = 108,6 \text{ mc/s}$ .

The maximum annual volume is of 3.424.810 thousand  $\text{m}^3$ .

Permanent functioning, 365 days/year, 24h/day.

**1.2. S.C. HIDROELECTRICA S.A. – Hydroelectric Power Station Buzau** – through the CHE at Agigea, which machines the water from the Danube-Black Sea Canal – canal pool II for producing the electric energy only in the situation of high levels of the Danube or when generalized rainfalls occur in the hydrographical basins of the navigable canals.

#### **2. Source of water for irrigation**

Through the arranging scheme, the navigable canals insure from the canal pool II – DBSC and canal pool I+II – PAMNC the water source for irrigating the agricultural surfaces, according to Annex No. 2, among which the most important use is that of A.N.I.F. the Constanta Territorial Branch.

#### **3. Source of raw water, for water supply**

According to the general hydro-technical scheme, the navigable canals insure the source of water for the following uses from Annex No. 3.

The maximum annual volume which can be taken is of 158.310 thousand  $\text{m}^3$ .

The insurance degree of the use is up to 97%, corresponding the 2,75 mrMB level at the Danube.

#### **4. Receiver for evacuating the waters that comes from draining.**

Along the Danube – Black Sea Canal there are situated agricultural fields provided with set up works in the purpose of controlling the excess of humidity from the ground, with the evacuation of the excess waters, in the canal.

The waters that come from draining are directed in the receiver through 9 pumping stations, placed between the Saligny and Poarta Alba villages (km 50 – km 33), having a total maximum flow of 8,051 mc/s.

## 5. Receiver for RESTITUTIONS OF WASTEWATER

In the two navigable canals the wastewater is evacuated, water which doesn't need purification and used waters already purified.

### 5.1. The restitutions of used waters that don't need purification are represented by:

- Cooling waters that come from the Nuclear Electric Station Cernavoda, with a maximum flow of 108 mc/s, which are reversed in canal pool II;
- The waters that come from the river drainage of the Cernavoda and Medgidia towns; the first system is dimensioned for a maximum flow 8mc/sec and is downloaded in canal pool I – DBSC, and the second one is dimensioned for a maximum flow of 16 mc/sec and is downloaded in canal pool II – DBSC.

### 5.2. The purified water restitutions:

The purified water restitutions are present from the point of view of the positioning and of the flows evacuated, in the table below:

No crt	Use name	The nature of the used waters	Daily medium reversed water volume
			mc
1.	CNE Cernavoda	Wash and technologic samplings	9 331 200
2.	S.C. SURSAL S.A. Saligny	industrial	239
3.	SC LAFARGE - ROMCIM SA Medgidia	industrial	780
4.	Public Services Directorate Medgidia	city	21 470
5.	S.C. RAJA SA Constanta	domestic	4 471

The quality conditions imposed on these waters at the evacuation in the receivers are according to the own rules from the water management point of view.

**6. Navigation** on the navigable canals Danube - Black Sea and Poarta Alba - Midia Navodari is made according to the Transport Ministry Order no. 426/2006 regarding the approval of the Navigational rules on the Danube - Black Sea Canal and Poarta Alba - Midia Navodari Canal. In the forming period of the ice bridge the traffic on the canal is closed.

6.1. The Navigation on the Danube - Black Sea Canal is made for the transport of merchandise and passengers, with fluvial and maritime ships which navigate

independently or in pushed convoy formation, tugged or in couple and which subscribes the following gauges:

- a) ship convoy:
- maximum length 296 m
  - maximum width 23,5 m
  - maximum draft 5,5 m
- b) fluvial and maritime ships which navigate independently:
- maximum length 5,5 m
  - maximum width 6,0 m
  - maximum draft 12 m
  - maximum height at the floating line  
And up to the highest point 16,5 m

Navigation of the ships with sails and of the rafts is forbidden on the DBSC.

The navigation is made both ways, in the limits of the low waters, with the insurance of 94% and in the high waters with the insurance of 1%, to which correspond the following levels in the 3 canal pools (table 3.2.1. below):

Table 3.2.1

Insurance degree	Canal pool (cotes in mrMB)		
	I	II	III
1%	+12,00	+8,50	+0,50
94%	+ 3,00	+7,00	-1,10

6.2. Navigation on the Poarta Alba - Midia Navodari Canal is made for transport of merchandise and passengers, with fluvial and maritime ships which navigate in pushed convoy formation, or fluvial-maritime ships which subscribe the following gauges:

- a) ship convoy:
- maximum length 120,0 m
  - maximum width 11,5 m
  - maximum draft 3,8 m
- b) fluvial and maritime ships which navigate independently:
- maximum length 110,5 m
  - maximum width 11,5 m
  - maximum draft 3,8 m
  - maximum height at the floating line  
And up to the highest point 12,5 m

Navigation of the ships with sails and of the rafts is forbidden on the PAMNC.

The navigation is made both ways, having the following water exploitation levels (mrMB):

	<u>Canal pool</u>		
	I	II	III
- minimum exploitation level	+7,00	+1,00	- 1,10
- normal retention level	+7,50	+1,25	- 0,50
- maximum insurance level 1%	+8,50	+2,00	+ 0,50

Under the minimum exploitation level and over the maximum insurance level 1% the navigation is stopped.

Maximum navigational speed is 8-9 km/h.

The calculus convoy is formed of a barge with the capacity of up to 3000 tones with pusher, having the following maximum dimensions:

- length	119,4 m
- width	11,4 m
- current draft	3,8 m

## 5. EXTREME FLOWS AND FLOOD DISASTERS

### 5.1. Floods regime

1. The achievement of Danube-Black Sea Canal and Poarta Alba-Midia Navodari Canal with a complex hydro-technical scheme imposed the need to take some measures for the transit of the flow through the canals, so that the beneficial uses could function in the insurance limits admitted without being affected.

2. The hydrographic basins of the two navigable canals Danube-Black Sea and Poarta Alba-Midia Navodari, have a total surface of 939,8 km<sup>2</sup> (including BH and Siutghiol = 12 km<sup>2</sup>).

The navigable canals have the function of receivers and evacuators of the waters, caused by the rainfalls in the afferent hydrographical basins.

This are taken over and assigned as follows:

- Out of 36,6 km<sup>2</sup> it is downloaded through canal pool I of DBSC, in the Danube;
- Out of 663 km<sup>2</sup> it is downloaded in the canal pool II of the DBSC;
- Out of 32,2 km<sup>2</sup> it is downloaded through canal pool III of DBSC, in the Black Sea;
- Out of 154 km<sup>2</sup> it is downloaded in the canal pool I of PAMNC;
- Out of 42 km<sup>2</sup> it is downloaded in the canal pool II of PAMNC;
- Out of 12 km<sup>2</sup> it is downloaded in BH Siutghiol.

The affluent valleys of the waterways have a non-permanent drainage system and a torrential character, fact which made necessary the defense against floods of the canal pool II of the Danube-Black Sea Canal and canal pool I of the Poarta Alba-Midia Navodari Canal, to achieve a number of 24 non-permanent accumulations, of attenuation and 10 accumulations for the retention of the wash.

The equipment beneficiary – A.N. “Romanian Waters” Bucharest - Dobrogea Seashore Water Directorate Constanta ensures the operating.

3. The floods in the affluent valleys and the direct slopes affect the canal pool II of the Danube-Black Sea Canal and the canal pool I of the Poarta Alba-Midia Navodari Canal located between the twin locks of Cernavoda, Agigea and Ovidiu. For the draining of the floods the Navigable Canals accomplish the function of receiver and evacuator of big waters. Under these circumstances level growths are produced, with partial and temporary water accumulations in the canals section. Canal pool III through which it will be transited the same flows of water that originates from floods in the canal pool II doesn't undergo special influences, because this being connected to the sea, allows the transit of floods without significant level modifications.

4. Affluent valleys are linked to the waterways through works that foresees the regularization of the valleys on the finishing sector and special constructions at the river mouth which reduces the transversal speeds in the downloading area until the admitted limit for navigation (0,3-0,4 m<sup>3</sup>/s)

5. The medium generalized rain with an insurance of 50% can be accumulated in the navigable canals with a surface of the normal level of operating it of about 0,20 m.

The canals disposes of static capacities of accumulation in guard of 2,50 m over the normal level of exploitation of +7,50 mrMB, of 7,74 mil. m<sup>3</sup> until the cote of +8,50 mrMB, of 15,77 mil. m<sup>3</sup> until the cote of +9,50 mrMB and of 19,90 mil. m<sup>3</sup> until the crest cote of the dam of +10mrMB.

6. At the Agigea locks the constructions which ensure the download to the sea of the flows that originate from the floods are Evacuating Galleries Big Waters, which regulate the maximum flows in the hydrographic sub-basin of the Danube – Black Sea Canal and the transit of the floods through the canal towards the Black Sea.

The evacuating galleries composed of evacuating outlet (siphoning batteries placed upstream), the constructions of enlargement (placed downstream), the discharger with clamshell (placed in the bodies of the hydro-electric stations), are dimensioned at the following flows:

- For the siphoning batteries = 2 pieces (one battery from 4 siphons each) – 150 mc/s x 2 pieces = 300 mc/s;
- Evacuating galleries;
  - o In free leakage system = 150 x 2 = 300 mc/s;
  - o In forced leakage system = 190 x 2 = 380 mc/s;
- Dischargers with clamshell = 2 pieces (40 mc/s x 2 pieces) = 80 mc/s ;
- Hydro-electric stations (CHE) from Agigea - 75 mc/s x 2 pieces, a total of 150 mc/s installed capacity of 2 x 5 Mw, H = 8 - 7 m).

7. The floods produced by rainfalls, partially generalized (local) in the basins of the affluent valleys, don't create any particular problems even if these are subscribed in the level of insurance of calculus of 1% or of check of 0,3% or 0,1%.

8. The success of evacuating calculus floods from its check is conditioned by the existence of an information flow regarding the hydro-meteorological forecast in the hydrographic basin, as well as forecasting on the basis of a mathematical pattern of the start of activity of the whole complex of works which form the evacuating capacity of the flood towards the sea.

In the periods of big waters (13 mrMB in canal pool I of the Danube – Black Sea Canal) or in draught (2,75 mrMB in canal pool I - Danube – Black Sea Canal), the

“Scheme of Operating the Navigable Canals Danube – Black Sea and Poarta Alba – Midia Navodari” goes alert and is coordinated by an interdepartmental quarter.

### **Defending the adjacent land of the waterways against floods**

As a consequence of the Danube – Black Sea Canal’s construction the normal level of exploitation of the water in the area located between km 4-18 with about 4 m (from the 3,5 at 7.5 mrMB) so that it was necessary to foresee defense works of some villages against floods, which are: Saligny – Stefan cel Mare, Faclia and Mircea Voda (railway station).

The hydro-technical scheme of the defense system of the villages against floods foresees a draining system and pumping stations for downloading ground waters in the canal pool II of the Danube – Black Sea Canal.

For the defense against floods of Saligny – Stefan cel Mare, Faclia and Mircea Voda and Castelu villages there are 3 pumping stations foreseen which have the role of maintaining the low level of the ground water.

Because the complex hydro-technical scheme of the Danube – Black Sea and Poarta Alba – Midia Navodari waterways is dimensioned to fulfill the purpose of regularization of the leakages in the own hydrographical basin and of defense against floods during flood or drought periods there are not registered any particular problems with the beneficiaries of use besides those created by the level of the Danube.

## **5.2. Drought regime**

The quantity management system, in low waters at the Danube takes into consideration the following:

1. At the Danube levels of +2,95 mrMB, corresponding to an insurance of low waters of 97%, more precisely 94%, which are produced usually in the autumn, outside the irrigation season and up to the levels of +4,30 mrMB, the beneficiaries of use can function in the limits of the characteristic parameters approved with some restrictions.

To insure the water needs of the uses special works are necessary on the Danube and on the Bala branch.

2. The diminish of the level in canal pool II of the Danube - Black Sea Canal and in canal pool I of Poarta Alba - Midia Navodari Canal under the cote of +7,00 mrMB, up to the minimum exceptional cote +6,00 mrMB is made with the purpose of using a sweet water reserve accumulated in the canal, between these cotes of about 13 millions m<sup>3</sup>.

Usually the beneficiaries of use whose needs of water take/download is insured through the activity of quantity and quality management of the waters in the canal, functions without restrictions.

3. If because of the draught or of other natural calamities, the water flows contracted cannot be insured to all the authorized users, it is applied without temporal restrictions of the water use in the DBSC and PAMNC. These restrictions are mentioned in the contracts for insuring the services of water management, closed between the Administration and the beneficiaries of use.

4. The restriction measures are assimilated with the situation of force majeure in the realization of the contracts of water delivery.

5. When the conditions of introduction of these restrictions appear, the beneficiaries of use will be informed by the Administration.

6. The main restrictions which appear in insuring the conditions of navigation on the navigable canals, according to the level of the Danube, are as follows:

Step 1: The summary of the auxiliary activities or less important production on shorter periods of time.

Step 2: It is realized through coupled lockage

Step 3: It is realized through coupled lockage and the programming of the transit at coupled lockage.

## **6. HYDROLOGICAL FORECASTING AND WARNING**

### **6.1. Forecasting services**

The information regarding the water level and flow on the Danube, the forecast of the level evolution is collected daily from the site of the National Institute of Hydrology and Water Management. At Administration of Navigable Canals S.H. there is a data basis serving this purpose.

### **6.2. Meteorological and Hydrological forecasting**

According to the initial project of the navigable canals DBS and PAMN there was a system for speed and wind direction measurement, of temperature and rainfall measurement but the system did not work because of the low flexibility of the equipments.

Presently on the navigable canals there is no hydro-meteorological station for collecting the hydrological parameters.

Information and meteorological forecasts are provided by the responsibility carried by National Meteorological Administration (ANM) – [www.inmh.ro](http://www.inmh.ro).

The main activities of the National Administration of Meteorology is the work of meteorology and climatology .

The project Data system of hydro-meteorological parameters was created which consisted of:

- Fixed stations for measuring the hydro-meteorological parameters (speed and direction of the wind, the nature and quantity of rainfalls, visibility, air temperature and water in the canal temperature);
- Data transmission equipment at the central dispatch in Agigea and at the other dispatches in the area;
- Equipment for processing and display of the transmitted data for the local stations.

The hydro-meteorological parameters will be public.

The Administration can temporarily close navigation when the hydro-meteorological conditions are unfavorable or during hydro-technical repairs or other special works, which imply such measures.

## 7. TRANSBOUNDARY COOPERATION

The Danube - Black Sea Canal and the Poarta Alba - Midia Navodari Canal, called navigable canals are Romania's national waters, which are under the statehood and exclusive jurisdiction of the Romanian state.

The works for the opening of the canal for navigation were accomplished from 1975 to 1984, on the basis of the execution project elaborated by the Project Institute of Auto, Naval and Air Transport, as general designer, the tasks of beneficiary being insured by the Administration.

When crossing the navigational canal the Romanian or foreign ships were obliged to respect the navigational, sanitary, border regulations of using the basins and harbor installations, of prevention and fight against pollution and the other maintenance and exploiting rules of the canal.

Through the contractual relationships the Administration, as Provider insures the transit of fluvial-maritime ships and convoys of barges according to the current navigational regulation.

The circulation on the canal of tugged convoys, of unusual categories ships, of floating constructions and installations of sportive vessels and cruises are admitted on the basis of a transit Note emitted by the Administration.

The navigation on the navigable canal is open to all ships, no matter what arbor it is which holds the papers, certificates, documents and which subscribe the maximum admitted gauges.

During transit, the surveillance and navigational leading is effectuated by the Administration through the Central Navigational Dispatch and of other stipulations which are obligatory for all the captains of ships/convoys during transit.

The Administration, according to the Navigational Regulation and of Order no. 426/2006 insures transit services of the canal with fluvial-maritime ships and convoys of barges, insures the assistance in transit of certified personnel, tug services, maneuvering, barge surveillance in the navigational canal and in the ports of the canal, other services annexed to transport, through the Service Contract.

For the crossing of the ships/convoys through the canal and for the provided services, the Administration has taxes and tariffs established according to the current law.

The Navigational Regulations refer to ships and convoys which can transit the canal, rules regarding the go out/in of the ships/ convoys on the navigable canal, the transport of dangerous merchandise, the navigation in the harbors and locks area, signaling for navigation.

In order to lead the circulation in safety conditions there is a signaling system functioning, composed of radio and telephonic links, such as the VTMIS system.

