2.3.2 IMPACTS ON NATURAL CONDITIONS

(1) Topography and Geology

No significant changing of the existing topographic condition in/around the WWTP site is identified. Based on the results of geological survey, soil in the WWTP site may be considered to be soft at some extent for supporting the structures, thus appropriate types of foundation should be considered for the structural plan.

(2) Groundwater

Because it was not possible to take groundwater samples in/around the SWDS, the situation of groundwater quality is not clear. However, from the results of groundwater and leachate survey in Braila, Galati and Constanta, the groundwater in these cities has been polluted at some extent, especially for the Coliform Group. Considering the facts that the concentrations of BOD_5, COD_{Mn}, NH_4-N and oil etc. in the leachate from the SWDS of Tulcea exceeded the standard of NTPA 002/1997 substantially, it is conjectural that the groundwater is polluted at some extent similar to Braila, Galati and Constanta. Hence, some countermeasures are considered to be necessary.

(3) Hydrological Situation

According to F/S Study the flow rate (0.614 m^3/s, maximum hourly flow) of effluent from WWTP is insignificant comparing with the flow rate of the Danube River (1,580 m^3/s, drought-period flow). The effects of treated wastewater on hydrological situation of Danube River are negligible.

In addition, based on the design effluent flow in F/S Study, the pollutant diffusion and dilution characteristics are analyzed by using "MIKE 11" model, created by Danish Hydraulic Institute-November 1992, Version 3.01. The calculation results indicated that complete mixing is achieved at a distance of 2,2 km downstream of WWTP outfall in all cases studied here.

(4) Fauna and Flora

The results of fauna and flora survey shown that there are no unique species of fauna and flora in/around the plant site. Faunas inhabiting around the site are domesticated animals such as dogs, cats, fowls, etc. In addition, aquatic life conditions will be improved by reducing the pollutant load as mentioned in following section.

2.3.3 ENVIRONMENTAL POLLUTION

(1) Water Pollution

The results (Annex 8) of industrial wastewater survey revealed that the concentrations of toxic materials, which may effect biological process for wastewater treatment, are under the standard of NTPA 002/1997. This can leads the conclusion that industrial wastewater will don't contribute a significant impact on WWTP influent characteristics.

Environmental Impact during Construction Period

During construction period the sanitary wastewater generated from site administration house may affect environment temporarily. Therefore, this part of wastewater should be collected and treated by some appropriate.

During the construction stage, every precaution shall be taken to prevent the spillage of waste form construction sites to the nearby waterways. There will be no major facility applied during construction that may affect the surface or the ground water. Routes, directions and hydraulic conditions of the streams and stormwater drains, presently discharging water to the Danube River, need not to be changed due to the construction works. The construction of all the different elements of the interceptor sewers has no direct impact on the quality of the surface water. There will be no major construction activities in streams or drains, except outfall structures. Although the works in the streams or drains could be minimized to the extent practicable, unavoidable activity may take place in the riverbed during the low-flow season.

The effluent outfall structure should be of such that can divert and disperse surface water flows to prevent erosion and to protect slopes of the riverbank. The structure should be lined and provided with energy dissipaters at discharge points to avoid erosion.

Storm water runoffs from the construction site should be collected and drained through properly designed drainage ditches to the nearby streams or other waterways.

Overall, during the construction period no appreciable adverse impacts to the surface water or ground water in/around the construction site are identified.

Environmental Impact during Operation Period

The quantities of pollutant load reduction by the project implementation are estimated in Table AII.7.10 based on the F/S Study. From this table, 1,513 tons of BOD_5 and 1,621 tons of SS per year (in target year, 2010) will be no more discharged into Danube River, so the impacts on the water quality during WWTP operation will be a positive one.

Table AII.7.10 Estimated pollutant load generation and reduction (2010)

Effluent Characteristics	Without Project	With Project	Reduction
Average Flow Rate (m^3/d)	37,000	37,000	0
BOD Concentration (mg/l)	130	18	112
BOD Load (ton/year)	1,756	243	1,513
SS Concentration (mg/l)	140	20	120
SS Load (ton/year)	1,891	270	1,621

Moreover, 243 tons of BOD_5 and 270 tons of SS per year (2010) will be discharged into the Danube River with WWTP effluent. In order to assess the impacts of effluent on the receiving water – the Danube River, pollutant concentrations in the mixture formed by the Danube River and WWTP Effluent have been simulated, taking into account river self-purification process and especially phenomena like pollutant diffusion, dilution and dispersion that contribute to this process. The results of simulation are presented in the Table AII.7.11, which shown that the maximum concentrations of BOD_5 and SS at downstream of complete mixing section (about 2.2 km downstream from the outfall of proposed WWTP) will be under the Maximum Allowable Concentration (MAC) of second quality category in STAS 4706/1998 (surface water quality).

Table AII.7.11 Maximum concentration of pollutant in the mixture

Receive Flow (m^3/s)		Q_{min}=1,580		Q_{avg}=6,400	
Effluent Flow (m^3/s)		Q_d avg=0.428	Q_h max=0.613	Q_d avg=0.428	Q_h max=0.613
Item	MAC for II-Category	Maximum concentration on the complete mixing section (2.2 km downstream from the outfall of WWTP)			
BOD (mg/l)	7	6.84	6.85	6.80	6.81
SS (mg/l)	60	60	60	60	60
NH_4 (mg/l)	3	2.752	2.790	2.222	2.250

It should be pointed that the total nitrogen and phosphorous concentrations of the effluent exceed the MAVs mentioned in NTPA 001 as shown in Table AII.7.1. There are three aspects which must be considered:

1) The Danube River has a high capacity of uptaking these elements by dilution (in this case the dilution factor is more then 3,000:1), so the change of water quality is an out of the question issue.

2) Dilution principle is accepted in special courses (GD 730/1997, Art.4, para.7)

3) Providing denitrification and phosphorous removal unit operations in the treatment process appears to be unrealistic to the following reasons:

- The investment cost will be almost doubled for achieving negligible results as for as environmental protection is concerned;
- Risks to get bad effects on environmental due to complicated operation of denitrification process, and
- The implementation of denitrification and phosphorous removal processes looks too ambitious for not stringent requirements (there is no denitrification process applied in any WWTP in the country, nor in the other riparian countries).

Nevertheless, these steps of treatment are to be considered in the next stage of design.

In conclusion the impact on the water environmental during WWTP operation will be a positive one, if the plant will operate on the designed conditions.

(2) Soil Pollution

To estimate the concentrations of typical heavy metals in excess sludge from proposed WWTP and to evaluate the concentrations of heavy metals in the soil in/around the WWTP site and sludge disposal site, a survey on soil and sludge from existing WWTP of Roman and Constanta is carried out. The results are summarized in Table AII.7.12

Table AII.7.12 Summary of heavy metals in soil (Tulcea) and sludge (Roman and Constanta)

Item	Soil (Tulcea)				Sludge in existing WWTP			
	WWTP	Sludge Disposal site (Inside)	Sludge Disposal site (outside)	Max. Desirable - Max. Permissible	Min.	Max.	Average	Max. Permissible Values of Standard
C_d (mg/l)	0	1.75	0	1-5	0	0	0	10
C_r (mg/l)	13	65	12.5	30-300	0	0	0	500
C_u (mg/l)	0	40.25	3.5	20-250	28	137	66	500
M_n (mg/l)	365	400	280	900-2,000	-	-	-	-
N_i (mg/l)	8.25	21.75	15.25	20-200	0	0	0	100
P_b (mg/l)	21.25	79	20.95	20-250	8	102	53	300
Z_n (mg/l)	205	465	312	100-700	243	1,600	645	2,000

The analysis results indicated that the concentrations of heavy metals in the soil (WWTP site, solid waste disposal site and agricultural field) and sludge generated in existing WWTP of Roman and Constanta are under the Romania Standard. This creates a possibility to utilize digested and dewatered sludge in agriculture. In present there are not standards concerning the quality of the sludge that could be deposited on the agricultural field as fertilizer, but there is a proposal that will be approved in the near future. The proposal has been taken into consideration the present study, and all the results obtained from the sludge analysis are compared with the values from the proposal (the proposal is based on EU regulations).

(3) Offensive Odor

According to the results of measurements for odor in/around the WWTP site as shown in Table AII.7.3, the concentrations of H_2S (0 mg/m^3), NH_3 (0.115 mg/m^3) and odor level (Level 1) on the WWTP boundary fence are under Romania Standard 12574/1987 (H_2S: 0.015 mg/m^3, NH_3: 0.3 mg/m^3 and odor level: Level 5). These results show that hydrogen sulfide and ammonia concentrations as well as the odor level in/around the WWTP site are keeping at a relatively low level.

In WWTP the odor may be emitted from wastewater treatment units, but the majority of it comes from the sludge handling system such as digesters, sludge gas facilities and dewatering equipment. At this stage it is difficult to predict exactly the odor levels in/around Tulcea WWTP site, however, the survey of odor levels from existing WWTP site in other cities may deserve reference. Table AII.7.13 presented the results of measurements for odor in/around existing WWTP site.

Table AII.7.13 Analysis results of odor in existing WWTP site (July 1999)

City	Parameter	Boundary fence	50m from boundary fence	150 m from boundary fence	Limits for 30 minutes sampling period according to RS 12574/1987
Roman	H_2S (mg/m^3)	0.45	0.48	0.42	0.015
	NH_3 (mg/m^3)	0.33	0.35	0.35	0.3
	Odor Level	4	4	4	5
Constant a	H_2S (mg/m^3)	0.35	0.05	0.033	0.015
	NH_3 (mg/m^3)	0.3	0.11	0.10	0.3
	Odor Level	4	3	3	5

Source: ICIM

The values in Roman WWTP exceed the Romania Standard and that not only due to the sludge treatment in the plant but also to the activity of a carcass animal disposal factory (animal feeding meal) located near the plant. While there are not other odor sources around Constanta WWTP. Therefore, it is feasible to assess and predict the impacts of odor in Tulcea WWTP using the results of Constanta WWTP.

According to Table AII.7.13, although the concentrations of H_2S (0.35 mg/m^3), NH_3 (0.3 mg/m^3) and odor level (Level 4) on Constanta WWTP boundary fence exceed the Romania Standard, the odor levels at 150 m from boundary fence would generally be within acceptable levels. In addition, considering the facts that the distance from Tulcea WWTP site to the housing areas is more than 300 m, there are no inhabitants on the leeward of WWTP site, and following countermeasures will be taken, therefore no serious impacts are identified.

1) A particular attention will be given to prevent emission of such odors from dewatering equipment rooms by providing efficient forced ventilation system, and to ensure against the escape of sludge gas from digesters.

2) Appropriate type of scrubbers will be provided for the removal of hydrogen sulfide from the digester gas. In addition, a waste gas burner for the digester gas control system will prevent any direct emission of sludge gas into the atmosphere. All the waste gas will be burned.

2.4 RECOMMENDATIONS FOR MITIGATING ACTIONS AND MONITORING PLAN

2.4.1 NOISE, VIBRATION AND TRAFFIC

1) The use of such heavy construction equipment as bulldozers, power shovels, pile drivers, etc. will be prohibited in early morning or late night. Construction works will be prohibited on Sundays and holidays.

2) Installation of acoustic walls and plant buffer zones around construction site.

3) It is recommended to use low noise and low Vibration equipment as possible during

construction.

4) Dump trucks and other heavy vehicles should also be operated at reasonably low speed so as to prevent unnecessary vibration along the routes.

5) During construction works, noise and vibration levels should be checked at least once a month at fixed observation points along the site boundary.

6) Before construction the Contractor shall prepare the detail plan to mitigate impacts on noise, vibration and traffic, then submit the plan to the Municipality.

2.4.2 GROUNDWATER AND WASTE

1) Groundwater insulation-type landfill disposal plant is recommended to protect groundwater from polluting. In this case it is recommended to install the leachate collecting system and to discharge leachate after to be treated, especially disinfection treatment.

2) The groundwater quality (at least Cl^-, COD_{Mn}, Coliform Group and typical heavy metals) should be checked 2 to 4 times per year in order to understand the change of groundwater quality.

3) With the background that an increase in agricultural utilization and incineration and a reduction of landfill for sewage sludge is forecast, it will be recommended to consider incineration or the utilization of sewage sludge in agriculture. In this case the load limiting values of EU Sewage Sludge Directive can be applied as alternative to sewage sludge limiting values in order to maintain the soil limiting values of heavy metals.

4) The characteristics (Cd, Cr, Cu, Pb, Hg, Ni and Zn) of dewatered sludge from WWTP should be checked at least 4 times per year.

2.4.3 Water Pollution and public health condition

1) It is recommended to establish a monitoring system to check the water quality of Danube River at main swimming area, intake for water supply as well as the downstream and upstream reaches of WWTP outfall.

2) The detail plan (such as monitoring point, analysis items and sampling frequency etc.) should be made in cooperation with the Tulcea Municipality.

3. ANNEXES

3.1 REFERENCIES

[1] - EPA Tulcea, Report on the State of Environment in the County of Tulcea, 1995

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[3] – CNAR, Water Quality Synthesis, 1995

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[6] – ICIM, The State of Environment in Romania, 1993

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[8] – JICA Study Team, Planning Basis for WWTP Tulcea, August 1999

[9] – Jorgensen, S.E, "Lake Management", Pergamon Press, 1980

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[14] – Romanian Academy, "Geographical Encyclopedia", 1974

3.2 ABBERVIATIONS

AF	= Average Flow
APM	= Agentia de Protectia Mediului
BOD	= Biochemical Oxygen Demand
CNAR	= Compania Nationala "Apele Romane" (National Company "Romania Waters")
DAF	= Daily Average Flow
DMF	= Daily Maximum Flow
DSP	= Directia de Sanatate Publica (Public Health Directorate)
EEA	= European Environment Agency
EPA	= Environmental Protection Agency
GD	= Government Decision
ICIM	= Institutul National de Cercetare Dezvoltare pentru Protectia Mediului Bucuresti (Research and Development National Institute for Environmental Protection)
JICA	= Japan International Cooperation Agency
MAC	= Maximum Allowable Concentration
MAF	= Multi-annual Average Flow
MAV	= Maximum Allowable Value
MO	= Ministerial Order
MWFEP	= Ministry of Water Forest and Environmental Protection
NCS	= National Commission for Statistics
NMVOC	= NON Methane Volatile Organic Compound
NTPA	= Norme tehnice pentru protectia apei
SA	= Societate pe Actiuni (Economic Unit by Shares)
SC	= Societate Comerciala (Commercial Unit)
SC ACET SA	= Societatea Comerciala Apa Canal Tulcea
SS	= Suspended Solids

STP	= Standard Temperature Pressure
SWDS	= Solid Waste Disposal Site
T-N	= Total Nitrogen
TNWP	= Technical works for Water Protection)
T-P	= Total Phosphorous
VOC	= Volatile Organic Compound
WWTP	= Wastewater Treatment Plant

3.3 RESULTS OF SURVEY

Results of EIA survey, such as soil, sludge, groundwater, leachate from existing solid disposal site, industrial wastewater and air, are summarized in Table AII.7.14 to AII.7.19.

Table AII.7.14 Summary of Analysis Results for Soil

Parameters	Analysis Method	Braila			Galati				Tulcea			Min.	Max.	Average	Max. Desirable (MD) - Max. Permissible (MP)
		Braila WWTP	Braila Sludge Disposal Site (Inside)	Braila Sludge Disposal Site (Outside)	Galati WWTP No.1 (Free Zone)	Galati WWTP Pumping Station No.3 Area	Galati Sludge Disposal Site (Inside)	Galati Sludge Disposal Site (Outside)	Tulcea WWTP	Tulcea Sludge Disposal Site (Inside)	Tulcea Sludge Disposal Site (Outside)				
pH	R.S. 7184/13-79	8.26	8.49	8.01	7.42	8.02	8.42	8.18	7.94	7.89	7.8	7.42	8.49	8.04	-
Electrical Conductivity (µS/cm)	R.S. 7184/7-87	246	480	170	190	208	1500	230	143	548	355	143	1,500	407	-
Cadmium - Cd (ppm)	AAS Method	0	1.5	0	0	0	3.25	0	0	1.75	0	0	3.25	0.65	1 - 5
Chromium - Cr (ppm)	AAS Method	0	6.8	0	12.5	13.8	140	6	13	65	12.5	0	140	27	30 - 300
Copper - Cu (ppm)	AAS Method	5.75	40.75	7.4	3.5	2.8	134.25	3	0	40.25	3.5	0	134.25	24	20 - 250
Manganese - Mn (ppm)	AAS Method	435	475	380	210	254	280	155	365	400	280	155	475	323	900 - 2,000
Nickel - Ni (ppm)	AAS Method	17	24.75	4.5	11.5	14.25	34.25	16.5	8.25	21.75	15.25	4.5	34.25	17	20 - 200
Lead - Pb (ppm)	AAS Method	8.2	44.6	7.5	29.5	17.5	180	7.9	21.25	79	20.95	7.5	180	42	20 - 250
Zinc - Zn (ppm)	AAS Method	270	420	210	415	380	580	290	205	465	312	205	580	355	100 - 700
Total hydrocarbons in oil (ppm)	R.S. 7877/87	21.18	82.6	10.4	11.48	10.21	429.2	16.4	31	168.8	46	10	429.20	83	100 - 1,000

Table AII.7.15 Summary of Analysis Results for Sludge from Existing WWTPs

Parameters	Roman Wastewater Treatment Plant				Constanta Wastewater Treatment Plant				Min.	Max.	Average	Max. Permissible Values Proposed in Romania Standard 1988 (MP)
	Crude Sludge from Mechanical System	Crude Sludge from Biological System (Activited Sludge)	Digested Sludge	Dewatered Sludge	Crude Sludge from Mechanical System	Crude Sludge from Biological System (Activited Sludge)	Digested Sludge	Dewatered Sludge				
pH	6.22	6.41	6.67	6.75	6.8	6.5	7.5	6.99	6.22	7.5	6.73	-
Total Nitrogen (% of weight rel. to TS)	2.68	2.41	1.71	1.52	5.73	4.93	2.29	2.18	1.52	5.73	2.93	-
Total Phosphorus (% of weight rel. to TS)	1.08	1.06	0.51	0.36	2.03	1.33	0.67	0.58	0.36	2.03	0.95	-
Water content (105 C) (% of weight)	91.25	99.55	95.24	74.24	89.2	95.53	99.89	58.48	58.48	99.89	87.92	-
Solids – TS (% of weight)	8.75	0.45	4.76	25.76	10.8	4.47	0.11	41.52	0.11	41.52	12.08	-
Organic Substances (550 C) (% of weight rel. to TS)	64.96	65.27	55.96	25.73	72.47	70.52	48.66	21.26	21.26	72.47	53.10	-
Mineral Substances (550 C) (% of weight rel. to TS)	35.04	34.73	44.04	74.27	27.53	29.48	51.34	78.74	27.53	78.74	46.90	-
Cadmium - Cd (mg/kg TS)	0	0	0	0	0	0	0	0	0	0	0	10
Chromium - Cr (mg/kg TS)	0	0	0	0	0	0	0	0	0	0	0	500
Copper - Cu (mg/kg TS)	60.37	28.09	32.24	88.05	137.41	58.34	48.18	71.42	28	137	66	500
Nickel - Ni (mg/kg TS)	0	0	0	0	0	0	0	0	0	0	0	100
Lead - Pb (mg/kg TS)	48.45	12.7	8.45	80.82	93.31	43.31	38.54	101.52	8	102	53	300
Zinc - Zn (mg/kg TS)	666.75	243.4	247.2	1,157.23	1007.64	307.69	294.64	1,600.35	243	1,600	645	2,000
Calorific Value (kJ/g TS)	17.2	16.8	16.2	-	18.7	19.2	17.3	-	16	19	18	-

Table AII.7.16 Summary of Analysis Results for Groundwater

Parameters	Braila					Galati					Constanta		
	WWTP Upstream	WWTP Downstream	Sludge Disposal site Upstream	Sludge Disposal site Downstream 1	Sludge Disposal site Downstream 2	WWTP Upstream	WWTP Downstream	Sludge Disposal site Upstream	Sludge Disposal site Downstream 1	Sludge Disposal site Downstream 2	Controlled Landfill Upstream	Controlled Landfill Downstream	Max. Desirable (MD) - Max. Permissible (MP)
Aspect	Clear supernatant, high quantity of sediment	Clear supernatant, high quantity of sediment	Clear supernatant	Clear supernatant	Clear supernatant	Turbid supernatant, yellow -red	Turbid supernatant, yellow -red	Clear supernatant	Opalescent	Opalescent	Clear supernatant	Clear supernatant; yellow -red sediment	
Colour	9.1	8.9	1.2	9.1	8.5	43.25	45.37	1.95	2.43	2.86	0.9	2.2	2 - 2
Turbidity (grade SiO_2)	-	-	15.1	19	25.9	71.05	72	9.7	28.45	9.4	-	-	2 - 2
Suspended solids (mg/dm^3)	151,560	11,580	34.55	97	115.15	118.55	121	12.05	18.3	16.2	32	302	
pH at 20°C (units)	6.93	7.28	7.34	7.8	7.28	7.42	7.53	7.72	7.9	7.7	7.68	7.75	6.5~7.4 - 8.5
Conductivity (μ S/cm)	2,306	1,802	886.6	1,369.50	1,250.10	1207.14	1,225.36	805.6	814.5	1,253	741	778	1000 - 3000
Total sulphides - agitated sample (as H_2S) (mg/dm^3)	136.32 / 0 *	1.24	-	-	-	0.04	0.05	-	-	-	-	8.34	0 - 0.1
Carbon Dioxide (mg/dm^3)	23.6	10.25	2.45	3.6	2.64	17.32	17.6	2.24	2.2	1.76	3.6	2.95	
Temperature (°C)	16	16	17	16	17	18	18	17	16	16	17		22/normal
CATIONS													
Calcium - Ca (mg/dm^3)	212.42	157.11	46.1	76.15	79.61	85.26	88.17	47.45	48.1	60.12	20.04	100.2	100 - 180
Magnesium - Mg(mg/dm^3)	147	123	54.68	86.27	84.3	65.25	65.6	30.15	30.2	37.5	10.23	26.73	50 - 80
Sodium and Potassium - Na + K (mg/dm^3)	262.1	209.12	169.2	202.8	169.7	149.3	149.3	67.2	68	239	165.2	170.46	
Iron - Fe (mg/dm^3)	1.304 / 0.39 *	300 / 0.51 *	0.28	0.23	1.48	4.55	7.96	0.08	0.09	0.08	0.85	192	0.1 - 0.3
Manganese - Mn (mg/dm^3)	24.00 / 0.32 *	1.792 / 0.144 *	0.105	0.176	0.144	0.36	0.373	0.025	0.036	0.026	0.048	1.2	0.05 - 0.3
Aluminium - Al (mg/dm^3)	1.072 / 0.04 *	0.792 / 0.152 *	0.064	0.096	0.096	0.233	0.252	0.08	0.12	0.08	0.084	0.76	0.05 - 0.2
Copper - Cu (mg/dm^3)	1.759 / 0 *	0.325 / 0 *	0	0.003	0	0	0	0	0	0	0	0.142	0.05 - 0.1
Chromium - Cr (mg/dm^3)	0.148 / 0 *	0.045 / 0 *	0	0.005	0.006	0.001	0.002	0.002	0.002	0.009	0	0.135	0.05
Zinc - Zn (mg/dm^3)	0.320 / 0.192 *	0.256 / 0.154 *	0.352	0.488	0.8	0.457	0.469	0.5	0.52	0.67	0.084	0.712	5 - 7
Nickel - Ni (mg/dm^3)	0.764 / 0.032 *	0.724 / 0 *	0	0.022	0	0	0	0.003	0.003	0.004	0	0.257	0.1
Cadmium - Cd (mg/dm^3)	0.05 / 0.006 *	0.019 / 0.004 *	0	0.004	0.003	0.002	0.004	0.002	0.002	0.0008	0	0.015	0.005
Lead - Pb (mg/dm^3)	0.15 / 0.091 *	0.451 / 0 *	0.02	0.025	0.035	0.057	0.062	0.024	0.046	0.014	0	0.019	0.05
Ammonia - NH_4 (mg/dm^3)	0.6*	- *	0.07	0.13	0.16	5.52	7.75	0.01	0.01	0.38	0.45	1.65	0 - 0.5
ANIONS and OTHER ITEMS													
Nitrites - NO_2 (mg/dm^3)	0.008	0.1	0.04	0.1	0.04	0	0	0.005	0.008	0.05	0.03	0.037	0 - 0.3
Nitrates - NO_3 (mg/dm^3)	5.37	0	1.72	5.3	1.74	1.44	1.84	4.15	3.07	31.16	1.32	1.36	45
Chlorides - Cl^- (mg/dm^3)	205.6	150.7	58.5	166.62	58.5	163	163.07	76.83	78	110	76.2	76.22	250 - 400
Bicarbonates - HCO^-_3 (mg/dm^3)	1,586.50	793.26	625.45	707.8	628.5	738.34	764.44	512.57	518.67	549.18	417.99	427.14	
Carbonates - CO^{2-}_3 (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	
Sulphates - SO^{2-}_4 (mg/dm^3)	116.25	480.95	108.35	161.43	109.1	9.25	9	57.75	57.8	385	90.05	90.05	200 - 400
Total phosphates - PO^{3-}_4 (mg/dm^3)	0.347 / 0.005 *	3.14 / 0.46 *	0.03	0.185	0.04	0.08	0.098	0.08	0.08	0.098	0.005	0.18	0.1 - 0.5
Cyanide - CN (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	0.01*
Organic Substances - $KMnO_4$ (mg/dm^3)	7.192 / 62.00 *	308 / 32.12 *	10.12	12.97	20.54	43.1	43.12	3.05	4.12	6.23	3.8	77.92	10 - 12
Oil and grease (mg/dm^3)	4.87	4.05	1.05	1.2	1.9	1.93	2.93	1.72	8.84	2.08	0.67	10.3	-
Phenols (mg/dm^3)	1.3	0.3	0	0	0	0	0	0	0	0	0	0.015	0.001*
Alkalinity- permanent "p" (mval/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	
Alkalinity - total "m" (mval/dm^3)	550 / 26 *	13	10.25	11.6	10.3	12.1	12.2	8.4	8.5	9	6.85	7	
Acidity (mval/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	
Dissolved solids at 105 °C (mg/dm^3)	1,895.20	1,329.50	761.3	1,056.45	998	861.57	863	600.8	602	1,192.50	590.12	593.16	min. 100/max. 800 - min. 20/max.1200
Hardness - total (German degrees)	33.6	25.84	19.04	30.5	30.55	26.95	27.44	25.1	25.2	28.6	8.96	18.2	20 - 30
BACTERIA													
Total number of bacteria at 37°C UFC / cm^3	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	under 300
Probable number of coliform bacteria /100 cm^3	920,000	172	1,600	24,000	9,420	16,090	16,090	920	16,090	1,600	1,600	54,200	under 10
Probable number of coliform-thermotolerabil bacteria (fecal coliforms) / 100 cm^3	540,000	2	22	350	27	240	240	94	2,600	240	920	3,400	under 2
Probable number of fecal streptococcus/100 cm^3	9,200	34,800	7	70	7	1	1	20	70	23	5.42	17,200	under 2

*: Agitated Sample/Supernatant of Sample

: means the parameters analysed not respect the Romanian Standard 1342/1991 - "Drinking Water"

Table AII.7.16 Summary of Analysis Results for Groundwater

Parameters	Braila					Galati					Constanta		
	WWTP Upstream	WWTP Downstream	Sludge Disposal site Upstream	Sludge Disposal site Downstream 1	Sludge Disposal site Downstream 2	WWTP Upstream	WWTP Downstream	Sludge Disposal site Upstream	Sludge Disposal site Downstream 1	Sludge Disposal site Downstream 2	Controlled Landfill Upstream	Controlled Landfill Downstream	Max. Desirable (MD) - Max. Permissible (MP)
Aspect	Clear supernatant, high quantity of sediment	Clear supernatant, high quantity of sediment	Clear supernatant	Clear supernatant	Clear supernatant	Turbid supernatant, yellow -red	Turbid supernatant, yellow -red	Clear supernatant	Opalescent	Opalescent	Clear supernatant	Clear supernatant, yellow -red sediment	
Colour	9.0	8.9	1.2	0.5	8.5	45.05	45.07	1.95	2.43	2.86	0.9	3.0	2 - 2
Turbidity (grade SiO_2)	-	-	15.3	19	25.3	71.05	72	9.7	28.49	9.4	-	-	2 - 2
Suspended solids (mg/dm^3)	151.560	11.580	34.55	97	115.15	118.55	121	12.05	18.3	16.2	32	332	
pH at 20°C (units)	6.93	7.28	7.36	7.8	7.28	7.42	7.53	7.72	7.9	7.7	7.68	7.25	6.5 ÷ 7.4 - 8.5
Conductivity (μ S/cm)	2,306	1,802	886.6	1,369.50	1,250.10	1207.14	1,225.36	805.6	814.5	1,253	741	778	1000 - 3000
Total sulphides - agitated sample (as H_2S) (mg/dm^3)	136.32 / 0 *	1.94	-	-	-	0.04	0.05	-	-	-	-	8.34	0 - 0.1
Carbon Dioxide (mg/dm^3)	23.6	10.25	2.45	3.6	2.64	17.32	17.6	2.24	2.2	1.76	3.6	2.95	
Temperature (°C)	16	16	17	16	17	18	18	17	16	16	17		22/normal
CATIONS													
Calcium - Ca (mg/dm^3)	212.42	157.11	46.1	76.15	79.61	85.26	88.17	47.45	48.1	60.12	20.04	100.2	100 - 180
Magnesium - Mg(mg/dm^3)	147	123	54.68	86.27	84.3	65.25	66.6	80.15	80.2	82.5	10.23	26.73	50 - 80
Sodium and Potassium - Na + K (mg/dm^3)	262.1	209.12	169.2	202.8	169.7	149.3	149.3	67.2	68	239	165.2	170.46	
Iron - Fe (mg/dm^3)	1.504/0.10 *	500 / 0.51 *	0.28	0.30	1.48	4.55	7.96	0.08	0.09	0.08	0.85	392	0.1 - 0.3
Manganese - Mn (mg/dm^3)	24.00/ 0.32 *	1.792 / 0.144 *	0.105	0.176	0.144	0.36	0.378	0.025	0.036	0.026	0.048	1.2	0.05 - 0.3
Aluminium - Al (mg/dm^3)	1.072 / 0.04 *	0.792 / 0.152 *	0.064	0.096	0.096	0.233	0.232	0.08	0.12	0.38	0.084	0.76	0.05 - 0.2
Copper - Cu (mg/dm^3)	1.759 / 0 *	0.325 / 0 *	0	0.003	0	0	0	0	0	0	0	0.342	0.05 - 0.1
Chromium - Cr (mg/dm^3)	0.148 / 0 *	0.048 / 0 *	0	0.005	0.006	0.001	0.002	0.002	0.002	0.009	0	0.115	0.05
Zinc - Zn (mg/dm^3)	0.320 / 0.192 *	0.256 / 0.154 *	0.352	0.488	0.8	0.457	0.469	0.5	0.52	0.67	0.084	0.712	5 - 7
Nickel - Ni (mg/dm^3)	0.764 / 0.032 *	0.724 / 0 *	0	0.022	0	0	0	0.003	0.003	0.004	0	0.247	0.1
Cadmium - Cd (mg/dm^3)	0.057 / 0.006 *	0.019 / 0.004 *	0	0.004	0.003	0.002	0.004	0.002	0.002	0.0008	0	0.015	0.005
Lead - Pb (mg/dm^3)	0.258 / 0.09 *	0.451 / 0 *	0.02	0.025	0.035	0.057	0.062	0.024	0.046	0.014	0	0.549	0.05
Ammonia - NH_4 (mg/dm^3)	0.67	0.2	0.07	0.13	0.16	5.52	2.75	0.01	0.01	0.38	0.45	1.663	0 - 0.5
ANIONS and OTHER ITEMS													
Nitrites - NO_2 (mg/dm^3)	0.008	0.1	0.04	0.1	0.04	0	0	0.005	0.008	0.05	0.03	0.037	0 - 0.3
Nitrates - NO_3 (mg/dm^3)	5.37	0	1.22	5.3	1.74	1.44	1.84	4.15	3.07	31.16	1.32	1.36	45
Chlorides - Cl^- (mg/dm^3)	205.6	150.7	58.5	106.62	58.5	163	163.07	76.83	78	110	76.2	76.22	250 - 400
Bicarbonates - HCO_3^- (mg/dm^3)	1,586.50	793.26	625.45	707.8	628.5	738.34	744.44	512.57	518.67	509.18	417.90	427.14	
Carbonates - CO_3^{2-} (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	
Sulphates - SO_4^{2-} (mg/dm^3)	116.25	680.05	108.35	161.43	109.1	9.25	9	57.75	57.8	385	90.05	90.05	200 - 400
Total phosphates - PO_4^{3-} (mg/dm^3)	0.34 / 0.005 *	3.14 / 0.46 *	0.03	0.185	0.04	0.08	0.098	0.08	0.08	0.098	0.005	0.18	0.1 - 0.5
Cyanide - CN (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	0.01*
Oxyane Substances - $KMnO_4$ (mg/dm^3)	7.102 / 0.00 *	398 / 22.12 *	10.12	12.32	20.52	41.1	45.12	3.05	4.12	6.23	3.8	32.92	10 - 12
Oil and grease (mg/dm^3)	4.87	4.05	1.05	1.2	1.9	1.93	2.93	1.72	8.84	2.08	0.67	10.3	-
Phenols (mg/dm^3)	0.5	0.33	0	0	0	0	0	0	6	0	0	0.015	0.001*
Alkalinity- permanent "p" (mval/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	
Alkalinity - total "m" (mval/dm^3)	550 / 26 *	13	10.25	11.6	10.3	12.1	12.2	8.4	8.5	9	6.85	7	
Acidity (mval/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	
Dissolved solids at 105 °C (mg/dm^3)	1,695.20	1,329.50	761.3	1,056.45	998	861.57	863	600.8	602	1,192.50	590.12	593.16	min. 100/max. 800 ÷ min. 1000/max. 1500
Hardness - total (German degrees)	43.8	35.84	19.04	30.5	30.55	26.95	27.44	25.1	25.2	28.6	8.96	18.2	20 - 30
BACTERIA													
Total number of bacteria at 37°C UFC / cm^3	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	over 300	under 300
Probable number of coliform bacteria /100 cm^3	920,000	172	3,000	24,000	5,420	54,000	16,000	920	16,000	1,600	2,600	54,200	under 10
Probable number of coliform-thermotolerabd bacteria (fecal coliforms) / 100 cm^3	542,000	2	22	180	37	240	240	94	1,600	240	920	3,400	under 2
Probable number of fecal streptococcus/100 cm^3	9,200	54,000	7	70	2	5	5	20	70	350	542	130,200	under 2

*: Agitated Sample/Supernatant of Sample

: means the parameters analysed not respect the Romanian Standard 1342/1991 - "Drinking Water"

Table AII.7.17 Summary of Analysis Results for Leachate from Existing Solid Disposal Site

Parameters	Braila Solid Waste Disposal Site	Galati Solid Waste Disposal Site	Tulcea Solid Waste Disposal Site	Constanta Solid Waste Disposal Site	NTPA 002
pH at 20°C (units)	8.22	8.3	8.18	8.12	6.5 - 8.5
BOD_5 (mg/dm^3)	3,824	4,135	3,465	2,988	300
COD_{Cr} (mg/dm3)	7,742	8,780	7,440	6,770	500
Chlorides (Cl^-) (mg/dm^3)	4,220	4,608	3,162	2,020	-
SS (mg/dm^3)	684	768	625	468	300
(NH_4 – N) (mg/dm^3)	592	635	590	548	30
Total Nitrogen (mg/dm^3)	7.36	756	722	677	-
Total Phosphorus (mg/dm^3)	4.3	5	4.25	3.8	5.0
$H_2S + S^{-2}$ (mg/dm^3)	18.8	22.4	16.3	11.08	0.5
Sulphates (SO_4^{2-}) (mg/dm^3)	20.6	31	28	24	400
Total Coliform Group (no./100 ml)	3.48×10^8	3.48×10^8	5.42×10^8	3.48×10^6	-
Fecal Coliform Bacteria (no./100 ml)	1.41×10^8	1.72×10^8	1.75×10^8	1.61×10^5	-
Fecal Streptococcus Group (no./100 ml)	1.61×10^6	1.75×10^6	1.41×10^6	5.42×10^5	-
Arsenic (As) (mg/dm^3)	0	0	0	0	-
Lead (Pb) (mg/dm^3)	0.265	0.322	0.135	0.085	0.5
Cadmium (Cd) (mg/dm^3)	0.042	0.047	0.042	0.033	0.1
Total Chromium (mg/dm^3)	0	0.075	0	0	Cr^{3+}1.0/Cr^{6+}0.1
Copper (Cu) (mg/dm^3)	0.142	0.185	0.022	0.014	0.1
Nickel (Ni) (mg/dm^3)	0.136	0.149	0.013	0.11	1
Zinc (Zn) (mg/dm^3)	0.41	0.5	0.316	0.225	1
Manganese (Mn) (mg/dm^3)	0.14	0.18	0.08	0.06	1
Cyanide (mg/dm^3)	0	0	0	0	0.5
Oil and Grease (mg/dm3)	528	580	462	278	20
Phenols (mg/dm^3)	1.32	1.48	1.16	0.88	30

: means the parameters analyzed not respect the Romanian Standard NTPA 002/1997- Quality Indicators of Waste Water Discharged into Municipal Sewage Systems

Table AII.7.17 Summary of Analysis Results for Leachate from Existing Solid Disposal Site

Parameters	Braila Solid Waste Disposal Site	Galati Solid Waste Disposal Site	Tulcea Solid Waste Disposal Site	Constanta Solid Waste Disposal Site	NTPA 002
pH at 20°C (units)	8.22	8.3	8.18	8.12	6.5 - 8.5
BOD_5 (mg/dm^3)	3,824	4,135	3,465	2,988	300
COD_{Cr} (mg/dm3)	7,742	8,780	7,440	6,770	500
Chlorides (Cl^-) (mg/dm^3)	4,220	4,608	3,162	2,020	-
SS (mg/dm^3)	684	768	625	468	300
(NH_4 -- N) (mg/dm^3)	592	635	590	548	30
Total Nitrogen (mg/dm^3)	7.36	756	722	677	-
Total Phosphorus (mg/dm^3)	4.3	5	4.25	3.8	5.0
$H_2S + S^{-2}$ (mg/dm^3)	18.8	22.4	16.3	11.08	0.5
Sulphates (SO_4^{2-}) (mg/dm^3)	20.6	31	28	24	400
Total Coliform Group (no./100 ml)	3.48×10^8	3.48×10^8	5.42×10^8	3.48×10^6	-
Fecal Coliform Bacteria (no./100 ml)	1.41×10^8	1.72×10^8	1.75×10^8	1.61×10^5	-
Fecal Streptococcus Group (no./100 ml)	1.61×10^6	1.75×10^6	1.41×10^6	5.42×10^5	-
Arsenic (As) (mg/dm^3)	0	0	0	0	-
Lead (Pb) (mg/dm^3)	0.265	0.322	0.135	0.085	0.5
Cadmium (Cd) (mg/dm^3)	0.042	0.047	0.042	0.033	0.1
Total Chromium (mg/dm^3)	0	0.075	0	0	Cr^{3+} 1.0/Cr^{6+} 0.1
Copper (Cu) (mg/dm^3)	0.142	0.185	0.022	0.014	0.1
Nickel (Ni) (mg/dm^3)	0.136	0.149	0.013	0.11	1
Zinc (Zn) (mg/dm^3)	0.41	0.5	0.316	0.225	1
Manganese (Mn) (mg/dm^3)	0.14	0.18	0.08	0.06	1
Cyanide (mg/dm^3)	0	0	0	0	0.5
Oil and Grease (mg/dm3)	528	580	462	278	20
Phenols (mg/dm^3)	1.32	1.48	1.16	0.88	30

: means the parameters analyzed not respect the Romanian Standard NTPA 002/1997- Quality Indicators of Waste Water Discharged into Municipal Sewage Systems

Table AII.7.18 Summary of Analysis Results for Industrial Wastewater in Tulcea

Parameters	Municipal Hospital			S.C. DELTA LACT S.A. (Milk Factory)			S.C. TABCO S.A. (Meat Factory)			Min.	Max.	Average	NTPA 002
	99/7/15 9:00	99/7/15 12:00	99/7/15 15:00	99/7/15 9:00	99/7/15 12:00	99/7/15 15:00	99/7/15 9:00	99/7/15 12:00	99/7/15 15:00				
Water Temperature (°C)	25	25	22	22	26	25	27	24	24	22	27	24	40
pH at 20°C (units)	7.54	6.82	7.7	6.62	6.64	6.6	7.8	6.71	7.2	6.6	7.8	7.1	6.5 – 8.5
BOD_5 (mg/dm^3)	235.6	112.8	178.4	682	265	264	411	2,380	392	112.8	2380	569	300
COD_{Cr} (mg/dm3)	401	220	346	1,550	432	467.7	673	4,276	766	220	4,276	1,015	500
COD_{Mn} (mg/dm3)	278	124	195.2	968	288	294	506.6	2522	428	124	2,522	623	-
Chlorides (Cl^-) (mg/dm^3)	70.9	81.6	81.6	638	638	673.7	117	163	99.4	70.9	674	285	-
SS (mg/dm^3)	248	126	75	602	174	188	78	104.6	176.4	75	602	197	300
(NH_4 – N) (mg/dm^3)	3.6	2.78	3.14	11.6	3	7	1.5	2	0.2	0.2	11.6	4	30
Total Nitrogen (mg/dm^3)	22.4	13.44	14.8	28.4	18.2	22.68	7.56	28	19.32	7.56	28.4	19	-
Total Phosphorus (mg/dm^3)	4.33	3	0.7	3.3	2.37	1.77	2.23	6.33	1.5	0.7	6.33	3	5
$H_2S + S^{-2}$ (mg/dm^3)	0	0	0	0	0	0	0	0.12	0	0	0.12	0	0.5
Sulphates (SO_4^{2-}) (mg/dm^3)	62.4	62.4	64.6	90	64.6	64.6	51.5	60	60	51.5	90	64	400
Total Coliform Group (no./100 ml)	3.5×10^7	5.4×10^7	5.4×10^7	5.4×10^6	3.5×10^8	1.6×10^7	1.6×10^8	1.6×10^8	9.2×10^7	5.4×10^6	3.5×10^8	1.2×10^8	-
Fecal Coliform Bacteria (no./100 ml)	1.6×10^7	1.6×10^4	3.5×10^7	3.5×10^6	1.6×10^8	9.2×10^6	9.2×10^7	5.4×10^7	3.5×10^7	1.6×10^4	1.6×10^8	5.4×10^7	-
Fecal Streptococcus Group (no./100 ml)	1.6×10^4	5.4×10^4	1.6×10^4	2.4×10^3	5.4×10^3	9.2×10^4	4.6×10^3	3.5×10^4	1.4×10^4	2.4×10^3	9.2×10^4	2.7×10^4	-
Arsenic (As) (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0.00	-
Lead (Pb) (mg/dm^3)	0	0	0	0.004	0.005	0.008	0.02	0.029	0.016	0	0.029	0.01	0.5
Cadmium (Cd) (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0.00	0.1
Total Chromium (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0.00	Cr^{3+}1.0/Cr^{6+}0.1
Copper (Cu) (mg/dm^3)	0.004	0.004	0.004	0.011	0.012	0.015	0.002	0.006	0.03	0.002	0.03	0.0	0.1
Nickel (Ni) (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	1
Zinc (Zn) (mg/dm^3)	0.32	0.29	0.3	0.57	0.61	0.31	0.48	0.5	0.43	0.29	0.61	0.42	1
Manganese (Mn) (mg/dm^3)	0.01	0.01	0.01	0.03	0.08	0.02	0.03	0.03	0.04	0.01	0.08	0.03	1
Cyanide (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	0.5
Phenols (mg/dm^3)	0	0	0	0	0	0	0.03	0.01	0.1	0	0.1	0.02	30
Oil and Grease (mg/dm^3)	1.2	0.8	0.8	48.4	12.8	14.2	36.4	52.8	43.6	0.8	52.8	23.4	20
Detergents (mg/dm^3)	0.76	0.62	0.44	0.01	0	0.5	0.17	2.2	2.6	0	2.6	0.8	30

: means the parameters analyzed not respect the Romanian Standard NTPA 002/1997- Quality Indicators of Waste Water Discharged into Municipal Sewage Systems

Table AII.7.18 Summary of Analysis Results for Industrial Wastewater in Tulcea

Parameters	Municipal Hospital			S.C. DELTA LACT S.A. (Milk Factory)			S.C. TABCO S.A. (Meat Factory)			Min.	Max.	Average	NTPA 002
	99/7/15 9:00	99/7/15 12:00	99/7/15 15:00	99/7/15 9:00	99/7/15 12:00	99/7/15 15:00	99/7/15 9:00	99/7/15 12:00	99/7/15 15:00				
Water Temperature (°C)	25	25	22	22	26	25	27	24	24	22	27	24	40
pH at 20°C (units)	7.54	6.82	7.7	6.62	6.64	6.6	7.8	6.71	7.2	6.6	7.8	7.1	6.5 – 8.5
BOD_5 (mg/dm^3)	235.6	112.8	178.4	882	265	264	411	2,380	392	112.8	2380	569	300
COD_{Cr} (mg/dm3)	401	220	346	1,550	432	467.7	675	4,276	766	220	4,276	1,015	500
COD_{Mn} (mg/dm3)	278	124	195.2	968	288	294	506.6	2522	428	124	2,522	623	-
Chlorides (Cl^-) (mg/dm^3)	70.9	81.6	81.6	638	638	673.7	117	163	99.4	70.9	674	285	-
SS (mg/dm^3)	248	126	75	602	174	188	78	104.6	176.4	75	602	197	300
(NH_4 – N) (mg/dm^3)	3.6	2.78	3.14	11.6	3	7	1.5	2	0.2	0.2	11.6	4	30
Total Nitrogen (mg/dm^3)	22.4	13.44	14.8	28.4	18.2	22.68	7.56	28	19.32	7.56	28.4	19	-
Total Phosphorus (mg/dm^3)	4.33	3	0.7	3.3	2.37	1.77	2.23	6.33	1.5	0.7	6.33	3	5
$H_2S - S^{-2}$ (mg/dm^3)	0	0	0	0	0	0	0	0.12	0	0	0.12	0	0.5
Sulphates (SO_4^{2-}) (mg/dm^3)	62.4	62.4	64.6	90	64.6	64.6	51.5	60	60	51.5	90	64	400
Total Coliform Group (no./100 ml)	3.5×10^7	5.4×10^7	5.4×10^7	5.4×10^6	3.5×10^8	1.6×10^7	1.6×10^8	1.6×10^8	9.2×10^7	5.4×10^6	3.5×10^8	1.2×10^8	-
Fecal Coliform Bacteria (no./100 ml)	1.6×10^7	1.6×10^4	3.5×10^7	3.5×10^6	1.6×10^8	9.2×10^6	9.2×10^7	5.4×10^7	3.5×10^7	1.6×10^4	1.6×10^8	5.4×10^7	-
Fecal Streptococcus Group (no./100 ml)	1.6×10^4	5.4×10^4	1.6×10^4	2.4×10^3	5.4×10^3	9.2×10^4	4.6×10^3	3.5×10^4	1.4×10^4	2.4×10^3	9.2×10^4	2.7×10^4	-
Arsenic (As) (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0.00	-
Lead (Pb) (mg/dm^3)	0	0	0	0.004	0.005	0.008	0.02	0.029	0.016	0	0.029	0.01	0.5
Cadmium (Cd) (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0.00	0.1
Total Chromium (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0.00	Cr^{3+}1.0/Cr^{6+}0.1
Copper (Cu) (mg/dm^3)	0.004	0.004	0.004	0.011	0.012	0.015	0.002	0.006	0.03	0.002	0.03	0.0	0.1
Nickel (Ni) (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	1
Zinc (Zn) (mg/dm^3)	0.32	0.29	0.3	0.57	0.61	0.31	0.48	0.5	0.43	0.29	0.61	0.42	1
Manganese (Mn) (mg/dm^3)	0.01	0.01	0.01	0.03	0.08	0.02	0.03	0.03	0.04	0.01	0.08	0.03	1
Cyanide (mg/dm^3)	0	0	0	0	0	0	0	0	0	0	0	0	0.5
Phenols (mg/dm^3)	0	0	0	0	0	0	0.03	0.01	0.1	0	0.1	0.02	30
Oil and Grease (mg/dm^3)	1.2	0.8	0.8	48.4	12.8	14.2	36.4	52.8	43.6	0.8	52.8	23.4	20
Detergents (mg/dm^3)	0.76	0.62	0.44	0.01	0	0.5	0.17	2.2	2.6	0	2.6	0.8	30

: means the parameters analyzed not respect the Romanian Standard NTPA 002/1997- Quality Indicators of Waste Water Discharged into Municipal Sewage Systems

Table AII.7.19 Summary of Analysis Results for the Air in Braila, Galati, Tulcea, Roman and Constanta WWTPs

City	Parameters	0 m from WWTP Boundary	50 m from WWTP Boundary	150 m from WWTP Boundary	Limits for 30 Minutes Sampling Period (R.S. 12574/1987)
Braila	H_2S	0	0	0	0.015 mg/m^3
	NH_3	0.105	0.105	0.105	0.3 mg/m^3
	Odor Level	1	1	1	1 - 5
Galati Free Zone Area	H_2S	0	0	0	0.015 mg/m^3
	NH_3	0.08	0.05	0.02	0.3 mg/m^3
	Odor Level	1	1	1	1 - 5
Galati Pumping Station No.3 Area	H_2S	0.0006	0.0004	0.0003	0.015 mg/m^3
	NH_3	0.018	0.012	0.01	0.3 mg/m^3
	Odor Level	1	1	1	1 - 5
Tulcea	H_2S	0	0	0	0.015 mg/m^3
	NH_3	0.115	0.105	0.095	0.3 mg/m^3
	Odor Level	1	1	1	1 - 5
Roman	H_2S	0.45	0.48	0.42	0.015 mg/m^3
	NH_3	0.33	0.35	0.35	0.3 mg/m^3
	Odor Level	4	4	4	1 - 5
Constanta	H_2S	0.35	0.05	0.033	0.015 mg/m^3
	NH_3	0.30	0.11	0.10	0.3 mg/m^3
	Odor Level	4	3	3	1 - 5

Table AII.7.19 Summary of Analysis Results for the Air in Braila, Gaiati, Tulcea, Roman and Constanta WWTPs

City	Parameters	0 m from WWTP Boundary	50 m from WWTP Boundary	150 m from WWTP Boundary	Limits for 30 Minutes Sampling Period (R.S. 12574/1987)
Braila	H_2S	0	0	0	0.015 mg/m^3
	NH_3	0.105	0.105	0.105	0.3 mg/m^3
	Odor Level	1	1	1	1 - 5
Galati Free Zone Area	H_2S	0	0	0	0.015 mg/m^3
	NH_3	0.08	0.05	0.02	0.3 mg/m^3
	Odor Level	1	1	1	1 - 5
Galati Pumping Station No.3 Area	H_2S	0.0006	0.0004	0.0003	0.015 mg/m^3
	NH_3	0.018	0.012	0.01	0.3 mg/m^3
	Odor Level	1	1	1	1 - 5
Tulcea	H_2S	0	0	0	0.015 mg/m^3
	NH_3	0.115	0.105	0.095	0.3 mg/m^3
	Odor Level	1	1	1	1 - 5
Roman	H_2S	0.45	0.48	0.42	0.015 mg/m^3
	NH_3	0.33	0.35	0.35	0.3 mg/m^3
	Odor Level	4	4	4	1 - 5
Constanta	H_2S	0.35	0.05	0.033	0.015 mg/m^3
	NH_3	0.30	0.11	0.10	0.3 mg/m^3
	Odor Level	4	3	3	1 - 5

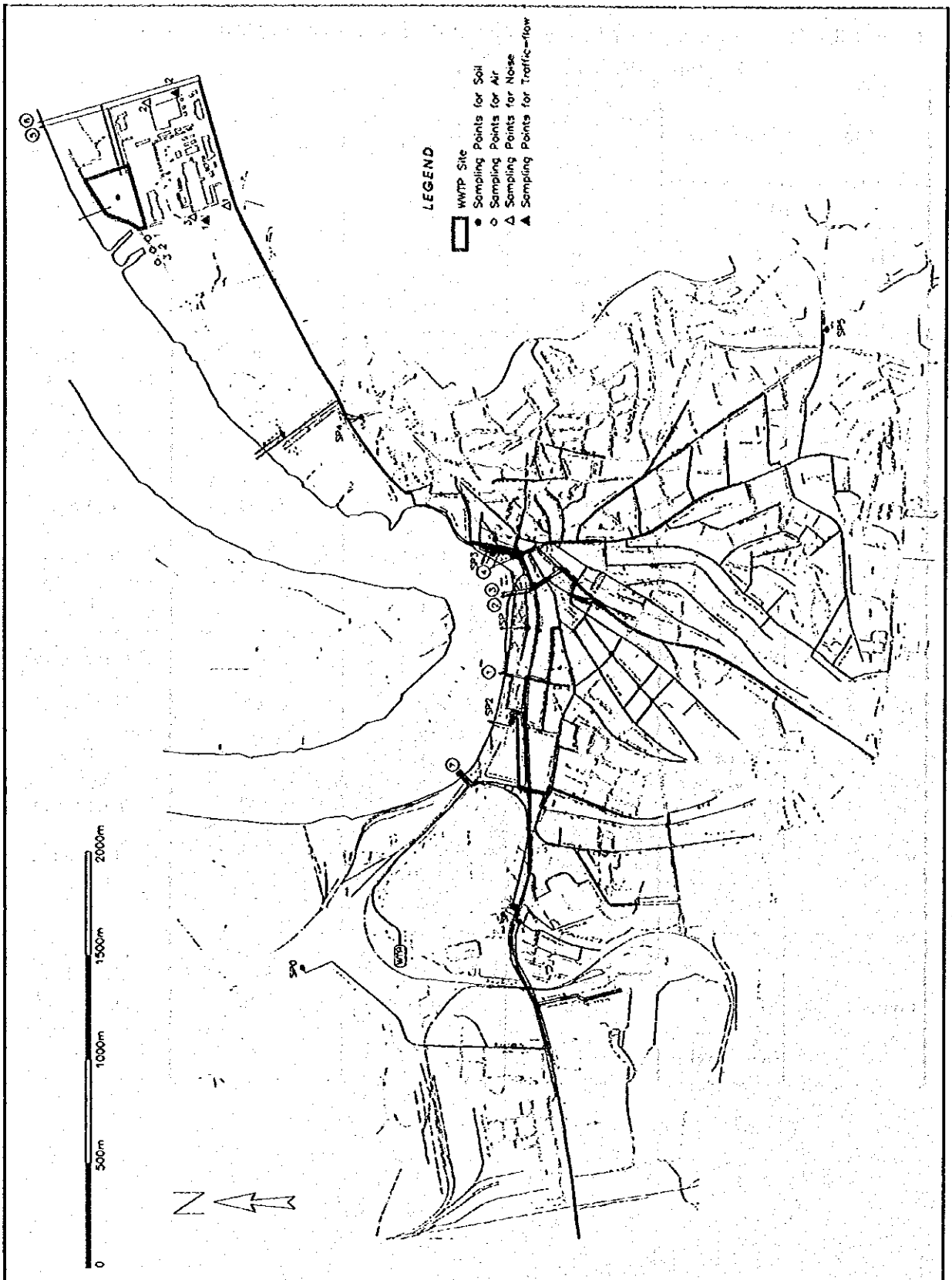


Figure AII.7.1	Location Map of Tulcea Wastewater Treatment Plant and Sampling Points

APPENDIX-8 GEOLOGICAL SURVEY

A geological survey was conducted to prepare basic information on the soil conditions, which are necessary to investigate the type of foundation and temporally work for planning of wastewater treatment plant.

The geological survey consists of borings at the potential sites of the proposed wastewater treatment plant, and in-situ test and laboratory test to examine the soil characteristics. Contents of the survey are as follows:

Boring (depth: 20m)	3 sites
Boring (depth: 30m)	1 site
Standard Penetration Test	4 boring sites
Physical Test at Laboratory (Specific gravity, Liquid/Plastic Limit and Grain Size)	4 samples
Unconfined compression test at Lab.	4 samples
Consolidation test at Lab.	4 samples

A report of the geological survey, which was prepared by the contractor "SETA S.A.", is attached hereinafter, and the contents of the report consists of a location map of samping points, geological results, dynamic penetration test, analytical results of laboratory and result of consolidation test.

SETA S.A. SOCIETATE DE ECOLOGIE ªI TEHNOLOGIE A APEI

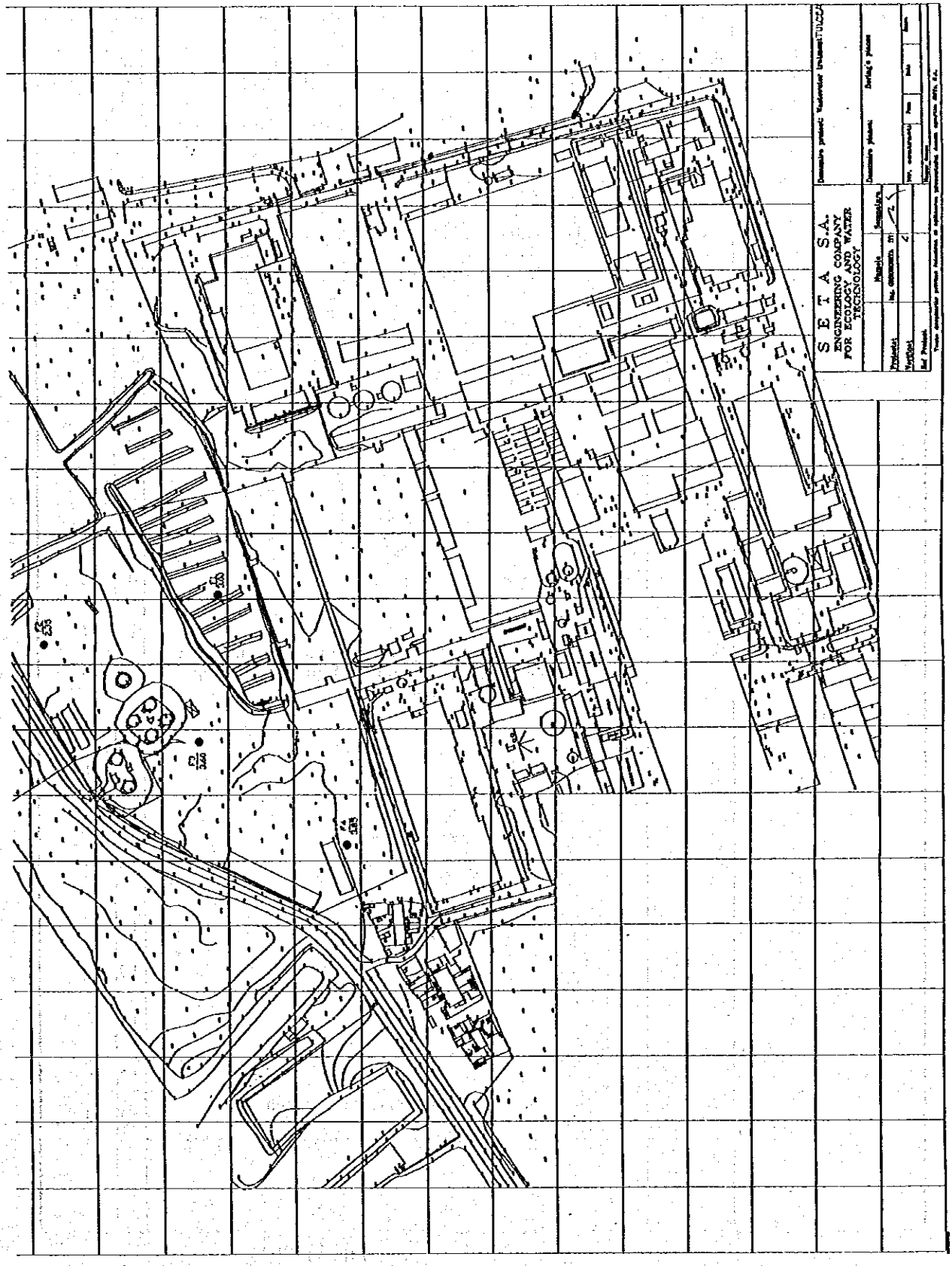
SEDIUL: str. Tudor Arghezi, nr.21 Sector 2, 70132, Bucure¿ti - J 40/4771/1995 - Cod fiscal R 7470611
Tel/fax: 211.32.20 ; 211.41.77; E-mail : Error! Reference source not found.

GEOLOGICAL SURVEY

Subject : THE FEASIBILITY STUDY ON WASTEWATER TREATMENT

Locality : TULCEA

To : JAPAN INTERNATIONAL COOPERATION AGENCY


S E T A S.A.
ENGINEERING COMPANY
FOR ECOLOGY AND WATER
TECHNOLOGY

SETA SA BUCURESTI

Comanda:Wasterwater treatment
Working place: Tulcea
Date: July 1999

GEOTEHNICAL RESULTS BOREHOLE Nr. F1 - 3.00 rBS

Mark of the underground water	Marks to 0.00 borehole	Bigness of the layer	Layers structure	THE NAME OF LAYER	Depth	Dynamic penetration SPT
m	m	m			m	shocks
	0.70	0.70		Unhomogeneous filling	1	
NH: 1.80	2.00	1.30		Yellow, consistent plastic sand clayish silt, with limestony concretions	2	28
	2.80	0.80		Medium - fine, yellow, sand	3	16
					4	24
					5	20
					6	20
					7	19
					8	30
					9	20
					10	22
				Gray fine-medium sand with broken snails and shells. Between 10.50 ... 11.20 m depth thin black peat interlayers	11	20
					12	27
					13	41
					14	42
					15	43
					16	50
					17	50
					18	26
	18.70	15.90			19	12
	20.00	1.30		Gray, soft plastic clay with broken shells	20	14

DRAFTED:
Eng. T. Gheorghita

SETA SA BUCURESTI

Comanda:Wasterwater treatment
Working place: Tulcea
Date: July 1999

GEOTEHNICAL RESULTS BOREHOLE Nr. F2 - 2.35 rBS

Mark of the underground water	Marks to 0.00 borehole	Bigness of the layer	Layers structure	THE NAME OF LAYER	Depth	Dynamic penetration SPT
m	m	m			m	shocks
NH: 0.60	0.70	0.70		Unhomogeneous filling	1	9
				Yellow sandy silt, consistent plastic immerged	2	19
	2.50	1.80			3	19
					4	18
					5	17
					6	8
				Gray fine-medium sand with broken snails and shells. Between 6.20 ... 6.35 m depth, grey clayish peat lenses. Between 11.50 ... 12.50 m depth, black peat with preserved plants.	7	19
					8	22
					9	23
					10	46
					11	29
					12	28
					13	31
					14	50
	14.50	12.00			15	7
					16	11
				Gray, soft plastic clay with slightly sandy interlayers	17	9
					18	8
					19	11
	20.00	5.50			20	15

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Eng. T. Gheorghita

SETA SA BUCURESTI

Comanda:Wasterwater treatment
Working place: Tulcea
Date: July 1999

GEOTEHNICAL RESULTS BOREHOLE Nr. F3 - 3.60 rBS

Mark of the underground water	Marks to 0.00 borehole	Bigness of the layer	Layers structure	THE NAME OF LAYER	Depth	Dynamic penetration SPT
m	m	m			m	shocks
NH: 0.90				Unhomogeneous filling	1	
					2	
	3.40	3.40			3	19
				Gray silty sand alternating with clayish sandy silt	4	2
					5	10
					6	21
	7.00	3.60			7	17
				Gray fine-medium sand with broken shells. Between 10.40 ... 10.80 m depth thin black peat interlayers	8	24
					9	30
					10	34
					11	36
					12	38
					13	26
					14	37
					15	42
					16	41
					17	50
	17.40	10.40			18	17
				Gray, soft plastic clay with slightly sandy interlayers. Gaseous emanations.	19	20
					20	16
					21	20
					22	24

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Eng. T. Gheorghita

SETA SA BUCURESTI

Comanda:Wasterwater treatment
Working place: Tulcea
Date: July 1999

GEOTEHNICAL RESULTS BOREHOLE Nr. F3

Mark of the underground water	Marks to 0.00 borehole	Bigness of the layer	Layers structure	THE NAME OF LAYER	Depth	Dynamic penetration SPT
m	m	m			m	shocks
					23	29
					24	23
					25	25
					26	19
				Grey, soft plastic clay with slightly sandy interlayers. Gaseous emanations.	27	21
					28	26
					29	24
	30.00	12.60			30	27

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Eng. T. Gheorghita

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Comanda:Wasterwater treatment
Working place: Tulcea
Date: July 1999

GEOTEHNICAL RESULTS BOREHOLE Nr. F 4 - 3.85 rBS

Mark of the underground water	Marks to 0.00 borehole	Bigness of the layer	Layers structure	THE NAME OF LAYER	Depth	Dynamic penetration SPT
m	m	m			m	shocks
				Unhomogeneous filling	1	36
NH: 2.20	2.00	2.00			2	7
				Gray sandy clayish silt consistent plastic	3	16
					4	9
					5	22
					6	3
					7	7
	7.90	5.90			8	22
				Gray fine-average sand with snails and shells. At 11 m depth, thin peat interlayers (cm)	9	29
					10	34
					11	33
					12	46
					13	32
					14	39
					15	48
					16	43
					17	50
	17.60	9.70			18	18
				Gray, soft plastic clay with shells and thin sandy lensses	19	20
	20.00	2.40			20	24

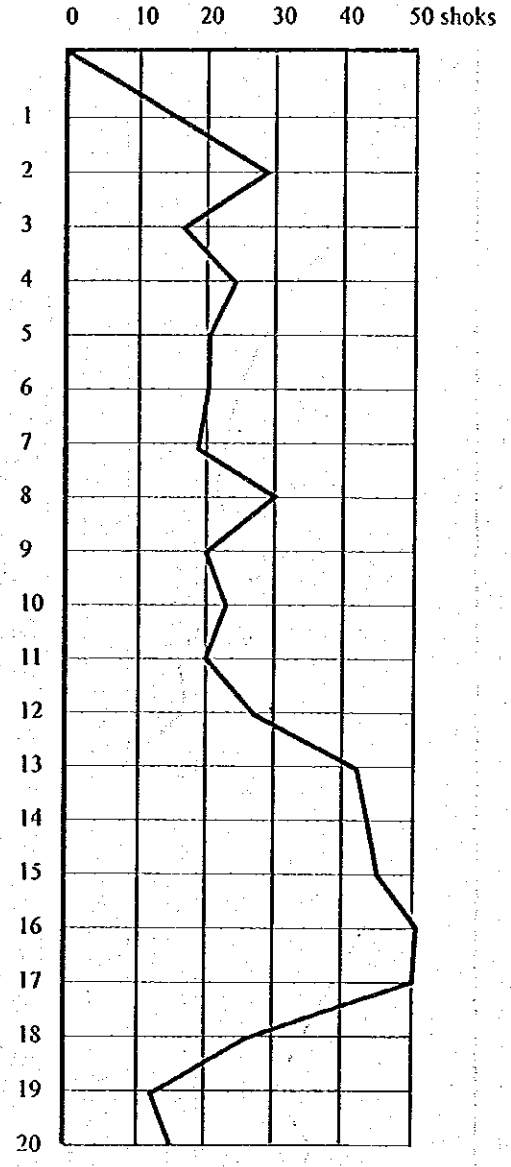
DRAFTED:
Eng. T. Gheorghita

SETA SA BUCURESTI

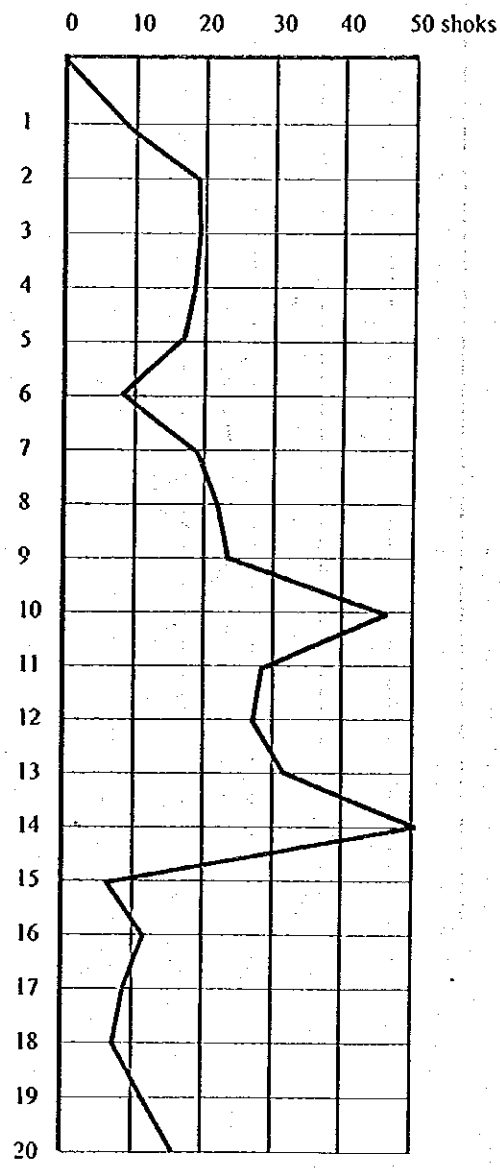
Comand:Wastewater treatment
Working place: Tulcea
Date: July 1999

Dynamic penetration test

F 1



F 2



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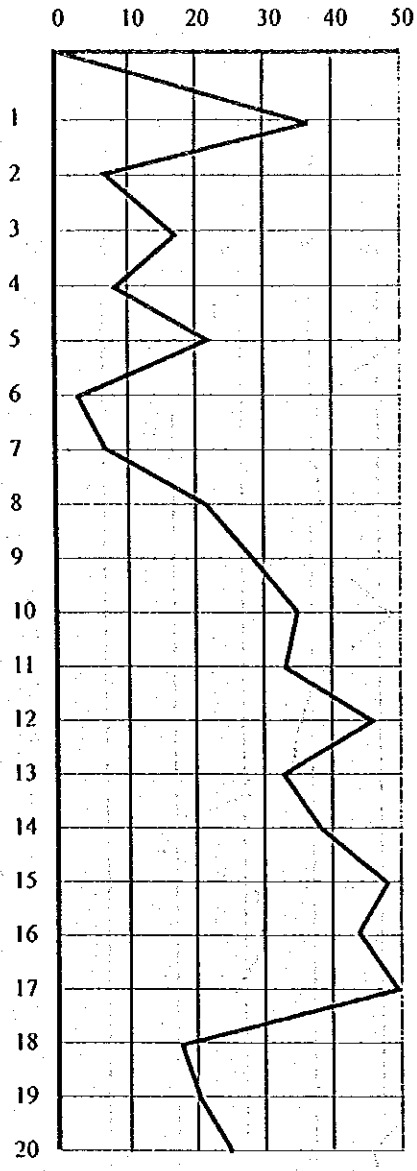
SETA SA BUCURESTI

Comand:Wastewater treatment
Working place: Tulcea
Date: July 1999

Dynamic penetration test

F 4



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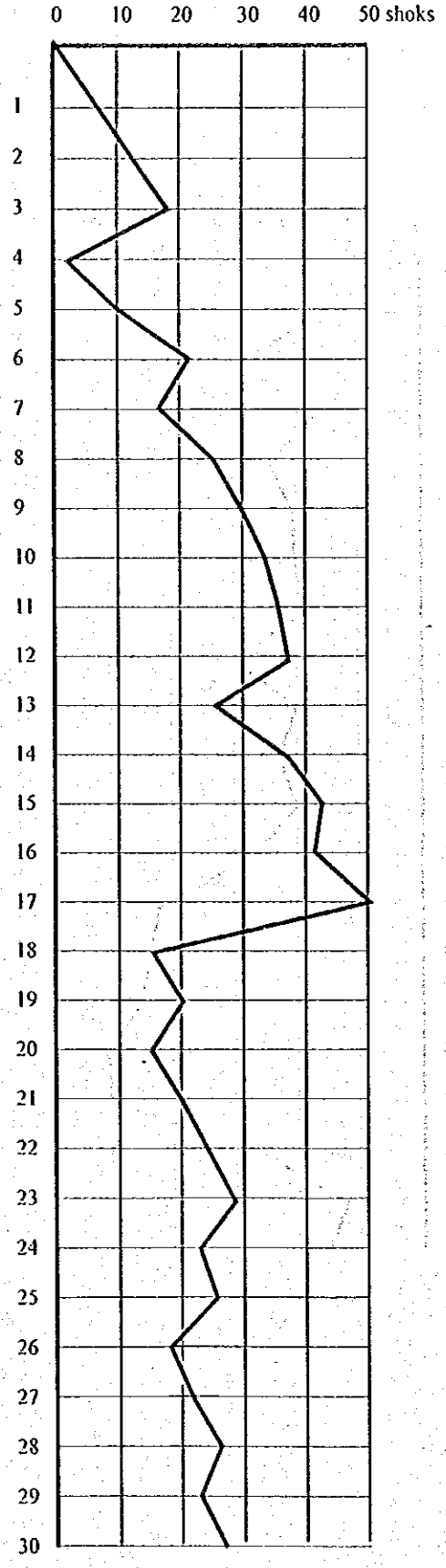

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Eng.. T. Gheorghita

SETA SA BUCURESTI

ANALYSIS RESULTS OF LABORATORY

Comanda: Wasterwater treatment
Working place: Tulcea
Date: August 1999

Drilling level 0.00	Layer thickness	Underground water depth	Layers	Name of layer	Bottle / Sleeve / Monolith: No. samples	Bottle / Sleeve / Monolith: Depth	Granulometric components (d in mm): Clay <0.005	Dust 0.005 - 0.05	Fine sand 0.05 - 0.25	Medium sand 0.25 - 0.5	Greal sand 0.5 - 2.00	Plasticity limits: Flow limit	Plasticity limits: Knead'limit	Plasticity index	Humidity	Consistency index	Volume weigh	Dry volume weigh	Porosity	Pore index	Humidity level	Specific weigh	Consolidation: Pressure	Consolidation: Primary consolidation time	Consolidation: Primary consolidation coeficient	Consolidation: Specific supplementary compression by damping	Consolidation: Specific compresion	Resistance to cutting: Internal abrasion angle	Resistance to cutting: Cohesion
	m	m		Drilling - no: F1/8"		m						W_l %	W_p %	I_p %	W %	I_c	γ KN/m³	γ_d KN/m³	n %	e	S_r	γ_s KN/m³	σ KPa	$t_{50}\%$ s	c_v 10^{-4} cm²/s	C_α	K 10^{-7} cm/s	$\varphi°$	c KPa
				Grey, soft plastic silty clay	1	19.0	42	46	12			55.0	23.8	31.2	40.2	0.47	16.7	11.6	55.8	1.26	0.92	26.3	200	424	3.48	0.002	10.9		
																							300	1020	1.32	0.0005	2.75	17	53
																							400	1743	0.725	0.0005	1.0		
				Drilling no: F2/8"																									
				Grey, soft plastic silty clay	1	15.0	43	48	9			53.7	28.6	25.1	44.2	0.38	17.0	11.6	55.7	1.26	0.98	26.3	200	349	4.0	0.0019			
																							300	839	1.53	0.0011	5.0	15	57
																							400	1435	0.85	0.0003	2.1		

Elaboration: Eng. Ana Stefanescu

Verification: Eng. Titi Gheorghita

SETA SA BUCURESTI

ANALYSIS RESULTS OF LABORATORY

Comanda: Wasterwater treatment
Working place: Tulcea
Date: August 1999

Drilling level 0.00	Layer thickness	Underground water depth	Layers	Name of layer	Bottle Sleeve Monolith		Granulometric components (d in mm)					Plasticity limits		Plasticity index	Humidity	Consistency index	Volume weigh	Dry volume weigh	Porosity	Pore index	Humidity level	Specific weigh	Consolidation						Resistance to cutting	
					No. samples	Depth	Clay	Dust	Fine sand	Medium sand	Great sand	Flow limit	Knead limit										Pressure	Primary consolidation time	Primary consolidation coeficient	Specific supplementary compression by damping	Specific compresion	Internal abrasion angle	Cohesion
	m	m		Drilling - no: F3/8*		m	<0.005	0.005 - 0.05	0.05 - 0.25	0.25 - 0.5	0.5 - 2.00	Wl	Wp	Ip	W	Ic	γ	γd	n	e	S_r	γs	σ	t_{50}%	c_v 10^{-4}	C_α	K_{-7} 10^{-7}	φ°	c
												%	%	%	%		KN/m³	KN/m³	%			KN/m³	KPa	s	cm²/s		cm/s		KPa
				Grey, consistent plastic clay	1	18.5	48	45	7			59.9	24.0	35.9	59.9	0.54	16.9	11.6	55.8	1.26	0.95	26.3	200	677	2.18	0.0017			
																							300	1239	1.04	0.0015	3.8	19	42
																							400	2453	0.51	0.00016	1.3		
				Drilling no: F4/8*																										
				Grey, running clayish sandy silt	1	4.50	23.5	46	30.5			37.4	25.4	12.0	34.8	0.22	17.7	13.2	49.7	1.00	0.92	26.3	100	467	3.37	0.0014	19.3		
																							200	626	2.25	0.0012	9.4	18	53
																							300	1124	1.15	0.0021	3.2		

Elaboration: Eng. Ana Stefanescu

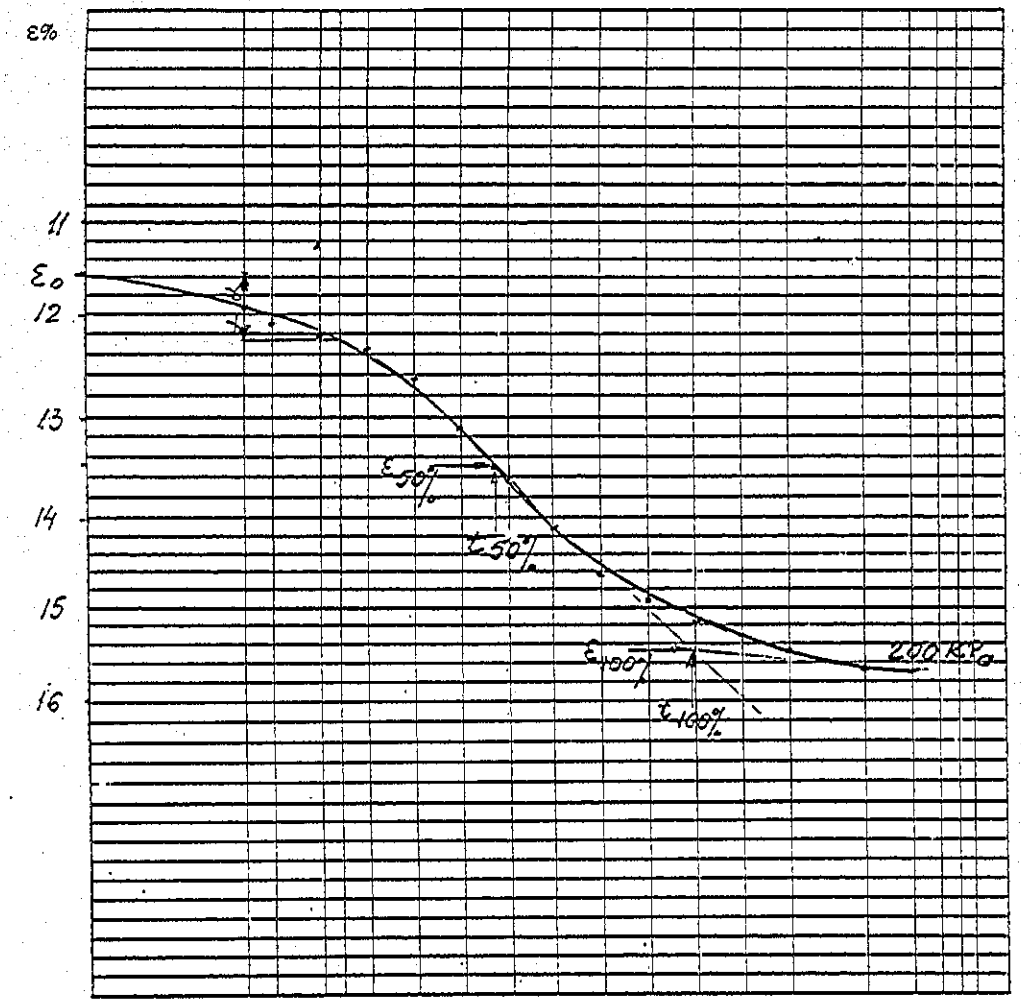
Verification: Eng. Titi Gheorghita

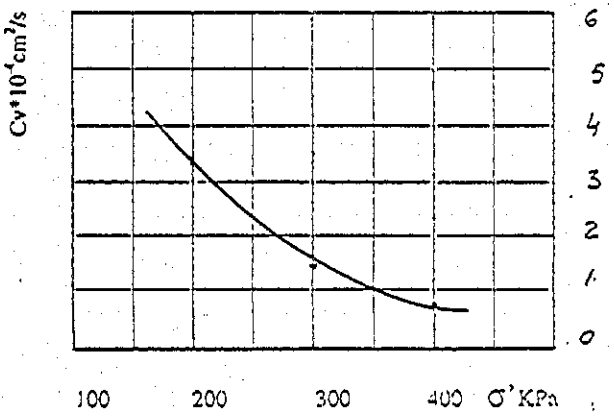
AII-8-12

SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION CURBE

Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F.118"...
Date: August 1999 Depth : ..19.00 m





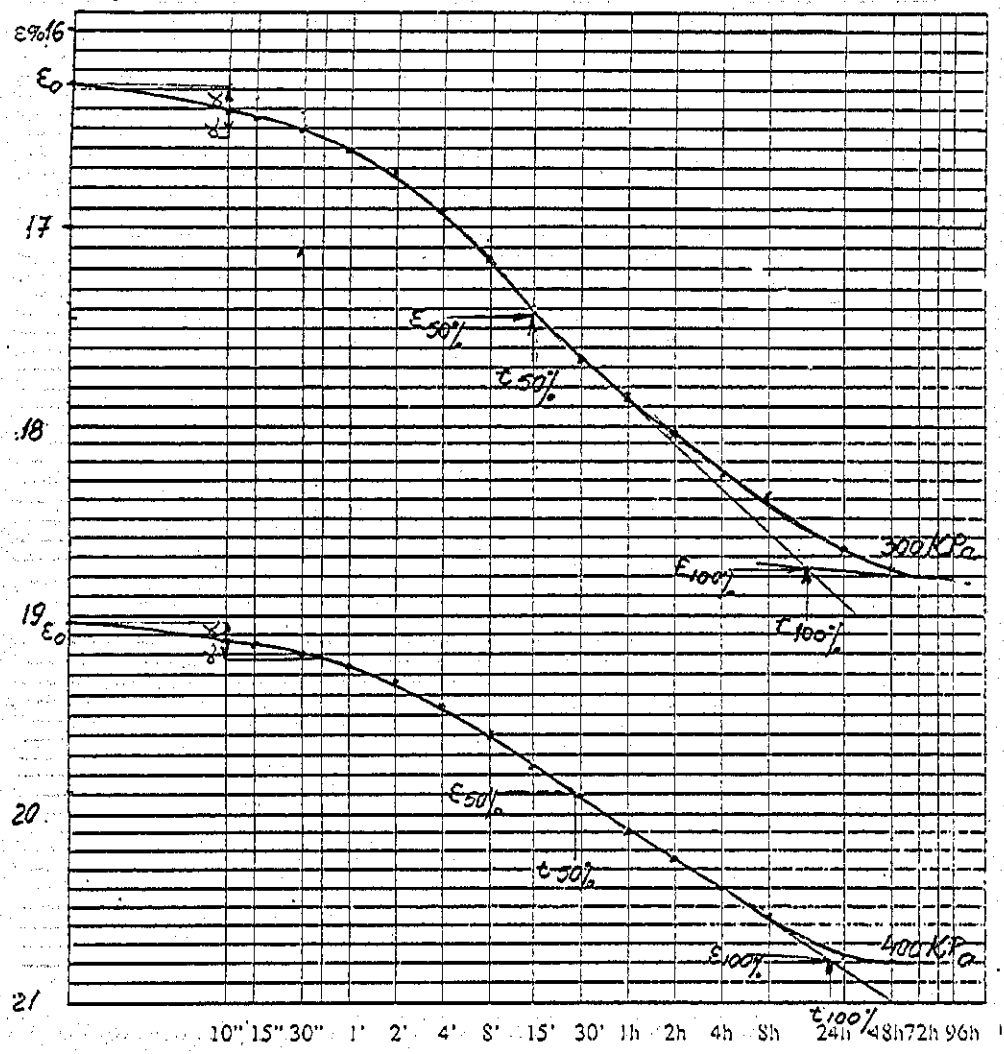
σ' KPa	t_{50}% sec	H_{50}% cm	c_v cm^2/s	c_u	K cm/s
200	424	0.8656	$3.48.10^{-4}$	0.0020	$10.9 \cdot 10^{-7}$

Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

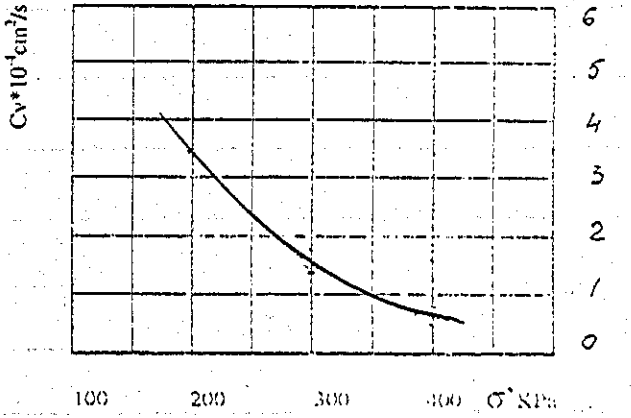
SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION

CURBE



Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F.1.18"...
Date: August 1999 Depth : 19.00 m.



σ' KPa	$t_{50\%}$ sec	$H_{50\%}$ cm	c_v Cm^2/s	c_α	K Cm/s
300	1020	0.8255	$1.32 \cdot 10^{-4}$	0.0005	$2.75 \cdot 10^{-7}$
400	1743	0.8010	$0.725 \cdot 10^{-4}$	0.0005	$1.0 \cdot 10^{-7}$

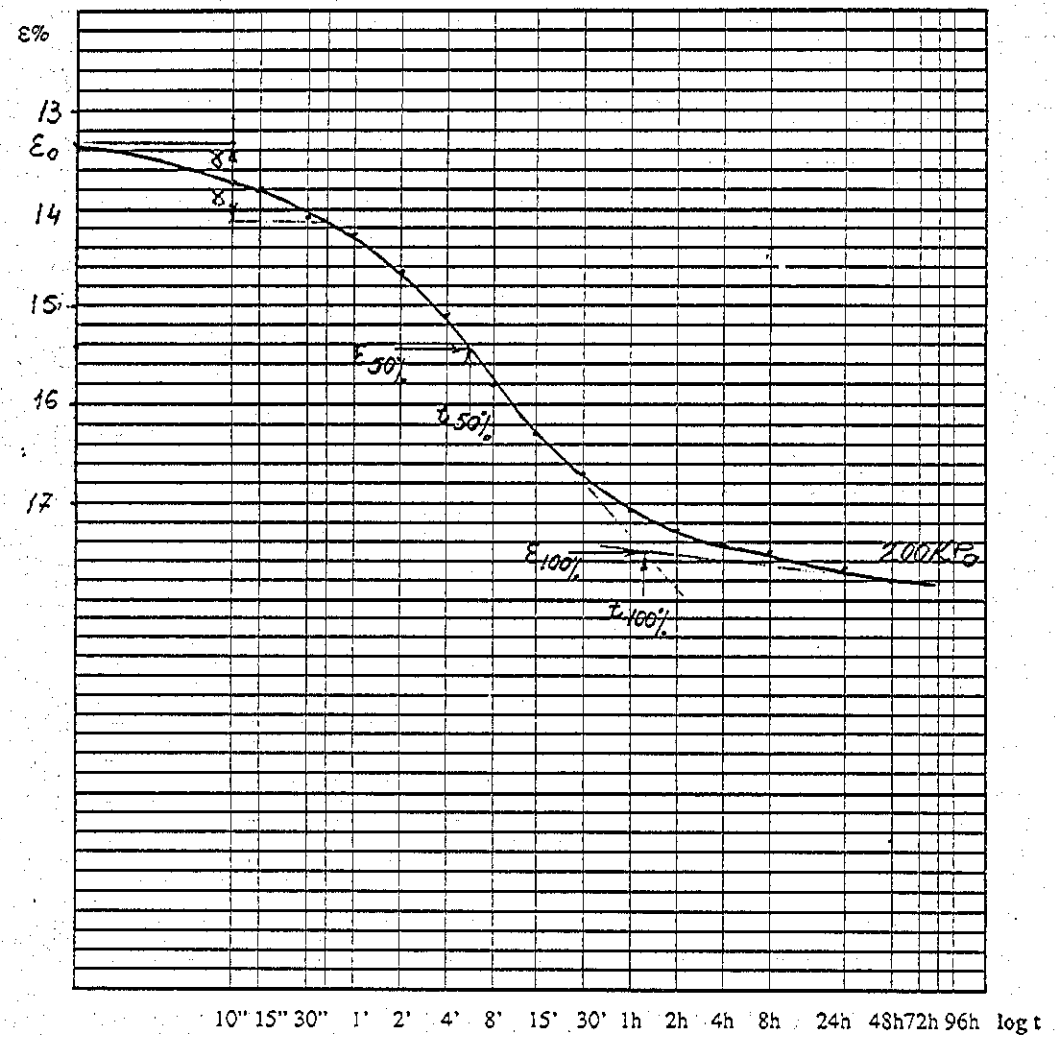
Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

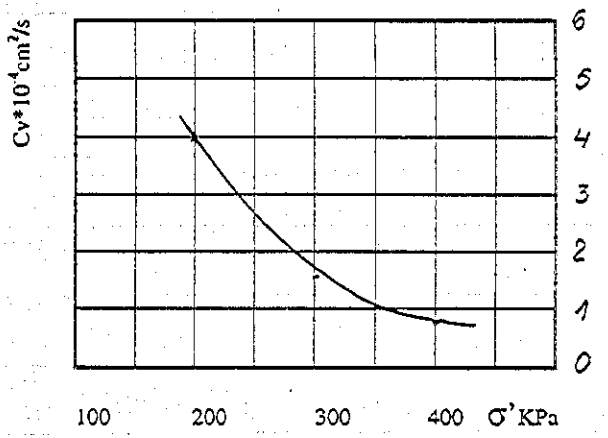
AII-8-14

SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION CURBE

Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F2.18"..
Date: August 1999 Depth : 150.m..





σ' KPa	$t_{50\%}$ sec	$H_{50\%}$ cm	c_v Cm^2/s	c_α	K Cm/s
200	349	0.8459	$4.0 \cdot 10^{-4}$	0.0019	

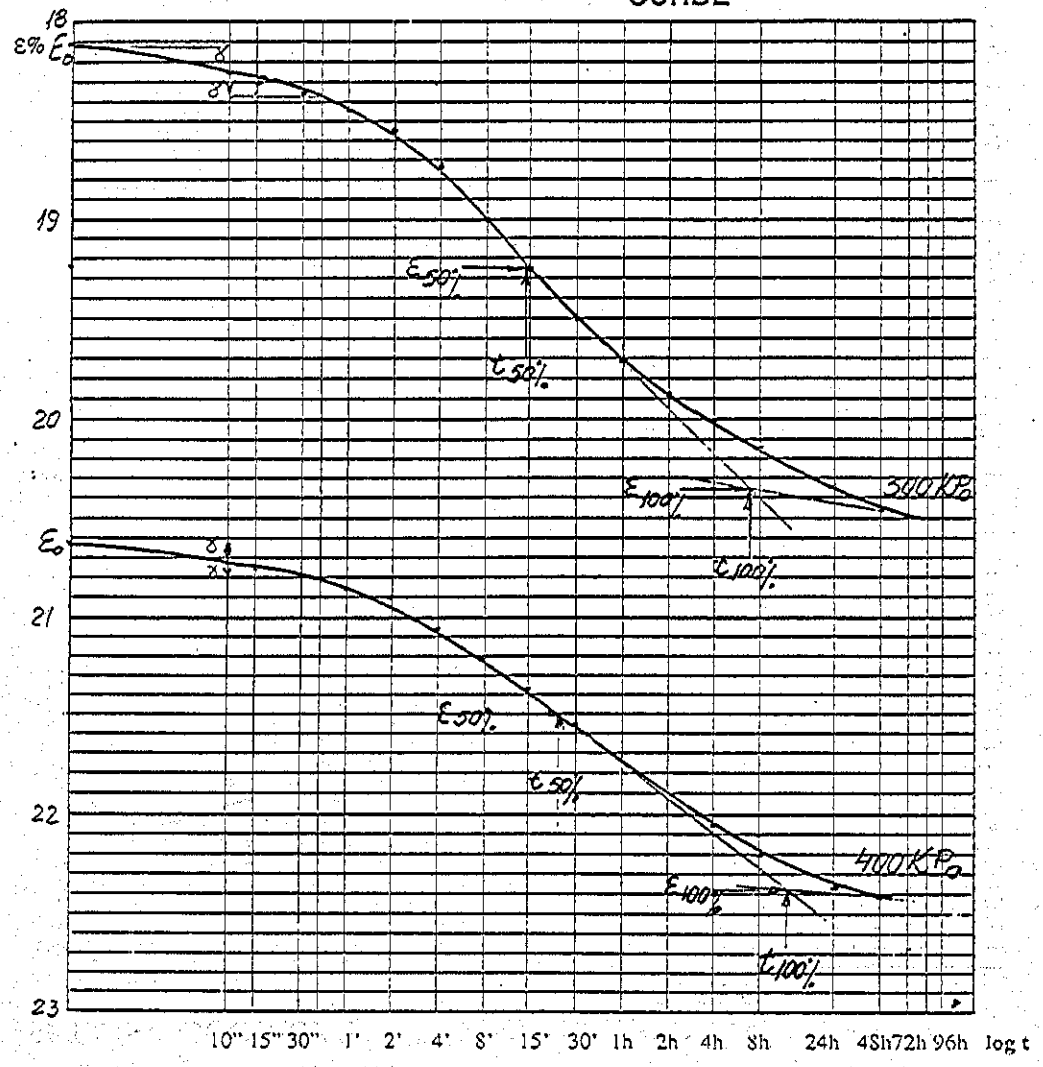
Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

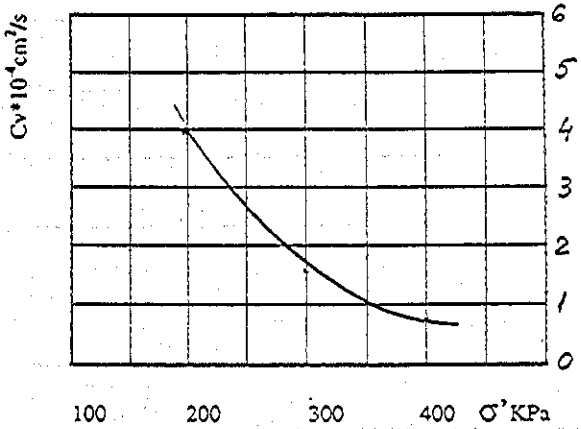
AII-8-15

SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION
CURBE

Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F218...
Date: August 1999 Depth : 15.0m..





σ' KPa	$t_{50\%}$ sec	$H_{50\%}$ cm	c_v Cm^2/s	c_α	K Cm/s
300	839	0.8076	$1.53 \cdot 10^{-4}$	0.0011	$5.0 \cdot 10^{-7}$
400	1435	0.7850	$0.85 \cdot 10^{-4}$	0.00032	$2.1 \cdot 10^{-7}$

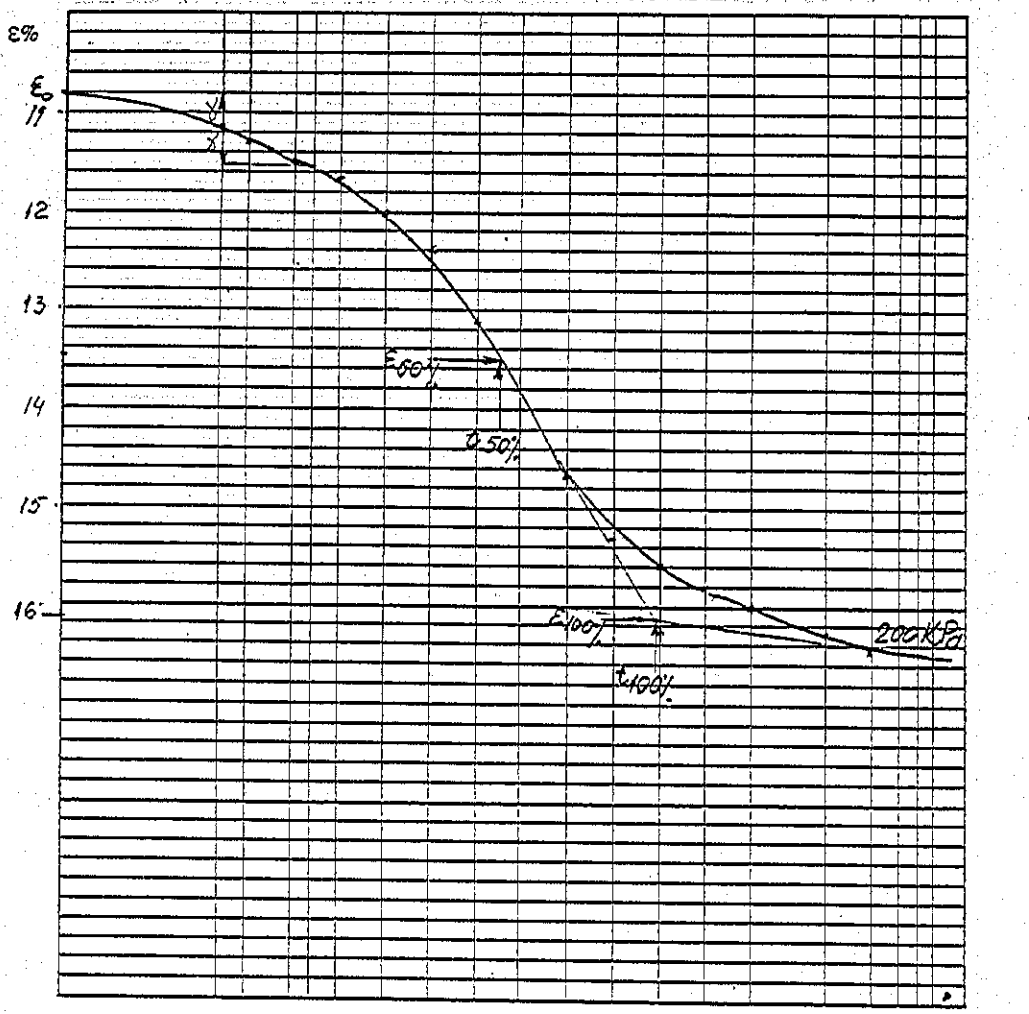
Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

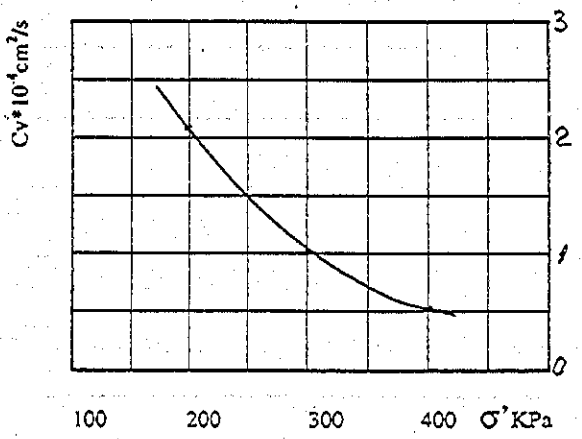
AII-8-16

SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION CURBE

Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F.3/8.
Date: August 1999 Depth : 18.50 m.





σ' KPa	$t_{50\%}$ sec	$H_{50\%}$ cm	c_v Cm^2/s	c_α	K Cm/s
200	677	0.8657	$2.18 \cdot 10^{-4}$	0.0017	

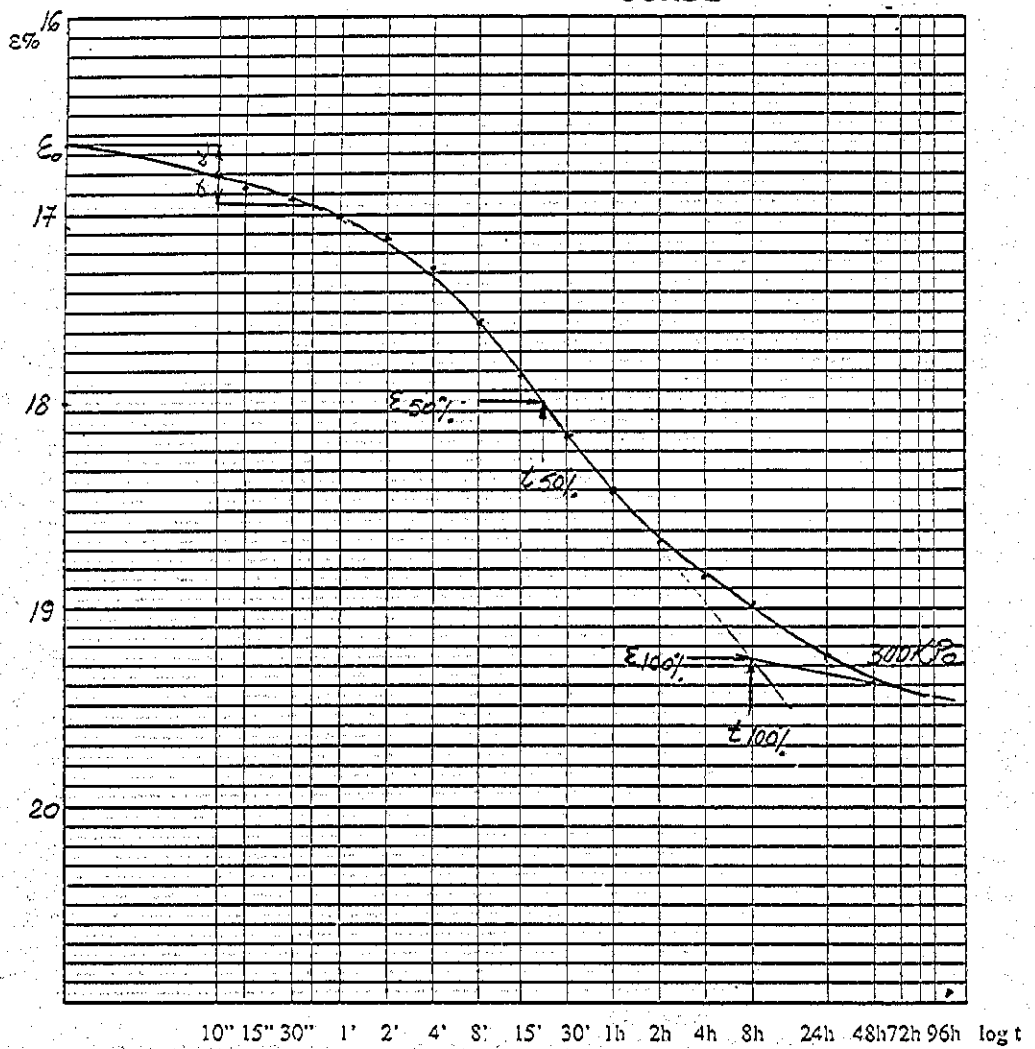
Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

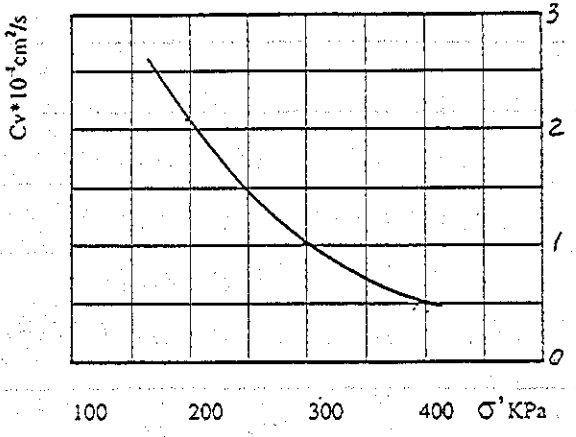
AII-8-17

SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION CURBE

Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F3/8"...
Date: August 1999 Depth : 18.50m.





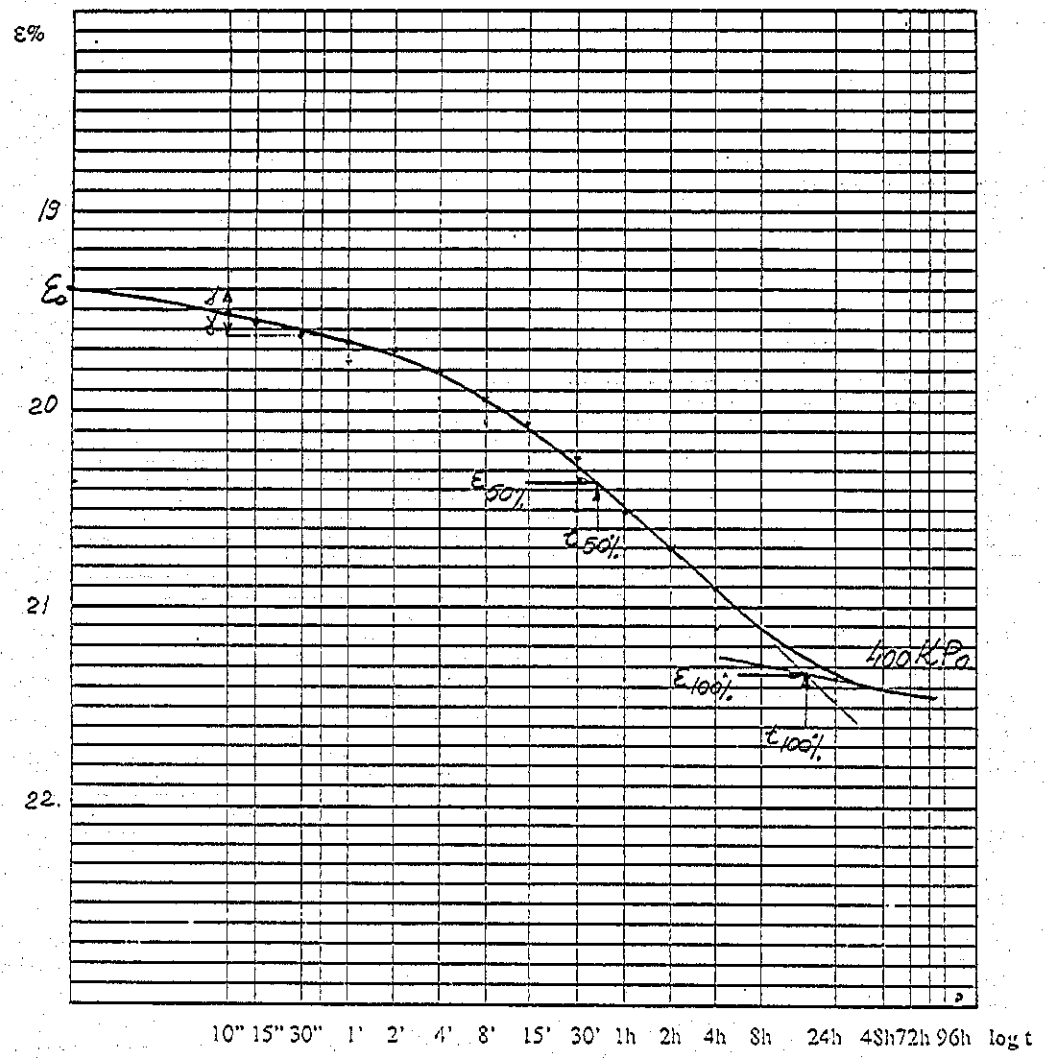
σ' KPa	$t_{50\%}$ sec	$H_{50\%}$ cm	c_v Cm^2/s	c_α	K Cm/s
300	1239	0.8202	$1.04 \cdot 10^{-4}$	0.0015	$3.8 \cdot 10^{-7}$

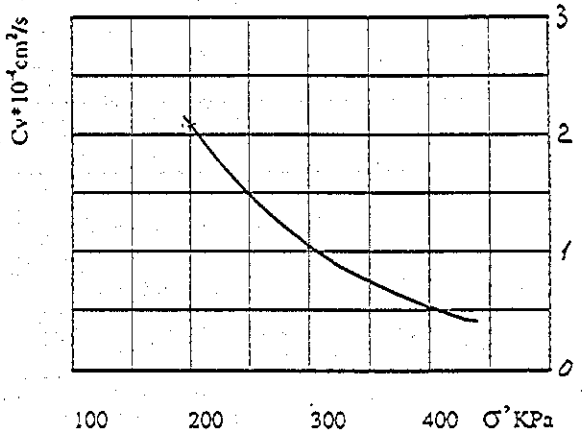
Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION
CURBE

Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F3.18''...
Date: August 1999 Depth : 18.50 m..





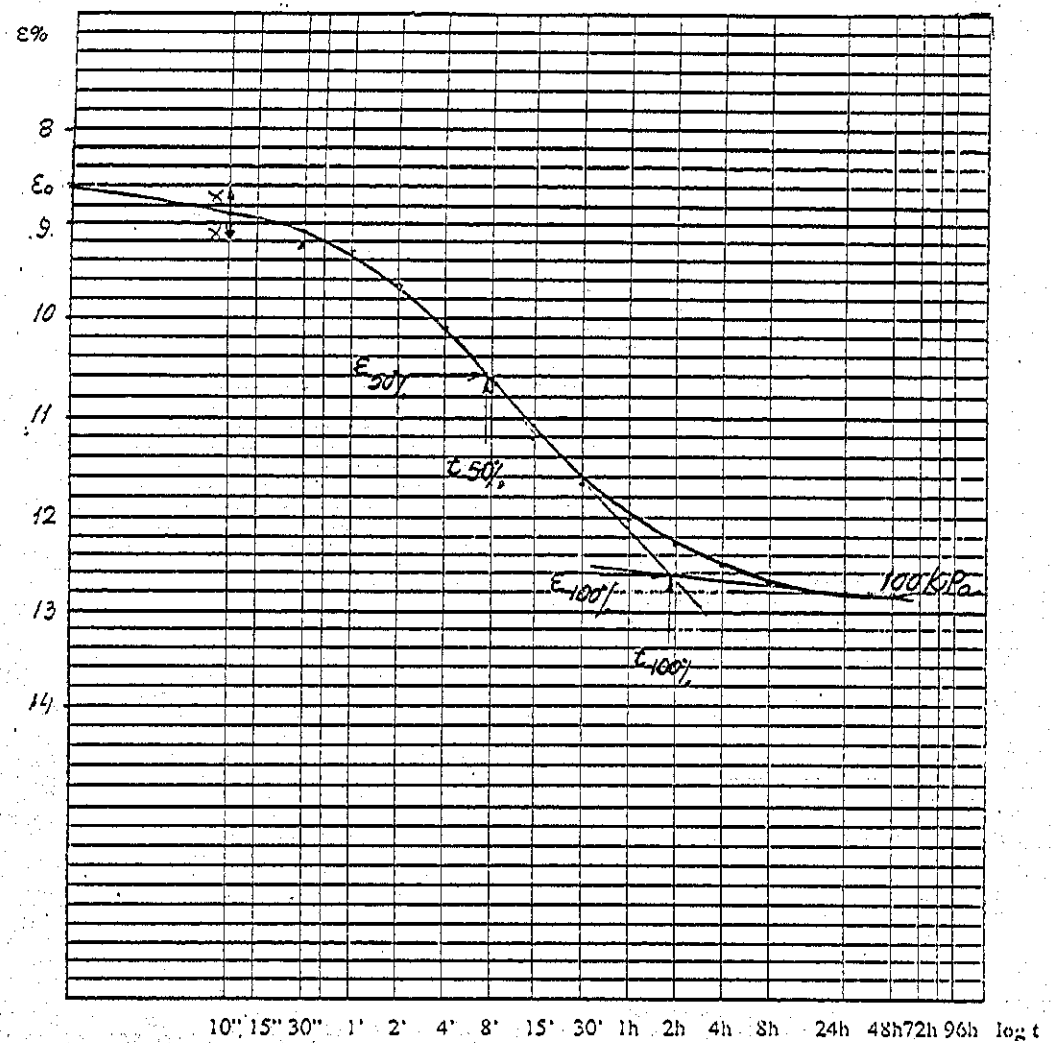
σ' KPa	$t_{50\%}$ sec	$H_{50\%}$ cm	c_v Cm^2/s	c_α	K Cm/s
400	2453	0.7962.	$0.51 \cdot 10^{-4}$	0.00016	$1.3 \cdot 10^{-7}$

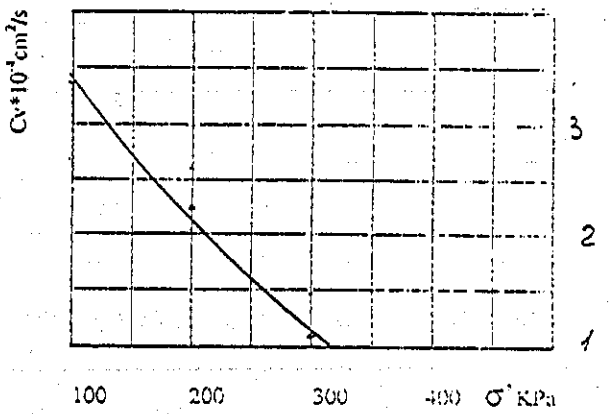
Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION
CURBE

Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F.4.18"....
Date: August 1999 Depth : 4.50 m.





σ' KPa	t50% sec	H50% cm	Cv Cm²/s	av	K Cm/s
100	467	0.893	$3.37 \cdot 10^{-4}$	0.0014	$12.3 \cdot 10^{-7}$

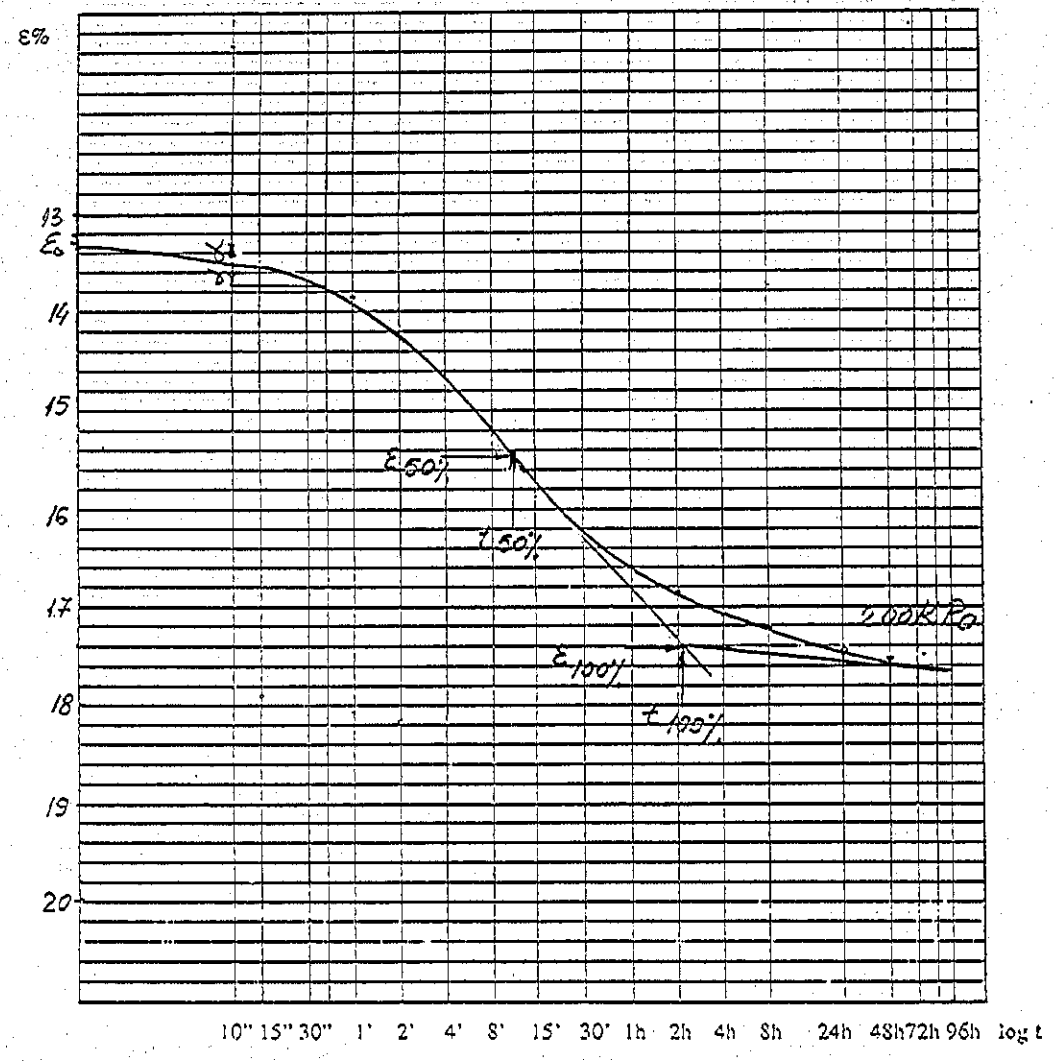
Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

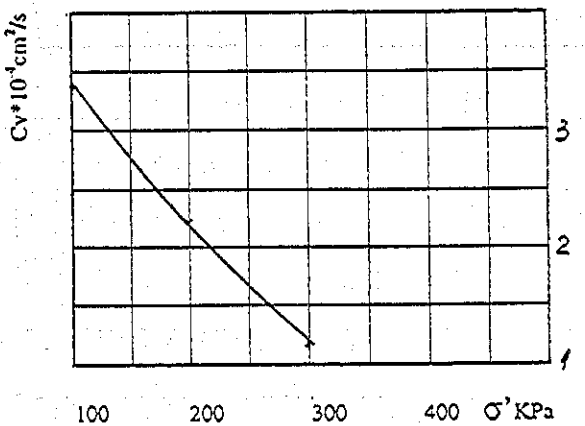
AII-8-20

SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION
CURBE

Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F.418"...
Date: August 1999 Depth : 4,50m.





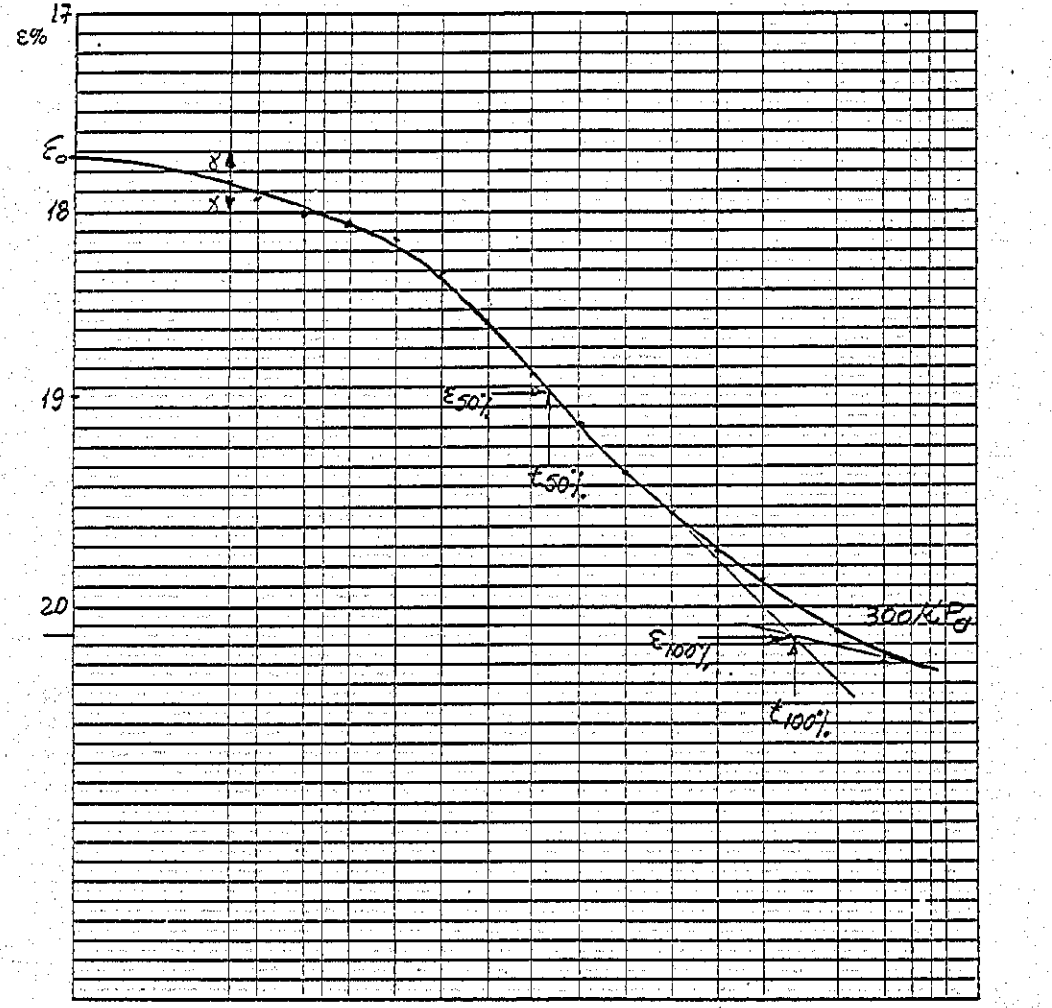
σ' KPa	$t_{50\%}$ sec	$H_{50\%}$ cm	c_v Cm^2/s	c_α	K Cm/s
200	626	0,8456	$2,25 \cdot 10^{-4}$	0.0012.	$9.4 \cdot 10^{-7}$

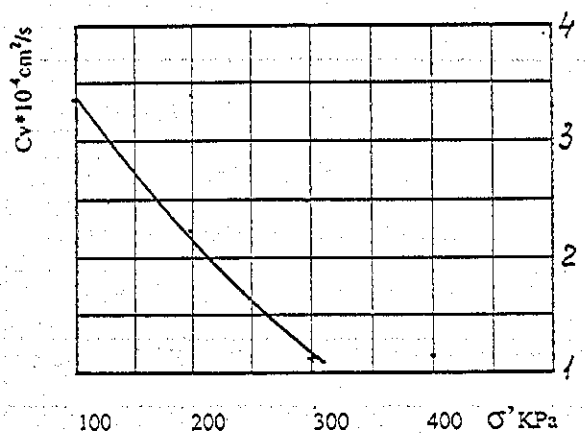
Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

SETA SA BUCURESTI

EDOMETRIC CONSOLIDATION CURBE

Comanda: Wasterwater treatment
Working place: Tulcea Drilling : F 4 18"...
Date: August 1999 Depth : 4,50m.





σ' KPa	$t_{50\%}$ sec	$H_{50\%}$ cm	c_v Cm^2/s	c_α	K Cm/s
300	1/24	0.8108	$1.15 \cdot 10^{-4}$	0.0021	$3.2 \cdot 10^{-7}$

Elaboration: Eng. Ana Stefanescu
Verification: Eng. Titi Gheorghita

AII-8-22

PART AII-2: FEASIBILITY STUDY FOR GALATI WWTP PROJECT

APPENDIX-1

PLANNING BASIS

1. PROCESS TO DETERMINE THE DESIGN BASIS

The following design basis for the Galati WWTP will be reviewed and updated:

- Population

  Total Administrative Population

  Service Population of Public Water Supply and Sewerage System

- Design Flow

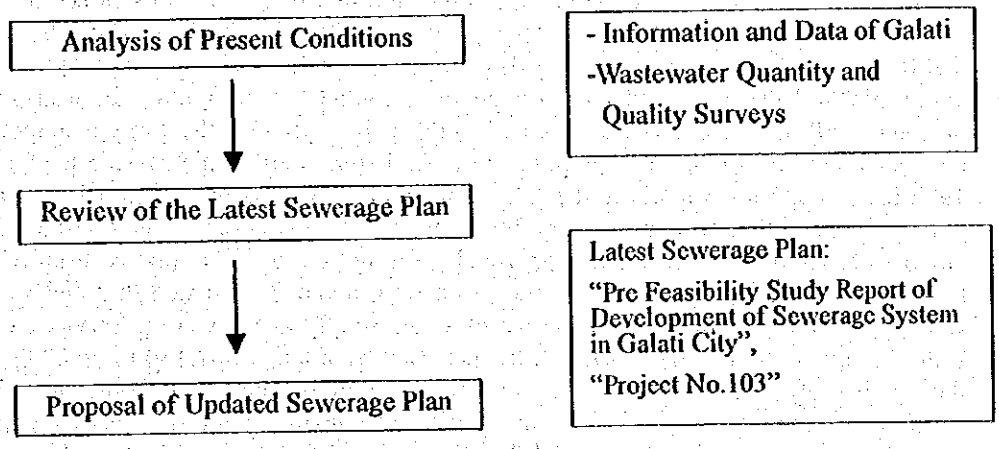
  Wastewater Generation, Average Daily Flow, Maximum Daily Flow, Maximum Hourly Flow, and Wet Weather Flow

- Wastewater Characteristics

  Wastewater Pollution Loads Estimates

  Design Influent Quality for the proposed WWTP

The design basis will be reviewed and updated by the following process as shown in Figure 1. First, the present conditions concernig design basis are analyzed based on the data and information provided by the Galati city, the public water company "APATERM" S.A. Galati, and related organizations. The survey results of wastewater quantity and quality are also used to understand the present conditions of wastewater generation and pollution loads. Second, the design basis proposed in the latest sewerage plan will be reviewed. The latest plan is "Pre Feasibility Study Report of Development of Sewerage System of Galati City, Project No.103", prepared by PROED in September 1992, hereinafter referred as "the 1992 Pre F/S". Finally, the design basis for this F/S will be updated and proposed.



Process to update the Design Basis

2 POPULATION

2.1 ADMINISTRATIVE POPULATION

The administrative population of Galati city is 330,276 at the end of December 1998, based on the data available from the bureau of statistics in Galati. Figure 2 shows the population data from 1982 to 1999 obtained from the bureau of statistics in Galati. It indicates that there are two growth patterns before and after the year of 1991. Before 1991, the population was increased with high annual growth rate at 1.67%, but after 1991, the population was nearly constant at about 324,000 to 330,000.

According to the 1992 Pre F/S prepared by PROED, the future population was projected 360,000 in the year 2000 and 382,000 in the year 2010. These projections are based on the population data of 324,000 in the year 1991, with the annual growth rate of 1.18% (from 1991 to 2000) and 0.59% (from 2000 to 2010), respectively. The population data in the year 1991 was confirmed and authorized by the police of Galati.

The bureau of statistics in Galati comments that the projected population of 382,000 in 2010 by the 1992 Pre F/S is appropriate, taking into account that the present population of 335,962 on June 25, 1999 can be increased by an annual growth rate of 1.2%. The latest present population of 335,962 is confirmed by the police of Galati.

When it is assumed that the high annual growth rate of 1.67%, recorded during 1982 to 1991, can be expected after 1999, the population can be increased to about 403,000 in 2010. While it is assumed the nearly constant growth rate of 0.08%, recorded during 1991 to 1999, the population will be about 339,100 in 2010. The projected population of 382,000 in 2010 by the 1992 Pre F/S is positioned at a mean value of the above projections based on the two distinctive population growth patterns as shown in *Figure AII.1.1*.

As a result of brief review of the administrative population of the Galati city, the projected population of 382,000 in the year 2010 is appropriate and can be used for the planning basis of the F/S to be conducted by JICA Study Team.

2.2 SERVICE POPULATION

At present the "APATERM" S.A. Galati provides the water supply and sewerage services. The following table shows the present service population in 1999. The present service population is compared with the proposed service population in 2010 by the 1992 Pre F/S. It indicates that the present population of category 1, provided water through communal taps, is only about 100, while the 1992 Pre F/S planned it population would be about 6,500. It means that the user of communal tap is already very limited. Taken into account the present number users of communal and yard taps, it is proposed to amend some part of the service population in the 1992 Pre F/S as shown in *Table AII.1.1*. The number of users of communal taps, category 1, will be zero, and that of taps, category 2, will be reduced 33% from about 7,450 to 5,000. The number of beneficiaries of water supply and sewerage service equipped with individual water heating system, category 4, will be decreased from about 21,000 to 8,000 and shifted to the Category 5. The number of beneficiries of water supply and sewerage services with central water heating system, category 5, will be increased from about 307,130 to 369,000. Therefore, the number of beneficiaries of sewerage service will be increased from about 328,095 to 377,000 with the increment of about 48,900. Compared with the service population of sewerage system proposed in the 1992 Pre F/S, additionally 8,000 residents will be provided the sewerage service as shown in the Table AII.1.