JAPAN INTERNATIONAL COOPERATION AGENCY

MINISTRY OF AGRICULTURE, WATER MANAGEMENT AND FORESTRY BOSNIA AND HERZEGOVINA

THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO CITY IN BOSNIA AND HERZEGOVINA

DRAFT FINAL REPORT

VOLUME

: ASSESSMENT WORK REPORT (APPENDIX)

SEPTEMBER 1999

TOKYO ENGINEERING CONSULTANTS CO., LTD.

IN ASSOCIATION WITH

NIHON SUIDO CONSULTANTS CO., LTD.

THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO CITY IN BOSNIA AND HERZEGOVINA

DRAFT FINAL REPORT CONSTITUENT VOLUMES

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VOLUME II MAIN REPORT

VOLUME III ASSESSMENT WORK REPORT

VOLUME IV APPENDIX

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APPENDIX A

MINUTES OF MEETING

AGREEMENT ON SITE SURVEY AND ASSESSMENT OF THE SARAJEVO WWTP BETWEEN JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING NO: 06 - 01

1. **DATE:** 01 June 1999 **TIME:** 10:00 AM

2. VENUE: WWTP Conference Rm., Butila

3. ATTENDANCE LIST

a.) Mr. K. Suzuki	JICA Study Team - Team Leader
b.) Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
c.) Mr. K. Ota	JICA Study Team - Electrical/Plant Design
d.) Mr. R. Despault	JICA Study Team - Structural/Facility Design
e.) Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning
f.) Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr., Mechanical Engineer
g.) Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
h.) Mr. E. Velagic	USB Kedly Doo - Director, Civil Engineer

4. MINUTES OF MEETING

Mr. K. Suzuki opened the meeting with the following issues clarified and agreed upon by both parties based on the agreed Terms of Reference (TOR).

- a.) USB Kedly will start the inlet works and pump installation as soon as the pump (Capacity = 150 m³/hr.) is delivered. Expected delivery is two days and pumping will begin this week (4 June 1999).
- b.) Hydraulic tests will start by filling the Aeration Tank with water pumped from River Miljacka. Approximate duration of pumping to the Aeration Tank is 7 days @ 24 hrs. per day.
- c.) To expedite the water filling of the tanks, pumping will be augmented by a spare pump with a capacity of 21 m³/hr., and water supply from the fire hydrant if negotiations with ViK management will be favourable.
- d.) Monitoring of the water level will be done after 48 hours of stabilisation period (2 days after filling the tanks with water). Water levels will be monitored for 48 hours.

- e.) Mechanical testing of the 36 aerators will be done with the Aeration Tank full of water at 2 hours per aerator for a total period of 10days. Due to the limited power supply, testing will be carried out for 1 aerator at a time although preparatory works will be done on 4 aerators at the same time.
- f.) An Inspection Sheet presented by Mr. Ota (please see attached) will be accomplished by USB Kedly on all the electro-mechanical tests.
- g.) Stress strength testing of the Aeration Tank & Grit Chamber will be done soon after the hydraulic tests are completed. An institute to be confirmed by USB Kedly later will do laboratory tests on the core samples and other concrete structure tests.
- h.) As per USB Kedly schedule, all works will be completed with a report of all the tests and investigations carried out due on 10 July 1999.
- i.) USB Kedly will submit the detailed project schedule on 3 June 1999.
- j.) Weekly project meeting will be held every Friday, @ 10:00 AM in WWTP Conference Room, Butila.
- 5. NEXT MEETING: 11 June 1999, Friday, @ 10:00 AM in WWTP Conference Room, Butila.

MR. K. SUZ

JICA Study Team

MR. S. CEMERLIC USB Kedly Doo

INSPECTION SHEET

Date of inspection

, 1999

Weather

Equipment	Induction motor	V	kW	pole
		Manufacturer ;		
Location		Facilities		

	Result of	inspect	ion	· · · · · · · · · · · · · · · · · · ·
	Physical inspection		Functional insp	ection
	Figure		Current	
	Stain / Corrosion		Rotating speed	
	Conductivity of stator coil		Others	
Degree of	Insulation resistance			
problem	Partial discharge			
	Vibration			
	Abnormal sound			
	Overheat			
De	ecision	t		

AGREEMENT ON SITE SURVEY AND ASSESSMENT OF THE SARAJEVO WWTP BETWEEN JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING NO: 06 - 02

1. **DATE:** 11 June 1999 **TIME:** 10:00 AM

2. VENUE: USB Kedly Site Office @ WWTP, Butila

3. ATTENDANCE LIST

a.) Mr. K. Suzuki	JICA Study Team - Team Leader
b.) Mr. H. Takada	JICA Study Team - Structural/Architectural Design
c.) Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
d.) Mr. K. Ota	JICA Study Team - Electrical/Plant Design
e.) Mr. R. Despault	JICA Study Team - Structural/Facility Design
f.) Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning
g.) Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr., Mechanical Engineer
h.) Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
i.) Mr. E. Velagic	USB Kedly Doo - Director, Civil Engineer

4. MINUTES OF MEETING

- a.) Mr. R. Crisostomo opened the meeting @ 10:05 AM.
- b.) Minutes of Meeting No. 06 01 was accepted without comments except for Item c.), wherein negotiations with ViK management on the use of the water from the fire hydrant has to be deleted.
- c.) The progress of work was discussed based on the revised Work Schedule and Progress of Work (please see attached) presented by USB Kedly as follows:
 - Preceding Tasks is almost 100% complete.
 - Extraction of kerns for Facility 5 (Aeration Tank) is 65% complete.
 - Extraction of kerns for Facility 3 (Aerated Grit Chamber) will commence on 15 June.
 - Testing of all kern samples will commence 17 June.
 - Locations of the underground pipelines were selected and excavation will start 14 June to be followed by mechanical tests of the steel pipelines on site.

- Water filling of Facility 4.2 (Primary Sedimentation Tank 2) will be completed by the end of the day. Monitoring of the water level will start on Monday after 2 days of stabilization. Measurement of the water level will be done twice a day (daytime and night time) to consider the percentage lost by evaporation. A Hydraulic Drain Test Data Sheet (please see attached) was presented by USB Kedly. USB Kedly will submit a Mechanical Data Sheet on Monday, 14 June.
- Water filling of Facility 4.1 (Primary Sedimentation Tank 1) will commence by 12-14 June and monitoring of the water level will follow after 2 days.
- Water filling of Facility 3 (Aerated Grit Chamber) will start on 17 June by pumping water from Facility 4.2 using Pump No.3 with a capacity of 50 m³/hr. Thereafter, monitoring of the water level will follow.
- Water filling and testing of the other facilities will be done as scheduled. Pumping capacities will improve due to the proximity from the source.
- All hydraulic tests are expected to be completed by 6 July.
- Preparatory works of the aerators will commence on 14 June and testing will follow soon after the water filling of the Aeration Tank on 23 June.
- All works will be completed 9 July as scheduled.

5. OTHER MATTERS

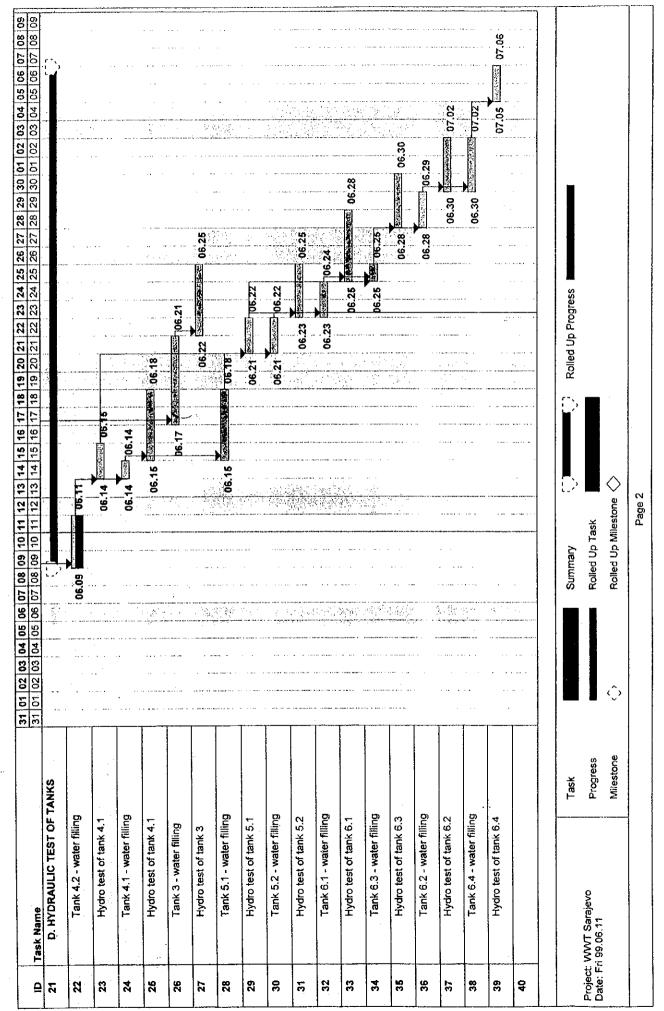
- a.) The proposal of dewatering the Raw Water Pumping Station wet well by USB Kedly to check the screw pumps bearing was called off due to the unavailability of funds.
- b.) Mr. K. Suzuki requested the USB Kedly officials to be present starting Monday 14 June during meetings with Degremont engineers at the WWTP site.

6. NEXT MEETING: 18 June 1999, Friday @ 10:00 AM in WWTP Site, Butila

JICA Study Team

MR. S. CEMERLIC USB Kedly Doo

₽	Task Name		31 01 02 03 04 05 06 06	3 04 05		07 08 09 10 11	11 12 13	14 15	16 17 18	19 20	21 22	23 24 25 26	5 26 27	8	5	02 03 04 05	05 06 07	06 07 08 09
	TOTAL PROJECT	-					4											
7	A. PRECEDING TASKS								1	1 × 1.								
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4	Preparing detailed Project planing	ect planing	5	90	06.04				./	ار د افرات								
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9	Provide HT equipment and material	and material	7	06.02									ide ty:				garana na sa garana na sa	
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•	Blinding of output pipes of tanks	s of tanks	06.03	i i i i						.96. 81.		medic familiare	ander (i) Livia Livia Livia					
6	B. TANKS STRESS STRENGTH TESTING	VGTH TESTING		<u> 13</u>														
10	Extraction of kerns for tank 5	tank 5		_ <u>.</u>	06.07	The second second		106.14	4				107.4 107.4 107.4		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Zińs)	
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13	Reporting				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		THE STATE OF THE S									6.70	501	······
4.	C. UNDERGROUND PIPELINES	INES					A CONTRACTOR						が変数を	a la	_			
15	Determination of 4 locations for testing	itions for testing		8	06.07		11.90										a ibi	
16	Pipes testing on 4 locations	tions		:. 			06.14		THE SAME	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-	06.23	1					
17	Reporting										- 19	7.		4		07.02	. Ai	
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		Task			nS.	Summary	1,			Rolle	Rolled Up Progress	gress 🛎			_			
Project:	Project: WWT Sarajevo Date: Fri 99 06.11	Progress			8	Rolled Up Task	. ×											
		Milestone	¢		8	Rolled Up Milestone	stone 🔷	^										



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06.14 Exercise mage and a second seco
<u> </u>

PROGRAM OF FILLING OF TANKS

TANK	Q=m3/h	START FILLING	DURATION h	END FILLING	CAPACITY m3	PUMP	END DATE	LOCATION OF FILLING
4.2.	120	10h.9JUN	24	-	2880	5	CET./THURSDAY	FROM RIVER
	120		24		2880	7	PEL /FRIDAY	FKOM KINER
10 - 13 10 - 13	9		24	10h.12JUN	1440	-	SUB./SATURDAY	FROM RIVER
	END FILLING:			10h.12JUN	7200		SUB./SATURDAY	1
4.1.	09	10h.11JUN	24	-	1440	`	SUB./SATURDAY	FROM RIVER
	120	e Milita	24		2880	N	NED./SUNDAY	FROM RIVER
	120	영화 (1984년) (1984년) (1984년)	24	10h.14JUN	2880	2	PON./MONDAY	FROM RIVER
	END FILLING:			10h.14JUN	7200		PON./MONDAY	i !
	120	10h.14JUN.	24		2880	7	UTOR./TUESDAY	FROM RIVER
	120		24		2880	7	SRIJ./WEDNESDAY	FROM RIVER
	120		24	•	2880	7	ČET./THURSDAY	FROM RIVER
	120		24	10h.18JUN	2880	7	PET,/FRIDAY	FROM RIVER
	END FILLING:			10h.18JUN	11520		PET./FRIDAY	
101	AL FROM RIVER:			10h.18JUN	25920		PET./FRIDAY	FROM RIVER
5.2	120	10h 18JUN	24		2880	2	SUB./SATURDAY	FROM TANK 4,1
<u> </u>	120	- 194 c	24		2880	7	NED./SUNDAY	FROM TANK 4,1
÷ .	120		24		2880	7	PON./MONDAY	FROM TANK 4,2
	120	. 15.	24	10h.22JUN	2880	7	UTOR./TUESDAY	FROM TANK 4,2
	END FILLING:			10h.22JUN	11520		UTOR./TUESDAY	
6.1.	120	10h.22JUN	24		2880	2	SRIJ./WEDNESDAY	FROM TANK 5,1
	120	•	24	10h.24JUN	2880	7	ČET./THURSDAY	FROM TANK 5,1
: .				REZERV:	2100			j
	END FILLING:			10h.24JUN	7860		ČET./THURSDAY	
6.3	120	10h.24JUN	24	-	2880	2	PET./FRIDAY	FROM TANK 5,1
	120		24	10h.26JUN	2880	7	SUB./SATURDAY	FROM TANK 5,1
				REZERV:	2100			
	END FILLING:			10h.26JUN	7860		SUB./SATURDAY	
6.2.	120	10h.26JUN	24		2880	2	NED./SUNDAY	FROM TANK 6,1
	120	•	24	• ,	2880	7	PON./MONDAY	FROM TANK 6,1
	99	10h.28JUN	24	10h.29JUN	1440	ν -	UTOR./TUESDAY	FROM TANK 6,1
	END FILLING:			10h.26JUN	7200		UTOR./TUESDAY	
6.4.	09	10h.28JUN	24		1440	1	UTOR./TUESDAY	FROM TANK 6,3
	120	.*	24	-	2880	7	SRIJ./WEDNESDAY	FROM TANK 6,3
	120	**	24	10h.01JUL	2880	2	ČET./THURSDAY	FROM TANK 6,3
				12 17 10 10 1	4300			

Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

DATA SHEET

Object:

Tank No 4.2 – Primary Sedimentation

Tank

Capacity:

7.150,00 m³

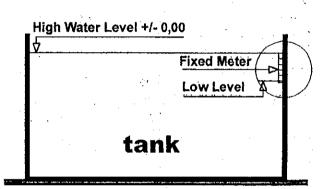
Construction form:

Round; D = 55,00 m

Construcion material:

Reinforced concrete

Measurement Scheme



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	*			
N ⁰ of Measurement	Date of Measurement	Time	Measurement Level (cm)	Qa. drained m³/day
1	11.06.99		0,00	0,00
2	12.06.99			
3	13.06.99			
4	14.06.99			
			Q _{middle}	

Reviewing:

Reviewer:

Sarajevo 14.06.99

AGREEMENT ON SITE SURVEY AND ASSESSMENT OF THE SARAJEVO WWTP BETWEEN JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING NO: 06 - 03

1. **DATE:** 18 June 1999 TIME: 10:00 AM

2. VENUE: WWTP Conference Room, Butila

3. ATTENDANCE LIST

3.1 Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
3.3 Mr. E. Velagic	USB Kedly Doo - Director, Civil Engineer
3.4 Mr. K. Suzuki	JICA Study Team - Team Leader
3.5 Mr. H. Takada	JICA Study Team - Structural/Architectural Design
3.6 Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
3.7 Mr. K. Ota	JICA Study Team - Electrical/Plant Design
3.8 Mr. R. Despault	JICA Study Team - Structural/Facility Design
3.9 Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning

4. MINUTES OF MEETING

- 4.1 Mr. K. Suzuki opened the meeting @ 10:05 AM.
- 4.2 Minutes of Meeting No. 06-01 was accepted without comments.
- 4.3 The Progress of Work was discussed based on the revised Work Schedule, Rev. 3 (please see attached) presented by USB Kedly as follows:
 - A. Preceding Tasks. 100% complete

B. Tanks Stress Strength Test

 Facility 3 (Aerated Grit Chamber) – extraction of concrete core samples, reinforcing bars and pH tests of concrete, 100% complete. Testing of the samples had started.

- Facility 5.1 (Aeration Tank 1) extraction of concrete core samples, reinforcing bars, and pH tests of concrete, 100% complete. Testing of the samples had started.
- Facility 5.2 (Aeration Tank 2) dewatering of the tank will be completed today. Extraction of concrete core samples, reinforcing bars and pH tests of concrete will soon follow.

C. Underground Pipelines

4 sites had been identified. USB Kedly started excavation yesterday of 1
of the sites. Excavation of the 4 sites will be completed next week. The
type of tests to be conducted on the pipes will be discussed between the
contractor and the Study Team soon.

D. Hydraulic Tests of Tanks

- Facility 4.2 (Primary Sedimentation Tank 2) hydraulic test is 100% complete. Preliminary results were presented for comments and final results will be submitted soon after confirmation of the meteorology data from the institute.
- Facility 4.1 (Primary Sedimentation Tank 1) water filling was stopped yesterday after confirmation from the study team due to the volume of leaks coming out from the walls as a result of the expansion joint failure. Monitoring of the drop in water level was done immediately.
- Facility 5.1 (Aeration Tank 1) water filling had started yesterday and will continue until 21 June. Monitoring of the water level will soon follow.
- Facility 5.2 (Aeration Tank) water filling will start 22 June and will lasts for 4 days. Monitoring of the water level will follow.
- Facility 6 (4 Final Sedimentation Tanks) water filling will start 29 June. Tests will be completed by 9 July.

E. Testing of the Aerators

Preparatory works will start tomorrow. Testing will commence on 21
 June starting with the aerators at Facility 5.1. Tests will be completed by 9 July.

5. OTHER MATTERS

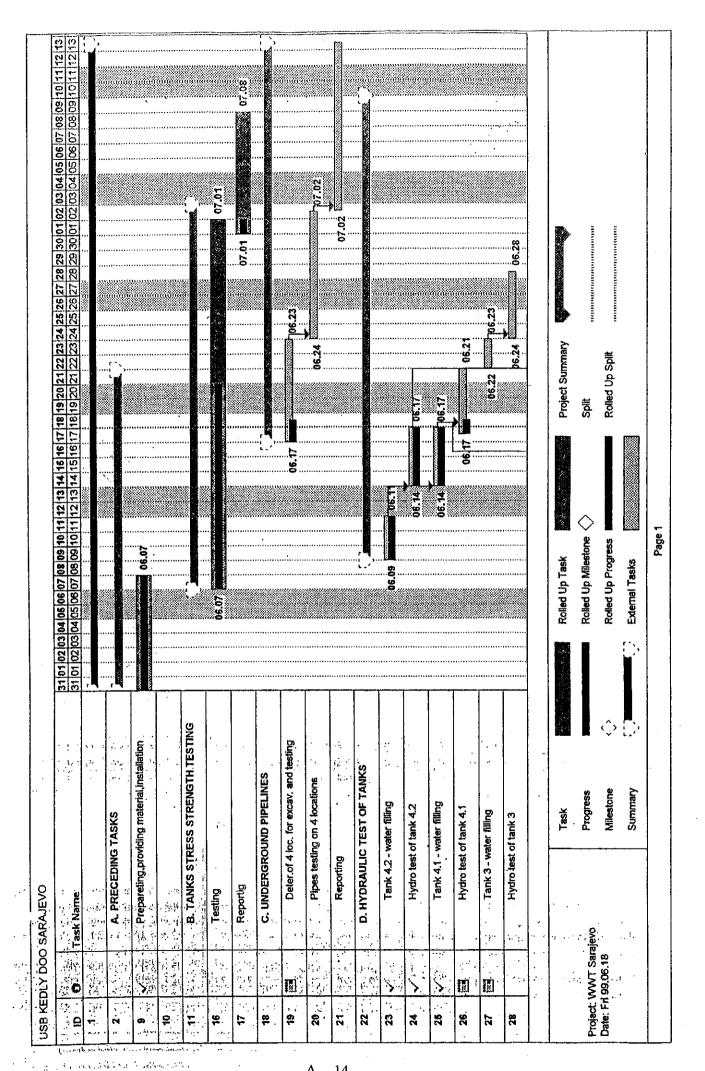
- 5.1 USB Kedly will start the cleaning of the inlet chamber and will attempt to close the sluice valve using the existing mechanism and with a hydraulic jack, where necessary. These works are in preparation for the dewatering of Facility 1 (Raw Water Pumping Station) wet well that will commence next week.
- 5.2 The JICA Study Team raised the concern on photo-documentation of all the

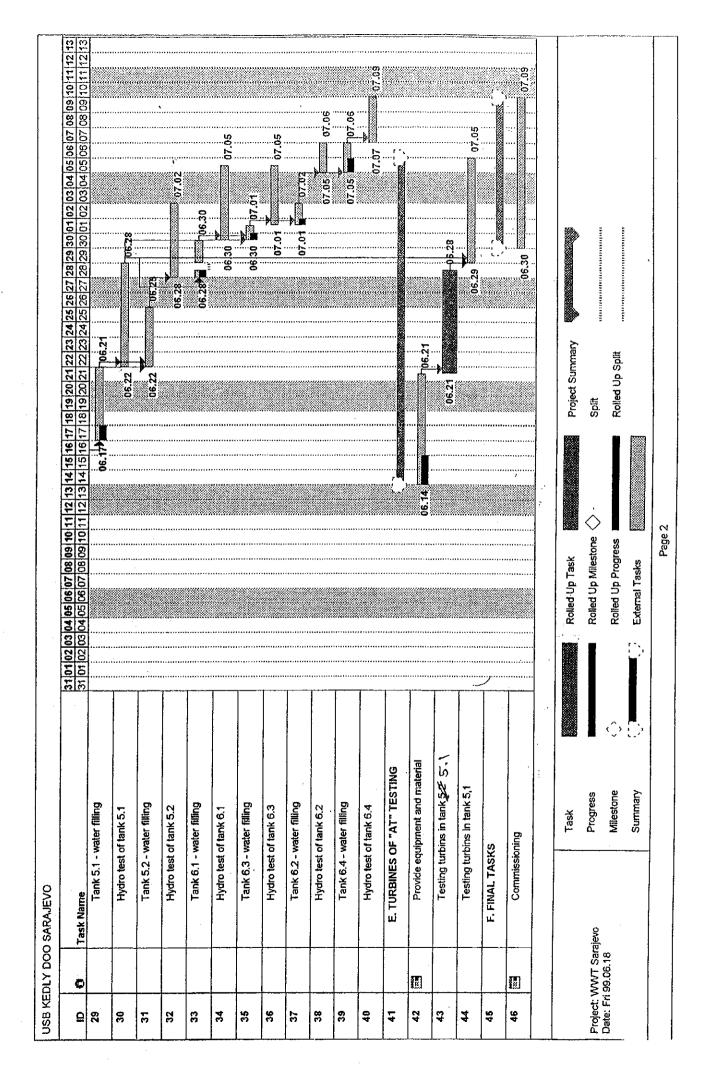
works to include the areas where leakages are evident.

- 5.3 The JICA Study Team requested the USB Kedly to provide a tool that could measure the thickness of the undercoat and finishing cover paint for the screw pumps.
- 6. NEXT MEETING: 25 June 1999, Friday @ 10:00 AM in WWTP site, Butila.

Mr. K. SUZUKI JICA Study Team

Mr. S. CEMERLIC USB Kedly Doo





USB KEDLY	USB KEDLY DOO SARAJEVO	EVO								
c	Task Name	e E		31 01 02 03	04 05 06 07 08 09 10 04 05 06 07 08 09 10	04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 01 02 03 04 05 06 07 08 09 10 11 12 13 04 05 06 07 08 09 10 11 12 13 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 01 02 03 04 05 06 07 08 09 10 11 12 13 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 01 02 03 04 05 06 07 08 09 10 11 12 13	18 19 20 21 22 23 24 18 19 20 21 22 23 24	25 26 27 28 29 30 0 25 26 27 28 29 30 0	02 03 04 05 06 07 02 03 04 05 06 07	7 08 09 10 11 12 13
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			Summary		External Tasks		-			
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Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

DATA SHEET

Object:

Tank No 4.2 - Primary Sedimentation

Tank

Capacity:

7.150,00 m³

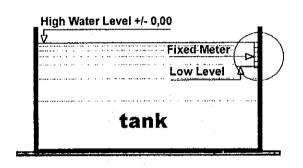
Construction form:

Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material:

Reinforced concrete

Measurement Scheme



N⁰ of Measurement	Date of Measurement	Time h	Daily Drain (mm)	Daily Drain Allowable (mm)	Drain Factor
1	13.06.99	0	0,00	0,86	
2	14.06.99	24	29,30	0,86	34,07
3	15.06.99	48	22,98	0,86	26,72
4	16.06.99	72	29,27	0,86	34,04
5	17.06.99	96	26,87	0,86	31,24
	Middl	e Value:	27,11	0,86	31,52 > 1,00

*Note: For above dada, see next page

Reviewing: Tank Hydraulic test drain test is negative. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

P	eviewer	for	HSR	KEDI	Y٠
к	CAICAACI	101	UUU		

Posavec Franjo

Sarajevo 17.06.99

CONCRETE BASIN HYDRAULIC DRAIN TEST / ISPITIVANJE PROPUSTLJIVOSTI BETONSKIH BAZENA

Date /Datum 17.06. 1999

Object/Objekat	ltem / Oznaka	Dimension Dimenzije	Volume Zapremina	Material <i>Materijal</i>
Primary Sedimentation Tank Primarni Taložnik	4.2	D = 55 m H = 3,01 m	7,150.00 m ³	Concrete beton

No. of measurement Broj mjerenja	Date of measurement Datum mjerenja	Time of measurement :: Vrijeme mjerenja	Water level Nivo vode	Diferenc razlika	ce
Dio, injurunga				cm:	hour/sati
1.	13. 6. 1999	1106	32,8 cm	4.2	g 41
2.	13. 6. 1999	19 47	34,0 cm	1,2	8 71
3	14. 6. 1999	900	35,5 cm	1,5	13 13
4.	14. 6. 1999	1600	36,2 cm	0,7	7 00
5.	15. 6. 1999	900	37,8 cm	1,6	17 00
6.	15. 6. 1999	1600	38,2 cm	0,3	17 00
7.	16. 6. 1999	8 4 5	40,70 cm	0,5	17 15
8.	16. 6. 1999	16 ⁰⁵	41,00	0,3	7 20
9.	16. 6. 1999	2115	41,40	0,4	3 15
10	16. 6. 1999	700	42.00	0,6	g 45

Temperature / Temperatura

	Date/datum	Time/Vrijeme	Temperature
Air temparature/ Temparatura zraka	15.6.99	9	25°C
Water temparature/ Temparatura vode	15.6.99	17 00	22°C
Air temparature/ Temparatura zraka	16.6.99	9	21°C
Water temparature/ Temparatura vode	16.6.99	. 9	22°C

USB KEDLY Site manager/Rukovodilac gradilišta

Posavec Franjo dipl. ing.

Object: Tank No 4.2. - Primary Sedimentation Tank

1. Calculation of Daily Evaporation from Tank Water Surface

1.1. Function

 $E = 3,206(1-0,52^*0,01pa)(1+0,167w)(V-v)$

0,202755906

1.2. Measurement Data

				-						
			Date (D1)	E1 (cm)	Date (D2)	E2 (cm)	Date (D3)	E3 (cm)	Date (D4)	E4 (cm)
ź	Description	Chrit Chrit	10h.06.11		10h.06.12		10h.06.13	÷ ,	10h.06.14	
W	a Water temperature (tw)	(2)	22,000	3,206	22,000	3,206	22,000	3,206	22,000	3,206
<u></u>	b Max. vapor pressure (V)	(cm)	0,206	0,206 (1-0,52*0,01pa)	0,205	(1-0,52*0,01pa)	0,205	(1-0,52*0,01pa)	0,205	(1-0,52*0,01pa)
	c Air temperature (ta)	<u></u>	26,000	0,626	.,	0,646	24,000	0,636	23,000	0,617
0	d Relative humidity	%	000'09	(1+0,167w)	58,000	(1+0,167w)	62,000	(1+0,167w)	65,000	(1+0,167w)
Ψ	e Vapor pressure (v)	(cm)	0,203	2,837	0,201	2,670	0,200	3,004	0,203	2,837
	f Wind velocity (w)	(km/h)	11,00	(\-\\)	10,00	· (\-\/)	12	(\frac{\sigma}{\sigma}\)	7	
زن	Barometric pressure (pa)	(cm)	72,000	0,003	68,000	0,004	70,000	300°0 × 300°2	73,660	0,002
		E (cm)	E (cm) 110h.06.11	0,02	0,02 10h.06.12	0,02	0,02 10h.06.13	0,03	0,03 10h 06.14	10,0:: -0,01

2. Calculation of Max. Allowable Daily Drain from Tank

A - 19

2.1. Function

 $\Delta h_{\text{max}} = (\text{Tc/Ta})$: k = 3010.3500 = 0.86 mm

al Tc = 7150,00 m3 - Total capacity of tank

c/ Tc/Ta = 7150/2375 m - middle depth of the tank - 3,01 m

bl Ta = DxDx3,14/4 - Surface of the tank - 2375 m2 $d/k = 7 days \times 500 - Factor - 3500$

3. Calculation of Daily Drain from Tank

-
Measurement Ding
Level (cm) mm
2
32,80
35,50
37,80
40,70
43,50
_

AGREEMENT ON SITE SURVEY AND ASSESSMENT OF THE SARAJEVO WWTP BETWEEN JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING NO: 06 - 04

1. DATE: 25 June 1999 TIME: 10:00 AM

2. VENUE: WWTP Conference Room, Butila

3. ATTENDANCE LIST

3.1 Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
3.3 Mr. E Velagic	USB Kedly Doo - Director, Civil Engineer
3.4 Mr. H. Takada	JICA Study Team - Structural/Architectural Design
3.5 Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
3.6 Mr. K. Ota	JICA Study Team - Electrical/Plant Design
3.7 Mr. R. Despault	JICA Study Team - Structural/Facility Design
3.8 Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning

4. MINUTES OF MEETING

- 4.1 Mr. R. Crisostomo opened the meeting @ 10:10 AM.
- 4.2 Minutes of Meeting No. 06 03 was accepted without comments.
- 4.3 The Progress of Work was discussed based on the revised Work Schedule, Rev. 4 (please see attached) presented by USB Kedly as follows:
 - C. Preceding Tasks. 100% complete
 - D. Tanks Stress Strength Test
 - Extraction of concrete core samples, reinforcing bars and pH tests for Facility 3 & 5 is 100 % complete.
 - Testing of the samples is 100% complete.
 - The result of the tests will be completed by 02 July.

C. Underground Pipelines

- Excavation of the 4 sites selected is 100% complete. Taking of 4 pipe samples is in progress and will be completed at the end of the week.
- Samples will be tested on 4 parameters such as (a) corrosion, (b) wall thickness of the pipe, (c) pipe material, (d) pipe diameter, and (e) encrustation.
- The result of the tests will be completed by 02 July.

D. Hydraulic Tests of Tanks

- Hydraulic tests for Facility 4 (Primary Sedimentation Tank 1 & 2) is 100% complete. Results were presented for comments from the Study Team.
- Facility 5.1 (Aeration Tank 1) water filling was completed this morning.
 Monitoring of the water level will be done to check the drop of the water
 level caused by the leaks in the wall between Tank 1 & 2 and the external
 wall of the Tank 1. Monitoring will also be done when both Tank 1 & 2
 are filled with water.
- Facility 5.2 (Aeration Tank 2) water filling will start at 1:00 PM today until 29 June. Monitoring of the water level will soon follow.
- Facility 6.1 & 6.3 (Final Sedimentation Tank 1 & 3) simultaneous water filling of these tanks will start 01 July for 2 days. Tests will be completed by 07 July.
- Facility 6.2 & 6.4 (Final Sedimentation Tank 2 & 4) simultaneous water filling of these tanks will commence on 05 July for 2 days. Tests will be completed by 09 July.

E. Testing of the Aerators

- Preparatory works is 100% complete.
- A figure showing the aerators to be tested as recommended by USB Kedly based on the criteria of selection such as (a) mechanical and electrical soundness, (b) structural safety and stability was presented. The total number of aerators to be tested will be confirmed soon after the final inspection to be made right after this meeting.
- Testing of the aerators in Facility 5.1 will start at 1:00 PM today. Each aerator will be tested for 2 hours continuous operation. Data and information to be monitored include (a) bearing temperature, (b) vibration, (c) speed/rotation, and (d) noise.
- Testing of the aerators in Facility 5.2 will commence right after the water filling is completed on 30 June.

5. OTHER MATTERS

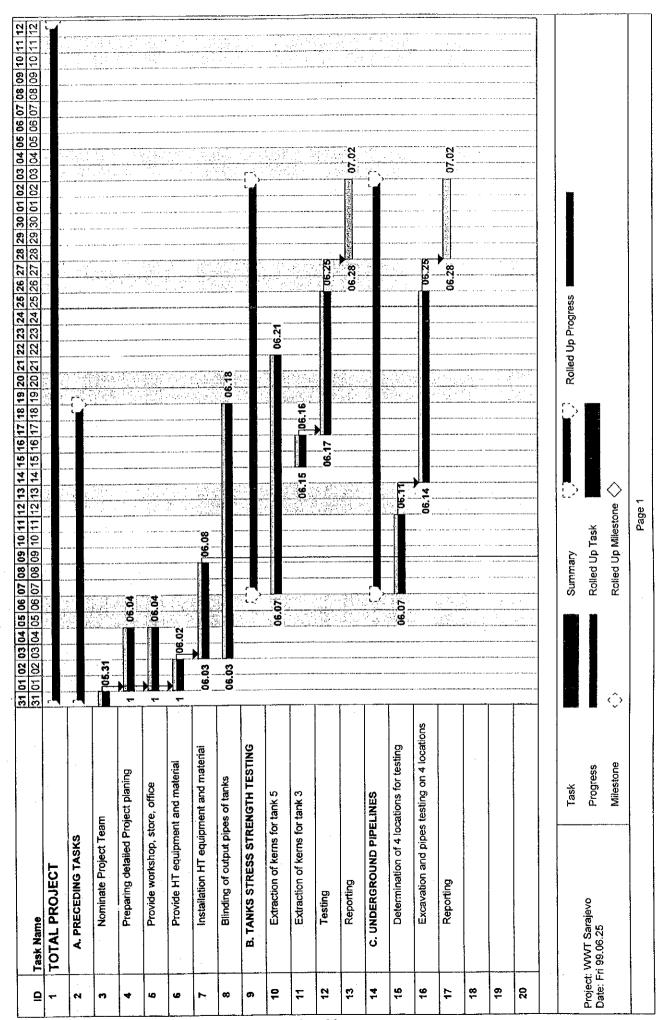
5.1 The JICA Study Team raised the concern on photo-documentation of all the

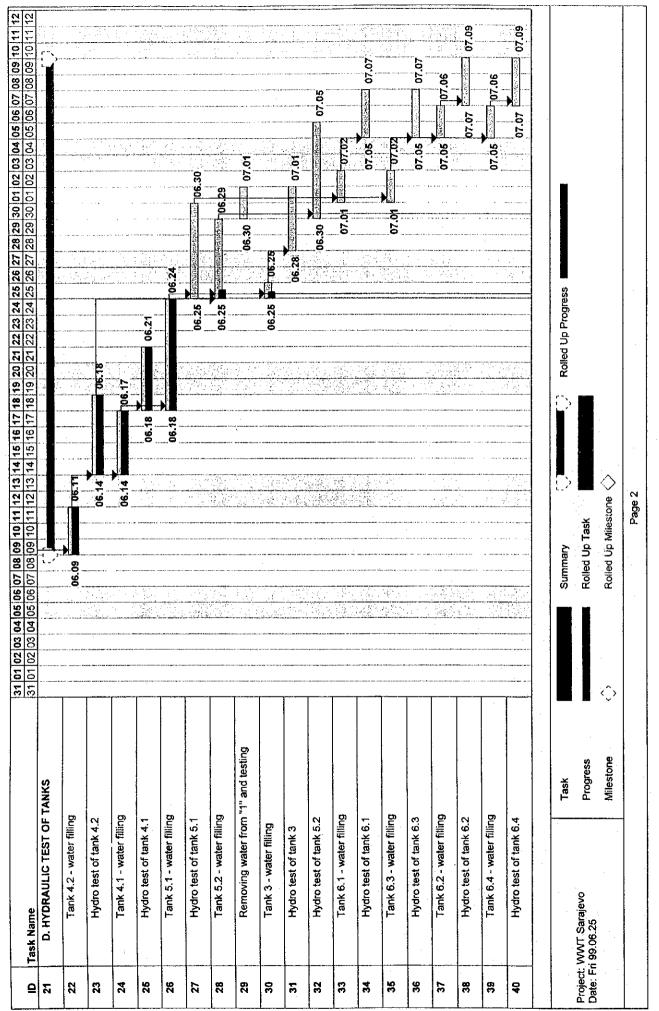
works to include the areas where leakages are evident, especially the division wall of the aeration tank

- 5.2 The JICA Study Team again requested the USB Kedly to provide a tool that could measure the thickness of the undercoat and finishing cover paint for the screw pumps.
- 5.3 The JICA Study Team requested with a list to USB Kedly on data and information regarding unit cost of construction and repair of facilities.
- 5.4 The USB Kedly will a arrange a meeting with the JICA Study Team regarding architectural standards and specification in BiH.
- 6. NEXT MEETING: 02 July 1999, Friday @ 10:00 AM in WWTP site, Butila.

Mr. K. SUZUKI JICA Study Team

Mr. S. CEMERLIC
USB Kedly Doo





Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank N° 4.2 – Primary Sedimentation

Tank

Capacity:

7.150,00 m³

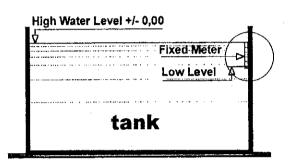
Construction form:

Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material:

Reinforced concrete

Measurement Scheme



N ⁰ of Measure ment	Date of Measure ment	Time (h)	Measure- ment level (mm)	Δh E-R (mm)	Daily Drain (mm) (4-5)	Daily Drain Allowable (mm)	Drain Factor
1	2	3	4	5	6	7	8
1	13.06.99	0	0,00		<u> </u>	0,86	
2	14.06.99	24	29,32			0,86	34,09
3	15.06.99	48	23,00			0,86	26,74
4	16.06.99	72	29,32			0,86	34,08
5	17.06.99	96	26,88			0,86	31,26
	<u> </u>		Mide	lle Value:		0,86	31,52 > 1,00

^{*}Note: For above dada, see next page

Test Result: Tank Hydraulic test drain test is negative. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.17.99

Tested by:		•	Ekrem Velagić B.Sc.
	Tested by:		

USB KEDLY

JICA STUDY TEAM

1. Calculation of Max. Allowable Daily Drain from Tank

Function

Dhmax=(Tc/Ta): k = 3010:3500 = 0.86 mm

a/ $Tc = 7150,00 \text{ m}3 - Total capacity of tank}$

c/ Tc/Ta = 7150/2375 m - middle depth of the tank - 3,01 m

d/ k = 7days x 500 - Factor - 3500

b/ Ta = DxDx3,14/4 - Surface of the tank - 2375 m2

2. Calculation of Daily Drain from Tanks

2.1. Tank No 4.2 - Primary Sedimentation Tank

A - 27

		-	-	-			
Factor-D 9/8.	11		34,09	26,74	34,08	31,26	31.52
Dhmax (mm)	10		0,86	98'0	98'0	0,86	98.0
D-drained 78 (mm)	6	0	29,30	22,98	29,29	26,87	27.11
Evaporation and Rain (E-R) (mm)	8	A	0,02	0,02		0,01	Middle value.V.
∆hmk 4x6 mm	7		29,32	23,00	29,32	26,88	
∆h m mm	9		27	23	29	28	
Measurement Level (cm)	5	32,8	35,5	37.8	40,7	43,5	
Time Corection Factor kt	4	1	1.086	1	1,011	96'0	
Data of Time of Measurement (h)	3	11h06m	9h00m	9h00m	8h45m	9h45m	
Data of Measurement	2	13.06.99	14 06 99	15 06 99	16.06.99	17.06.99	
No of Meas.	,	-	6	i cu	9	5	

Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank No 4.1 - Primary Sedimentation

Tank

Capacity:

7.150,00 m³

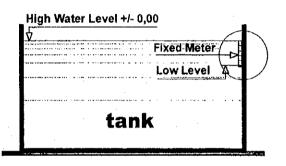
Construction form:

Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material:

Reinforced concrete

Measurement Scheme



Nº of Measure ment	Date of Measure ment	Time (h)	Measure- ment level (mm)	Δh E-R (mm)	Daily Drain (mm) (4-5)	Daily Drain Allowable (mm)	Drain Factor
1	2	3	4	5	6	7	8
1	13.06.99	0	0,00			0,86	
2	14.06.99	24	50,27			0,86	58,43
3	15.06.99	48	43,08			0,86	50,07
4	16.06.99	72	58,00			0,86	67,41
5	17.06.99	96	25,53			0,86	29,67
		-	Midd	lle Value:		0,86	51,39 > 1,00

^{*}Note: For above dada, see next page

Test Result: Tank Hydraulic test drain test is negative. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.25.99

Tested by:	•	
		ن نور جين ۾ پره هر سد سد سر پر جرجم سڪ ۾ نوي عجم سده سدن خاڪن خ
		Ekrem Velagić B.Sc.

2.2. Tank No 4.1 - Primary Sedimentation Tank

77.50	>>>>	>1,1								
51 39	98.0	00 00	Middle value.V.							
31,26	0,86	25,52	0,01	25,53	22	73,7	1,021	m0046	22.06.99	5
34,08	98'0	57,97	0,03	28,00	28	76,2	1,000	9h30m	21.06.99	4
26,74	98'0	43,06	6,02	43,08	6	82,0	1,077	9h30m	20.06.99	က
34,09	98'0	50,25		50,27	22	96,0	0,914	11h50m	19.06.99	2
		0	Sales September 1			91,5	1	9h35m	18.06.99	-
4.4	10	6	8	7	9	5	4	3	2	1
	(mm)	(mm)	(mm)	mm	mm	(cm)	¥	(h)		
9/8.		7. -8	and Rain (E-R)	4 x6		Level	Factor	Measurement	Measurement	Meas.
Factor-D	Dhmax	D-drained	Evaporation	∆hmk	√hm	Measurement	Time Corection	Time of	Data of	No of
	Factor-D 9/8. 11 34,09 26,74 34,08 31,26 51,39	Ohmax Factor-D 9/8. (mm) 11 10 11 0,86 34,09 0,86 26,74 0,86 34,08 0,86 31,26 0,86 31,26		D-drained Dhmax 18 (mm) (mm) (mm) (mm) 0 0 0.86 0.86 0.86 0.86 0.86 0.86 0.86	Evaporation D-drained Dhmax and Rain (E-R) 78 (mm) (mm) (mm) (mm) (mm) (mm) (mm) (mm	∆hmk Evaporation of the control of the c	Measurement Δhm Δhmk Evaporation D-drained Dhmax Independent Level 4x6 and Rain (E-R) 78 (mm) (mm) 5 6 7 8 9 10 91,5 6 7 8 9 10 86,0 55 50,27 6,02 56,25 0,86 82,0 40 43,08 6,02 43,06 0,86 76,2 58 58,00 6,03 57,97 0,86 73,7 25 25,53 0,86 0,86 73,7 25 25,53 0,86 0,86	Ation Measurement Ahmk Evaporation of CeR) D-drained of Dhmax Dhmax of CeR Level 4x6 and Rain (E-R) 78 (mm) (mm) 5 6 7 8 9 10 91,5 6 7 8 9 10 86,0 55 50,27 60,02 55,025 0,86 82,0 40 43,08 60,02 43,06 0,86 76,2 58,00 60,02 57,97 0,86 73,7 25 25,53 60,04 44,20 0,86	Time Corection Measurement Δhmk Evaporation D-drained Dhmax Independent Factor Level 4x6 and Rain (E-R) 78 (mm) (mm) 4 5 6 7 8 9 10 1 91,5 6 7 8 9 10 0,914 86,0 55 50,27 6,02 50,25 0,86 1,077 82,0 40 43,08 6,03 57,97 0,86 1,021 73,7 25 25,53 6,04 44,20 0,86	rift Measurement (h) Time Of Time Corection (Measurement) Δhm Δhmk

A - 29

INSPECTION SHEET FOR INSULATION RESISTANCE

-KONTROLNI LIST ZA OTPOR IZOLACIJE-

1. Date of Testing/Datum ispitivanja:

19.06.1999.

2. Data of Instrument using for measurement/Podatci o instrumentu za ispitivanje:

2.1. Type/*Tip*:

Instalation Tester LEM

2.2. No.

JO 33712 DB CE A185606111

2.3. Producer/Proizvođać:

NORMA, Austria

3. Data of Equipment tested/Podatci o testiranoj opremi:

Equipment/ Oprema	Induction	Voltage/ Napon:	Power/ Snaga:	Current/ Struja:	cos φ	n/min
Aerator N ^o :	motor/ Indukcioni motor	380 V 50 Hz	37 kW	70 A	0,87	1465
	·	Number/Broj:	FL 256280	Lot as V.	JULJ 225 S4	1/1980
A 1	Manufacturer/ Proizvođač	С	EM - Cie Elec	tro- Mecaniq	ue, France	-
Location/ Lokacija		Ae	ration tank	No. 5.1		

4. Test Data/Podatci o ispitivanju:

- A Test insulation resistance between spools;
- B Test insulation resistance between spools and ground;
- C Test of continuous of spools:

	Α	MOhm
1.	W2 - U2	> 100
2.	W2 - V2	> 100
3.	U2 - V2	> 100

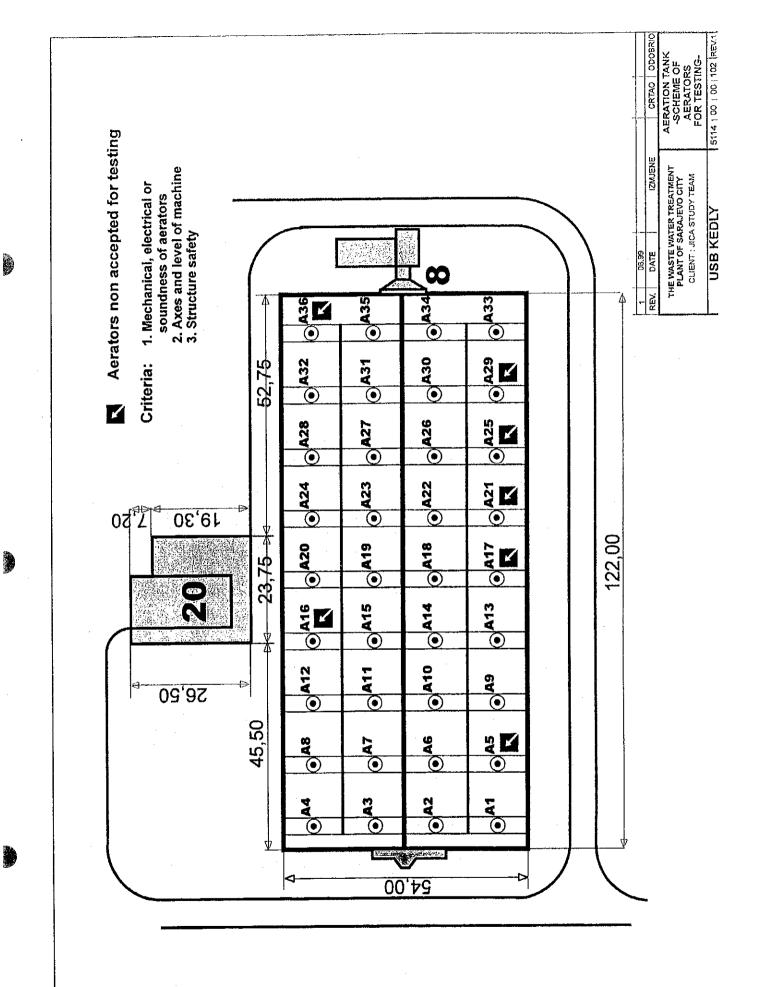
	В	MOhm
4.	W2 - N	> 100
5.	U2 - N	> 100
6.	V2 - N	> 100

	С	MOhm
7.	U1 - U2	0,00
8.	V1 - V2	0,00
9.	W1 - W2	0,00

5. Test Result/Rezultati testa: A and B: > 0,38 MOhm (1000 Ohm/V); C ~ 0,00 Mohm;

Test is positive

Tested	by:
--------	-----



AGREEMENT ON SITE SURVEY AND ASSESSMENT OF THE SARAJEVO WWTP BETWEEN JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING NO: 06 - 05

1. DATE: 02 July 1999 TIME: 10:00 AM

2. VENUE: WWTP Conference Room, Butila

3. ATTENDANCE LIST

3.1 Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
3.3 Mr. E Velagic	USB Kedly Doo - Director, Civil Engineer
3.4 Mr. K. Suzuki	JICA Study Team – Team Leader
3.5 Mr. H. Takada	JICA Study Team - Structural/Architectural Design
3.6 Mr. H. Sakai	ЛСА Study Team - Mechanical/Plant Design
3.7 Mr. K. Ota	JICA Study Team - Electrical/Plant Design
3.8 Mr. R. Despault	JICA Study Team - Structural/Facility Design
3.9 Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning

4. MINUTES OF MEETING

- 4.1 Mr. K. Suzuki opened the meeting @ 10:05 AM.
- 4.2 Minutes of Meeting No. 06 04 was accepted without comments.
- 4.3 The Progress of Work was discussed based on the revised Work Schedule, Rev. 5 (please see attached) presented by USB Kedly as follows:
 - A. Preceding Tasks. 100% complete
 - B. Tanks Stress Strength Test
 - Extraction of concrete core samples, reinforcing bars and pH tests for Facility 3 & 5 is 100% complete.
 - Testing of the samples is 100% complete.
 - Reporting of the results will be completed by 9 July.

C. Underground Pipelines

- Testing of the 4 pipe samples is 100% complete.
- The report should include items such as pipe earth cover, and depth of ground water level.
- Reporting of the results will be completed by 9 July.

D. Hydraulic Tests of Tanks

- Hydraulic tests for Facility 4 (Primary Sedimentation Tank 1 & 2) is 100% complete. Comments of the Study Team were incorporated in the preliminary test results.
- Hydraulic tests for Facility 5.1 (Aeration Tank 1) is 100% complete.
 Preliminary test results were presented to the Study Team (please see attached).
- Water filling of Facility 5.2 will be completed today. Tests will be completed by 06 July.
- Hydraulic tests for Facility 3 (Aerated Grit Chamber) is 100% complete. Preliminary test results were presented to the Study Team (please see attached).
- Facility 6.1 & 6.3 (Final Sedimentation Tank 1 & 3) simultaneous water filling of these tanks will start 07 July for 2 days. Tests will be completed by 12 July.
- Facility 6.2 & 6.4 (Final Sedimentation Tank 2 & 4) simultaneous water filling of these tanks will commence on 09 July for 2 days. Tests will be completed by 15 July.

E. Testing of the Aerators

- Preparatory works is 100% complete.
- Testing of 9 aerators in Facility 5.1 was completed.
- Testing of 10 aerators in Facility 5.2 will start tomorrow and will be completed by Monday 05 July.
- The total number of aerators was finally confirmed after a thorough site inspection of each aerator by the Study Team and USB Kedly.
- Criteria of selection for the testing of the aerators include (a) mechanical and electrical soundness, (b) structural safety and stability.
- Broken coupling and worn out rubber gasket were found in a large number of aerators. USB Kedly will confirm the availability of the above spare parts.

5. OTHER MATTERS

5.1 The Study Team requested USB Kedly to make an inventory of the sluice gates

in Facility 3 (Aerated Grit Chamber) and Facility 5 (Aeration Tank). Information and data such as (a) manufacturer, (b) model, (c) technical specifications, and (d) existing condition will be included in the inventory. A report will be submitted to the Study Team with appropriate recommendations.

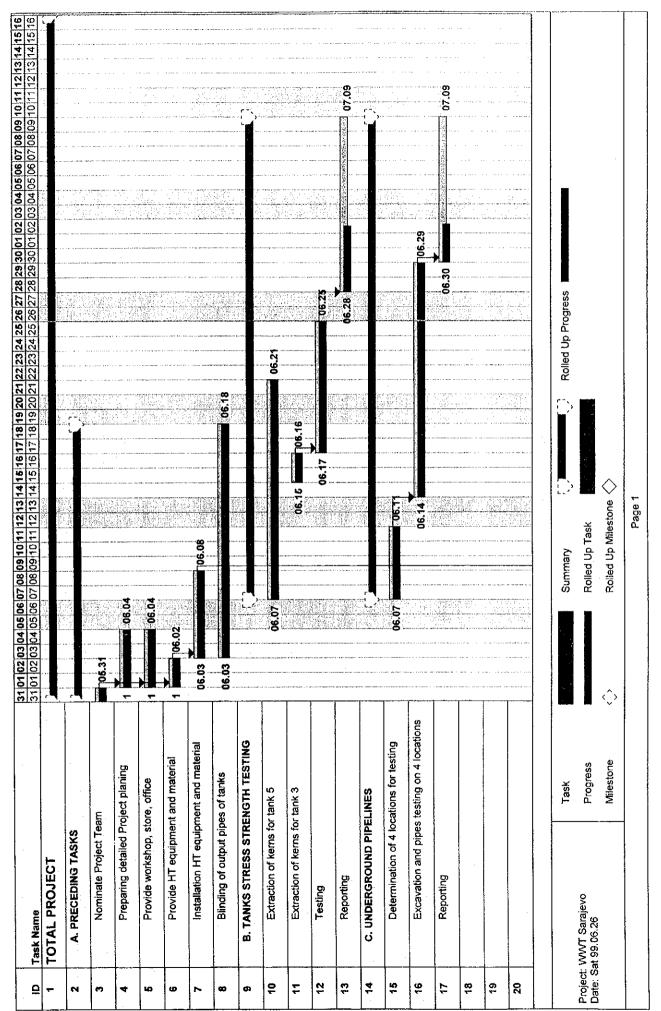
- 5.2 The Study Team requested for the negatives of all the photo-documentation of the field assessment done by USB Kedly and the Institute for Material Testing.
- 5.3 The USB Kedly will submit to the Study Team a Letter of Request for Time Extension next week.
- 5.4 The USB Kedly requested to the Study Team to facilitate the arrangement of the 2nd Payment. The Study Team acknowledged the request and promised to take positive action.

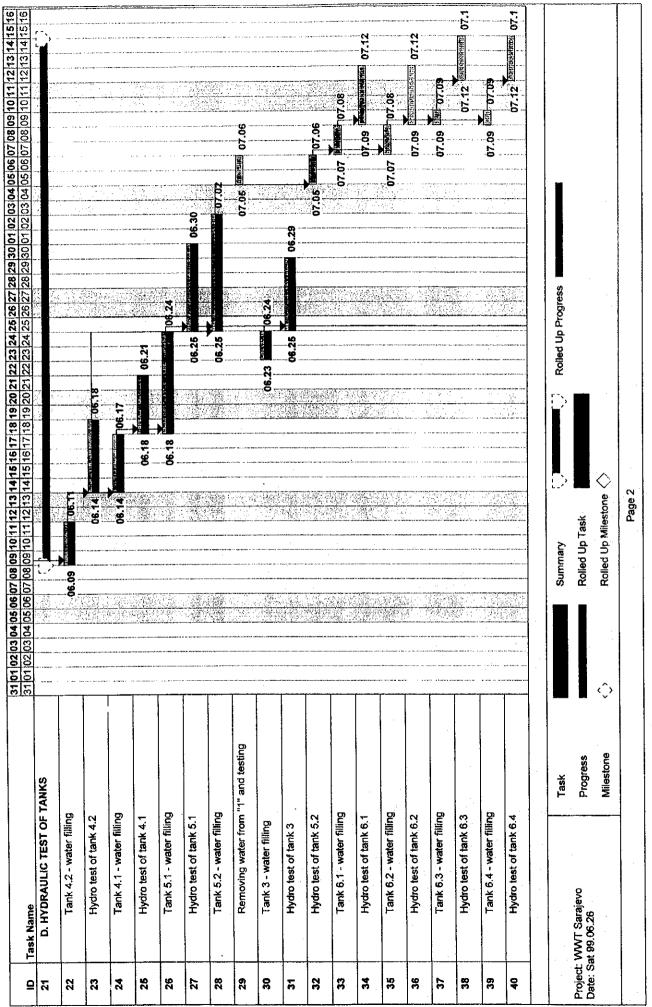
6. NEXT MEETING: 09 July 1999, Friday @ 10:00 AM in WWTP site, Butila.

JICA Study Team

Mr. S. CEMERLIC

USB Kedly Doo





2	The second secon	31 01 02 03 04 05 06	07 08 09 10 11 12 1	3 14 15 16 17 18 19 20 3	21 22 23 24 26 26 27 28 29 31 22 23 24 26 26 27 28 29 39 39 39 39 39 39 39 39 39 39 39 39 39	31 01 02 03 04 05 06 07 08 09 10 11 12 13 14 16 16 17 18 19 20 21 22 23 24 25 25 27 28 29 30 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 16 10 10 10 10 10 10 10 10 10 11 12 13 14 15 16	19
2	E. TURBINES OF "AT" TESTING						
42	Provide equipment and material		0 4	90			
43	Prepararing equipment for testing			006.21		06.30	
4	Testing of aerators				06.25	07.05	
45	F. FINAL TASKS			The Associated States			
46	Reporting and final acceptance					07.05 DESCRIPTION OF THE PROPERTY OF THE PROPE	
	Task		Summary		Rolled Up Progress		To the beautiful and the second
Project: Date: S.	Project: WWYT Sarajevo Date: Sat 99:06.26 Milestone	^	Rolled Up Task Rolled Up Milestone	⇔ a			
			Page 3	3			

Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank No 4.2 – Primary Sedimentation

Tank

Capacity:

7.150,00 m³

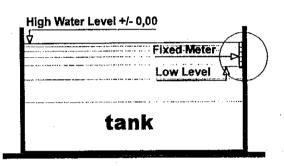
Construction form:

Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material:

Reinforced concrete

Measurement Scheme



Nº of Measure ment	Date of Measure ment	Time (h)	Measure- ment level (mm)	∆h E-R (mm)	Daily Loss (mm)	Daily Loss Allowable (mm)	Leakage Factor
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	13.06.99	0	0,00			0,86	·
2	14.06.99	24	29,32	0.02	29,30	0,86	34,09
3	15.06.99	48	23,00	0.02	22,98	0,86	26,74
4	16.06.99	72	29,32	0,03	29,29	0,86	34,08
5	17.06.99	96	26,88	0.01	26,87	0,86	31,26
	<u> </u>		Avera	ge Value:		0,86	31,52 > 1,00

^{*}Note: For above dada, see next pages

Test Result: Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.17.99

Т	00	eع	a	hv	
- 1	ÇĐ	re	u	by	•

Ekrem Velagić B.Sc.

Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank No 4.2 – Primary Sedimentation

Capacity:

7.150,00 m³

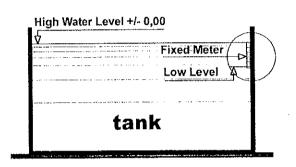
Construction form:

Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material:

Reinforced concrete

Measurement Scheme



N ⁰ of Measure	Date of Measure	Time	Measure- ment	∆h E-R	Daily Loss	Daily Loss Allowable	Leakage Factor
ment	ment	(h)	level (mm)	(mm)	(mm)	(mm)	(0) ((7)
(1)	(2)	(3)	(4)	(5)	(4)-(5)	(7)	(6)/(7) (8)
1	13.06.99	0	0,00			0,86	
2	14.06.99	24	29,32	0,02	29,30	0,86	34,09
3	15.06.99	48	23,00	0,02	22,98	0,86	26,74
4	16.06.99	72	29,32	0,03	29,29	0,86	34,08
5	17.06.99	96	26,88	0,01	26,87	0,86	31,26
	1		Avera	ge Value:		0,86	31,52 > 1,00

*Note: For above dada, see next pages

Test Result: Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.17.99

Tested by:	
	المن في المن المن المن في في المن المن المن المن المن المن المن المن
	Ekrem Velagić B.Sc.

USB KEDLY

JICA STUDY TEAM

1. Calculation of Max. Allowable Daily Leakage from Tank, Dh max

Function

Dhmax=(Tc/Ta): k = 3010:3500 = 0,86 mm per day

where:

a) Tc = 7150,00 m3 - Total capacity of tank

c) Tc/Ta = 7150/2375 m - average depth of the tank - 3,01 m

b) Ta = DxDx3,14/4 - Surface of the tank - 2375 m2

d) $k = 7 \text{days} \times 500 - \text{Factor} - 3500$

2. Calculation of Daily Drain from Tanks

2.1. Tank No 4.2 - Primary Sedimentation Tank

A - 39

20,000	Time	74th Course office	the contract of the	A han	James	- E. Janes Company			C 1171 + L
	sime of	Z4ri Correction	Measurement		Anink	Evaporation	U-loss	T T T T T T T T T T T T T T T T T T T	Tactor-U
	Measurement Measurement	Factor	Level		(4)x(6)	and Rain (E-R)	(4)-(8)	**	(8)/(6)
	(h)	kt	(cm)	mm	mm	(mm)	(mm/day)	(mm/day)	
П	(3.)	(4.)	(5.)	(9)	(7.)	(8.)	(9:)	(10.)	(11.)
	11h06m	1	32,8				0		
14.06.99	9h00m	1,086	35,5	27	29,32	2010Z4	29,30	0,86	34,07
15.06.99	9h00m	1	37,8	23	23,00	# 10000 CO	22,98	0,86	26,72
16.06.99	8h45m	1,011	40,7	29	29,32	E0(0)	29,29	0,86	34,06
17.06.99	9h45m	96'0	43,5	28	26,88	10.0	26,87	0,86	31,24
						Average value-V:	27,11	98'0	31,52

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

USB KEDLY

JICA STUDY TEAM

1. Calculation of Max. Allowable Daily Leakage from Tank, Dh max

Function

Dhmax=(Tc/Ta): k = 3010:3500 = 0,86 mm per day

where:

a) Tc = 7150,00 m3 - Total capacity of tank

c) Tc/Ta = 7150/2375 m - average depth of the tank - 3,01 m

d) k = 7days x 500 - Factor - 3500

b) Ta = DxDx3,14/4 - Surface of the tank - 2375 m2

2. Calculation of Daily Drain from Tanks

2.1. Tank No 4.2 - Primary Sedimentation Tank

A - 39

	-	ı	****	*****	****	·	****	
Factor-D (9)/(8)		(11.)		34,07	26,72	34,06	31,24	31,52
Dhmax	(mm/day)	(10.)		98'0	98'0	98'0	98'0	98'0
D-loss (7)-(8)	(mm/day)	(3.)	0	29,30	22,98	29,29	26,87	27,11
Evaporation and Rain (E-R)	(mm)	(8.)	1000年100年100日	本版[20]05][[本]	\$10.00 mg/s	E0.0	0.01	Average value-V:
∆hmk (4)x(6)	mm	('2)		29,32	23,00	29,32	26,88	Q.
∆hm	mm	(6.)		27	23	58	28	
Measurement Level	(cm)	(2.)	32,8	35,5	37,8	40,7	43,5	
24h Correction Factor	kt	(4.)	1	1,086	1	1,011	96'0	
Time of Measurement	(h)	(3.)	11h06m	9h00m	9h00m	8h45m	9h45m	
Data of Measurement		(2.)	13.06.99	14.06.99	15.06.99	16.06.99	17.06.99	
No of Meas.	-	(1.)	1	2	3	4	5	

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 \times Normal operating deph

Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank No 4.1 – Primary Sedimentation

Tank

Capacity:

7.150,00 m³

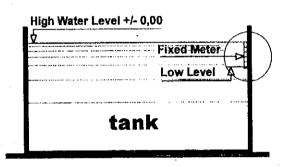
Construction form:

Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material:

Reinforced concrete

Measurement Scheme



N ⁰ of Measure ment	Date of Measure ment	Time (h)	Measure- ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D"
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	18.06.99	0	0,00			0,86	
2	19.06.99	24	50,27	0,62	50,25	0,86	58,43
3	20.06.99	48	43,08	0.02	43,06	0,86	50,07
4	21.06.99	72	58,00	0,03	57,97	0,86	67,41
5	22.06.99	96	56,16	ORGA	56,15	0,86	65,28
			Avera	ge Value:		0,86	60,30 > 1,00

^{*}Note: For above dada, see next pages

Test Result: Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.22.99

Tested by:

Ekrem Velagić B.Sc.

JICA STUDY TEAM
Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank No 4.1 - Primary Sedimentation Tank

Capacity:

7.150,00 m³

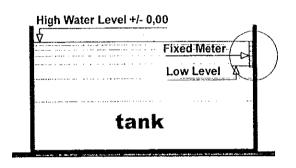
Construction form:

Round; D = 55,00 m; Hm = 3,01 m; 2375 m^2

Construcion material:

Reinforced concrete

Measurement Scheme



N ⁰ of Measure ment	Date of Measure ment	Time (h)	Measure- ment level (mm)	∆h E-R (mm)	Daily Loss (mm)	Daily Loss Allowable (mm)	Leakage Factor "D"
					(4)-(5)		(6)/(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	18.06.99	0	0,00			0,86	
2	19.06.99	24	50,27	0,02	50,25	0,86	58,43
3	20.06.99	48	43,08	0.02	43,06	0,86	50,07
4	21.06.99	72	58,00	0,03	57,97	0,86	67,41
5	22.06.99	96	56,16	0,01	56,15	0,86	65,28
			Avera	ge Value:		0,86	60,30 > 1,00

*Note: For above dada, see next pages

Test Result: Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.22.99

Tested by:	
	Ekrem Velagić B.Sc.

2.2. Tank No 4.1 - Primary Sedimentation Tank

No of	Data of	Time of	24h Correction	Measurement	∆hm	∆hmk	Evaporation	D-loss	Dhmax	Factor-D
Meas.	Measurement	Measurement Measurement	Factor	Level		(4)x(6)	and Rain (E-R)	(2)-(8)		(8)/(8)
		ε	¥	(cm)	mm	mm	(mm)	(mm/day)	(mm/day)	
€	(2.)	(3.)	(4.)	(5.)	(9)	(2)	(8.)	(6.)	(10.)	(11.)
1	18.06.99	9h35m	1	91,5			51-51-61-01-01-51-51-51-51-51-51-51-51-51-51-51-51-51	0		
2	19.06.99	11h50m	0,914	0'98	52	50,27	A PROPOSITION OF THE PROPERTY	50,25	98'0	58,43
3	20.06.99	9h30m	1,077	82,0	9	43,08	F. 4.40102219	43,06	98'0	20'05
4	21.06.99	9h30m	1,000	76,2	28	58,00	HE THEOLOGY IN	57,97	0,86	67,41
5	22.06.99	9h00m	1,021	70,7	55	56,16	10000 Table 1	56,15	98'0	65,28
							Average value-V:	51.86	0.86	60.30

TEST CRITERIA:

A - 41

Max. loss in 7 days no greater then $1/500 \times Normal$ operating deph

2.2. Tank No 4.1 - Primary Sedimentation Tank

-			_	-	_		-	_
Factor-D (9)/(8)		(11.)		58,43	50,07	67,41	65,28	60.30
Dhmax	(mm/day)	(10.)		98'0	98'0	98'0	98'0	0.86
D-loss (7)-(8)	(mm/day)	(6.)	0	50,25	43,06	22,97	56,15	51.86
Evaporation and Rain (E-R)	(mm)	(8.)	20 M 10 M	0.02	1 STATE O 0 STATE OF THE STATE	WE 10 CO 10 CO	1000 TO 100 TO 1	Average value-V:
∆hmk (4)x(6)	mm	(7.)		50,27	43,08	58,00	56,16	7
∆hm	mm	(9)		55	40	58	55	
Measurement Level	(cm)	(2.)	91,5	86,0	82,0	76,2	7,07	
24h Correction Factor	ĸţ	(4.)	-	0,914	1,077	1,000	1,021	
Data of Time of Measurement	(h)	(3.)	9h35m	11h50m	9h30m	9h30m	9h00m	
Data of Measurement		(2.)	18.06.99	19.06.99	20.06.99	21.06.99	22.06.99	
No of Meas.		(4.)		2	3	4	2	

TEST CRITERIA:

A - 41

Max. loss in 7 days no greater then 1/500 x Normal operating deph

JICA STUDY TEAM
Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank Nº 3 - Aerated grit chamber

Capacity:

1.200,00 m³

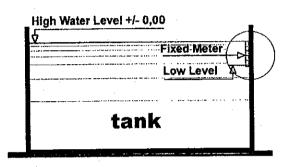
Construction form:

Squore

Construcion material:

Reinforced concrete

Measurement Scheme



N ⁰ of Measure ment	Date of Measure ment	Time (h)	Measure- ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D"
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	25.06.99	0	0,00			0,86	
2	26.06.99	24	300,00	0,02	299,98	0,86	348,81
3	27.06.99	48	205,70	0,02	205,68	0,86	239,17
4	28.06.99	72	169,42	0.03	169,39	0,86	196,96
5	29.06.99	96	166,53	0.91	166,52	0,86	193,63
A	<u> </u>		Avera	ge Value:		0,86	244,64 > 1,00

^{*}Note: For above dada, see next pages

Test Result: Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.29.99

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Ekrem Velagić B.Sc.

Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank No 3 - Aerated grit chamber

Capacity:

1.200,00 m³

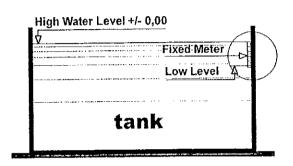
Construction form:

Squore

Construcion material:

Reinforced concrete

Measurement Scheme



N ⁰ of Measure ment	Date of Measure ment	Time (h)	Measure- ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D"
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	25.06.99	0	0,00			0,86	
2	26.06.99	24	300,00	0,02	299,98	0,86	348,81
3	27.06.99	48	205,70	0,02	205,68	0,86	239,17
4	28.06.99	72	169,42	0,03	169,39	0,86	196,96
5	29.06.99	96	166,53	0,01	166,52	0,86	193,63
	<u> </u>			0,86	244,64 > 1,00		

^{*}Note: For above dada, see next pages

Test Result: Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.29.99

Tested by:	

	Ekrem Velagić B.Sc.

2.3. Tank No 3 - Aerated grit chamber

-				_	_		_		_
Factor-D	(8)/(6)		(11.)		348,81	239,17	196,96	193,63	244.64
Dhmax		(mm/day)	(10.)		98'0	98'0	98'0	98'0	0.86
D-loss	(7)-(8)	(mm/day)	(-6)	0	299,98	205,68	169,39	166,52	210.39
Evaporation	and Rain (E-R)	(mm)	(8.)	测生物的 然识别	W44 (10 10 10 10 10 10 10 10 10 10 10 10 10 1	1.01.01000	The second control of	原理型(0)(0)(型形型	Average value-V:[
	(4)x(6)		('2)		00'00E	205,70	169,42	166,53	V
∆hm		mm	(6.)		300	180	180	170	
Measurement	Level	(cm)	(2.)	0'06	120,0	138,0	156,0	173,0	
24h Correction	Factor	kt	(4.)	1	1	1,1428	0,941	0,9796	
Time of	Measurement	(h)	(3.)	8h30m	8h30m	5h30m	7h00m	7h30m	
Data of	Measurement		(2.)	25.06.99	26.06.99	27.06.99	28.06.99	29.06.99	
No of	Meas.		(1)	4~*	2	3	4	2	

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

The Feasibility study on the Wastewater treatment plant of Sarajevo

2.3. Tank No 3 - Aerated grit chamber

		_	-	_				(***·
Factor-D	(o)/(e)	(11.)		348,81	239,17	196,96	193,63	244,64
Dhmax	(mm/day)	(10.)		0,86	98'0	98'0	98'0	98'0
D-loss	(* /)-(o) (mm/day)	(6.)	0	299,98	205,68	169,39	166,52	210,39
Evaporation	and rain (E-r.) (mm)	(8.)	555112K(0*55511)	(1/40/8/10)1029(10)11	(足师。1000 起来。	图图图1000新沙山	Average value-V:
∆hmk	(4)x(6) mm	('2)		300,00	205,70	169,42	166,53	4
∆hm	mm	(6.)		300	180	180	170	
Measurement	(cm)	(5.)	0'06	120,0	138,0	156,0	173,0	
24h Correction	ractor	(4.)	L	-	1,1428	0,941	9626'0	
Time of	weasurement measurement (h)	(3.)	8h30m	8h30m	5h30m	7h00m	7h30m	
Data of	weasurement	(2.)	25.06.99	26.06.99	27.06.99	28.06.99	29.06.99	
No of	Meas.	(1.)	τ-	2	3	4	5	

TEST CRITERIA:

A - 43

Max. loss in 7 days no greater then 1/500 x Normal operating deph

Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank No 5.1 - Aeration Tank

Capacity:

12.000,00 m³

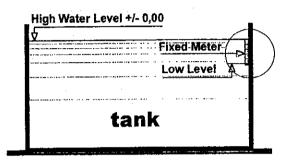
Construction form:

Squore

Construcion material:

Reinforced concrete

Measurement Scheme



N ⁰ of Measure ment	Date of Measure ment	Time (h)	Measure- ment level (mm)	Δh E-R (mm)	Daily Loss (mm) (4)-(5)	Daily Loss Allowable (mm)	Leakage Factor "D"
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	25.06.99	0	0,00			0,86	
2	26.06.99	24	258,30	0,02	258,28	0,86	300,33
3	27.06.99	48	219,03	0,02	219,01	0,86	254,66
4	28.06.99	72	184,60	0,03	184,57	0,86	214,62
	<u> </u>		Avera	ge Value:		0,86	256,53 > 1,00

*Note: For above dada, see next pages

Test Result: Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.28.99

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Ekrem Velagić B.Sc.

Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

HYDRAULIC TEST DRAIN TEST

INSPECTION SHEET

Object:

Tank No 5.1 - Aeration Tank

Capacity:

12.000,00 m³

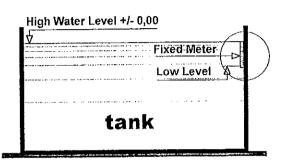
Construction form:

Squore

Construcion material:

Reinforced concrete

Measurement Scheme



N ⁰ of Measure ment	Date of Measure ment	Time	Measure- ment level	∆h E-R	Daily Loss	Daily Loss Allowable	Leakage Factor "D"
		(h)	(mm)	(mm)	(mm)	(mm)	(2) ((2)
(1)	(2)	(3)	(4)	(5)	(4)-(5) (6)	(7)	(6)/(7) (8)
1	25.06.99	0	0,00			0,86	
2	26.06.99	24	258,30	0,02	258,28	0,86	300,33
3	27.06.99	48	219,03	0,02	219,01	0,86	254,66
4	28.06.99	72	184,60	0,03	184,57	0,86	214,62
			Avera	ge Value:		0,86	256,53 > 1,00

*Note: For above dada, see next pages

Test Result: Tank Hydraulic test drain test is fail. Adecvate additional reparation and drain protection of inside surfaces of tank is recommended, including output pipes and valves.

Sarajevo 06.28.99

Tested by:

Ekrem Velagić B.Sc.

2.4. Tank No 5.1 - Aeration Tank

-				_			, -	
Factor-D	(8)/(8)		(11.)		300,33	254,66	214,62	256 52
Dhmax		(mm/day)	(10.)		98'0	98'0	0,86	280
D-loss	(7)-(8)	(mm/day)	(6)	0	258,28	219,01	184,57	220 62
Evaporation	and Rain (E-R)	(mm)	(8.)	一次分大大OCEMENT	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.4 4 (0) 02 4 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	W. W	Verage value.V
∆hmk	(4)x(6)	mm	(7.)		258,30	219,03	184,60	V
∆hm		mm	(9)		210	210	200	
Measurement	Level	(cm)	(2.)	200,0	179,0	158,0	138,0	
24h Carrection	Factor	kt	(4.)	1	1,23	1,043	0,923	
Time of	deasurement Measurement	(h)	(3.)	13h00m	8h30m	7h30m	9h30m	
Data of	Measurement		(2.)	25.06.99	26.06.99	27.06.99	28.06.99	
No of	Meas.		(1.)	1	2	3	4	

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

The Feasibility study on the Wastewater treatment plant of Sarajevo

2.4. Tank No 5.1 - Aeration Tank

		-	-	-		-	1
(8)/(8)		(11.)		300,33	254,66	214,62	256.53
	(mm/day)	(10.)		0,86	0,86	0,86	98.0
(7)-(8)	(mm/day)	(8.)	0	258,28	219,01	184,57	220.62
and Rain (E-R)	(mm)	(8.)		10102 F	4,0,02,7	11 H 10 00 00 H 11 11 11 11 11 11 11 11 11 11 11 11 1	Average value-V:
(4)x(6)	mm	('2)		258,30	219,03	184,60	4
	mm	(9)		210	210	200	
Level	(cm)	(2.)	200,0	179,0	158,0	138,0	
Factor	kt	(4.)	1	1,23	1,043	0,923	
Measurement	(h)	(3.)	13h00m	8h30m	7h30m	9h30m	
Measurement		(2.)	25.06.99	26.06.99	27.06.99	28.06.99	
Meas.		(1.)	1	2	3	4	
	Measurement Measurement Factor Level (4)x(6) and Rain (E-R) (7)-(8)	Measurement Measurement (4)x(6)Measurement (7)-(8)(h)kt(cm)mm(mm/day)(mm/day)	Measurement (h) Factor (h) Level (cm) (4)x(6) and Rain (E-R) (7)-(8) (mm/day) (mm/day) (2.) (3.) (4.) (5.) (6.) (7.) (8.) (9.) (10.)	Measurement Measurement (h) Factor (cm) Level (dm) (4)x(6) and Rain (E-R) (7)-(8) (7)-(8) (mm/day) (mm/day) (mm/day) (mm/day) (mm/day) (mm/day) (mm/day) (mm/day) (mm/day) (10.)	Measurement (h) Factor (cm) Level (cm) (4)x(6) and Rain (E-R) (7)-(8) (7)-(8) (2.) (3.) (4.) (5.) (6.) (7.) (8.) (9.) (10.) 25.06.99 8h30m 1,23 179,0 210 258,30 (8.) (7.) (8.) (9.) (10.)	Measurement Measurement (h) Factor (cm) Level (cm) (4)x(6) and Rain (E-R) (7)-(8) (7)-(8) (2) (3) (4) (5) (6) (7) (8) (9) (10.) 25.06.99 8h30m 1,23 179,0 210 258,30 (8) 258,28 0,86 27.06.99 7h30m 1,043 158,0 210 219,03 (310,01) 0,86	Measurement (h) Factor (cm) Level (m) (4)x(6) and Rain (E-R) (7)-(8) (7)-(8) (mm/day) (mm/day) (mm/day) 25.06.99 13h00m 1 200,0 210 258,30 (8) (9.) (10.) 26.06.99 8h30m 1,23 179,0 210 258,30 (8) 0 0 27.06.99 7h30m 1,043 158,0 210 219,03 (8) 219,01 0,86 28.06.99 9h30m 0,923 138,0 200 184,60 (8) 184,57 0,86

TEST CRITERIA:

Max. loss in 7 days no greater then 1/500 x Normal operating deph

The Feasibility study on the Wastewater treatment plant of Sarajevo

AGREEMENT ON SITE SURVEY AND ASSESSMENT OF THE SARAJEVO WWTP BETWEEN JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING NO: 06 - 06

1. DATE: 09 July 1999 TIME: 1:00 PM

2. VENUE: WWTP Conference Room, Butila

3. ATTENDANCE LIST

3.1 Mr. S. Cemerlic	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. F. Posavac	USB Kedly Doo - Site Mgr., Electrical Engineer
3.3 Mr. E Velagic	USB Kedly Doo - Director, Civil Engineer
3.4 Mr. K. Suzuki	JICA Study Team – Team Leader
3.5 Mr. H. Takada	JICA Study Team - Structural/Architectural Design
3.6 Mr. H. Sakai	JICA Study Team - Mechanical/Plant Design
3.7 Mr. K. Ota	JICA Study Team - Electrical/Plant Design
3.8 Mr. R. Despault	JICA Study Team - Structural/Facility Design
3.9 Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning

4. MINUTES OF MEETING

- 4.1 Mr. R. Crisostomo opened the meeting @ 1:00 PM.
- 4.2 Minutes of Meeting No. 06-05 was accepted with comments on Item 5.3 to be deleted. The total project schedule has been clarified to be 60 days and not 45 days as previously reported. Therefore, the request for time extension by USB Kedly is absurd.
- 4.3 The Progress of Work was discussed based on the revised Work Schedule, Report No. 5 (please see attached) presented by USB Kedly as follows:
 - A. Preceding Tasks. 100% complete
 - B. Tanks Stress Strength Test
 - Extraction of concrete core samples, reinforcing bars and pH tests for Facility 3 & 5 is 100% complete.

Testing of the samples is 100% complete.

• Reporting of the results is completed and will be incorporated in the final report.

C. Underground Pipelines

• Testing of the 4 pipe samples is 100% complete.

 Reporting of the results is completed and will be incorporated in the final report.

 Repair of the pipelines has started 08 July and will be completed next week

D. Hydraulic Tests of Tanks

Hydraulic tests for Facility 4 (Primary Sedimentation Tank 1 & 2) is 100% complete. Reporting of the results is completed and will be incorporated in the final report.

Hydraulic tests for Facility 5.1 (Aeration Tank 1) is 100% complete.
 Reporting of the results is completed and will be incorporated in the final report.

• Hydraulic tests for Facility 5.2 (Aeration Tank 2) is on-going and is expected to be completed on Monday.

Hydraulic tests for Facility 3 (Aerated Grit Chamber) is 100% complete.
 Reporting of the results is completed and will be incorporated in the final report.

• Facility 6.1 & 6.3 (Final Sedimentation Tank 1 & 3) – simultaneous water filling of these tanks started 08 July for 2 days. Tests will be completed by 14 July.

• Facility 6.2 & 6.4 (Final Sedimentation Tank 2 & 4) – simultaneous water filling of these tanks will commence on 12 July for 2 days. Tests will be completed by 16 July.

E. Testing of the Aerators

• Preparatory works is 100% complete.

• Testing of 19 aerators in Facility 5.1 and 5.2 (Aeration Tanks) is completed.

 The total number of aerators was finally confirmed after a thorough site inspection of each aerator by the Study Team and USB Kedly.

 Criteria of selection for the testing of the aerators include (a) mechanical and electrical soundness, (b) structural safety and stability.

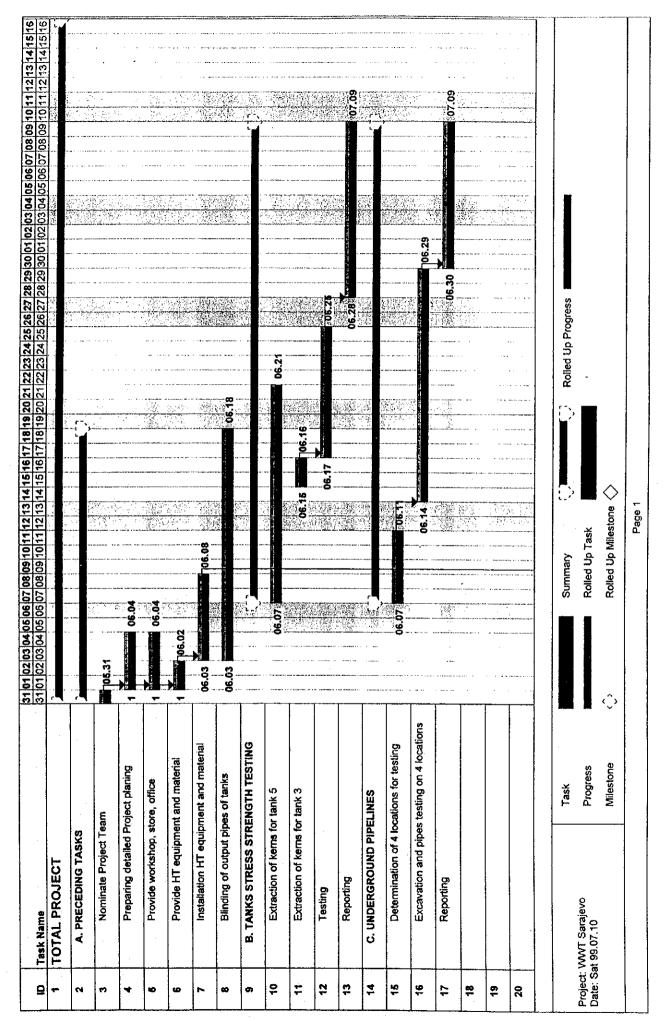
 Broken coupling and worn out rubber gasket were found in a large number of aerators. USB Kedly will confirm the availability of the above spare parts. Preliminary report was submitted to the JICA Study Team for comments.

5. OTHER MATTERS

- 5.1 As per request of the JICA Study Team the USB Kedly started the inventory of the sluice gates on Facility 3 and 5 and is expected to be completed next week. Results will be incorporated in the final report.
- 5.2 As per request of the JICA Study Team the negatives for all the photodocumentation of the field assessment done by USB Kedly and the Institute for Material Testing will be given together with be final report.
- 5.3 The USB Kedly submitted to the JICA Study Team the acknowledgement receipt of the 2nd Payment.
- 5.4 The USB Kedly submitted an inspection sheet of the aerators for the Study Team's comments.
- 6. NEXT MEETING: 19 July 1999, Monday @ 10:00 AM, WWTP Conference Room, Butila.

Mr. K. SUZUKI JICA Study Team

Mr. S. CEMERLIC USB Kedly Doo



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JICA STUDY TEAM

Project: THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO, BIH

AERATION TURBINE TEST LOAD INSPECTION SHEET

Date of testing: 19. 06.1999.

Time of testing:

12 30 - 14 30

INSTRUMENT USED FOR MEASUREMENT (See Attachment) 2.

3. **EQUIPMENT TESTED DATA**

AERATION TURBINE		Nº A1	
Location:		Aeration tank N	° 5.1.
Aeration turbine type: Fixed position surface aerator	Manufacturer:	DEGREMONT	Materials (Shaft/Rotor): carbon steel/carbon steel
Service: air supply for biological treatment	Duty:	permanent	Corrosive protection:
Turbine diametar: 2300,00 mm?	Installation:	out door	Turbine speed: 51,9 tr/min

Elektro Motore:		
Electromotore type: Induction motor	Manufacturer: CEM-Cie Electro-Mecanique, France	Manufacturer type:
Manufacturer number: FL 256280	Production Year: 1980	Lot: VJULJ 225 S4 1/1980
Voltage: 380V; 50Hz Power: 37 kW	Current: 70 A Cos φ: 0,87	n/min: 1465
Service: turbine drive	Installation: out door	Duty: permanent

Coupling:		
Coupling type: Periflex	Manufacturer: TEXROPE France	Manufacturer type:

Gear Box:	<u> </u>	
Gear box type: 2 step vertical shaft	Manufacturer: Hansen Patent France	Manufacturer type: NE 36 AN
Manufacturer number. E 10663	Production Year. 1980	Ratio: 1465/51,9/28,528
Service: turbine drive	Installation: out door	Duty: permanent

TEST DATA 3.

Description	Unit	GEAR BOX	ELECTRO MOTORE
Figure:			
Coπosion:	%		
Insulation resistance:		7	
Terminals:		<i>1</i>	
Abnormal Sound:			
Bearings:			
Shafts:			1
Gears:			
Electricity:	A	1	
Speed:	O/min		
Vibration:	μm		
Oil temperature:			
El. mot.overheating:		1	
Anchor bolts:		-	1

4.	TEST RESULT:		Verified by:
		Test is Pass	
			Posavac Franjo B.Sc.

AGREEMENT ON SITE SURVEY AND ASSESSMENT OF THE SARAJEVO WWTP BETWEEN JICA STUDY TEAM AND USB KEDLY DOO

MINUTES OF MEETING NO: 06 – 07

1. **DATE:** 19 July 1999 **TIME:** 10:00 PM

2. VENUE: WWTP Conference Room, Butila

3. ATTENDANCE LIST

3.1 Mr. S. CEMERLIC	USB Kedly Doo - Proj. Mgr/MechanicalEngineer
3.2 Mr. E VELAGIC	USB Kedly Doo - Director, Civil Engineer
3.3 Mr. K. SUZUKI	JICA Study Team – Team Leader
3.4 Mr. H. TAKADA	ЛСА Study Team - Structural/Architectural Design
3.5 Mr. H. SAKAI	JICA Study Team - Mechanical/Plant Design
3.6 Mr. K. OTA	JICA Study Team - Electrical/Plant Design
3.7 Mr. R. DESPAULT	JICA Study Team - Structural/Facility Design
3.8 Mr. R. CRISOSTOMO	JICA Study Team - Facility Design/O&M Planning

4. MINUTES OF MEETING

- 4.1 Mr. K. SUZUKI opened the meeting @ 1:00 AM with special thanks to the USB Kedly acknowledging their cooperation and performance in carrying out all the works as per the contract.
- 4.2 Minutes of Meeting No. 06 06 was accepted.
- 4.3 All works as per the Agreement made and signed on the 25th May 1999 by and between the JICA Study Team and USB Kedly Doo is completed.
- 4.4 The USB Kedly presented and explained briefly the contents of the Final Report (Elaboration of the Testing). They also presented 8 copies of the Report done by the Institute for Materials and Structures, Faculty of Civil Engineering, University Sarajevo on the tests they did on the Aerated Grit Chamber, Aeration Tank and Underground Pipelines.
- 4.5 Mr E. VELAGIC and Mr. K. SUZUKI signed the Certificate of Final Acceptance (please see attached) for and in behalf of USB Kedly Doo and JICA Study Team,

and in behalf of USB Kedly Doo and JICA Study Team, respectively. Included in the Certificate is an invoice in the amount of DEM 2,800.00 for payment of the additional works done by the contractor which were not originally part of the Scope of Work. The JICA Study Team agreed to pay the said amount.

- 4.6 The USB Kedly started the restoration and cleaning of the tested facilities, and the repair of the underground pipelines. Completion of the above works is expected after two weeks.
- 4.7 The JICA Study Team finally accepted the completion of works done by USB Kedly.

Mr. K. SUZUKI JICA Study Team

Mr. S. CEMERLIC USB Kedly Doo

THE CERTIFICATE OF FINAL ACCEPTANCE

According to the Agreement made and signed on the 25th of May 1999 by and between the JICA Study Team for the Feasibility Study on the Wastewater Treatment Plant of Sarajevo City in Bosnia and Herzegovina and USB KEDLY DOO Sarajevo, we herewith declare as follows:

- 1. The work on the field survey and assessment of the Sarajevo WWTP carried out by USB Kedly doo Sarajevo was started on the 31.05.1999 and finished on the 16.07.1999.
- 2. The work is finished successfully and in compliance with the Agreement specification,
- 3. USB KEDLY during the Work carried out the Additional works and services according to requests of JICA Study Team as follows:
 - Cutting of pipes on 4 locations, supplying new pieces, welding pipes and isolation of pipes,
 - Discharging water from raw water pump station tank within 3 days with 2 pumps.
 - Preparing additional photo documentation.
 - · Improving necessary instruments for aerators testing,
 - Testing and inspection of machines coating color.
 - Inspection of sluice gates with reporting.
 - · Preparing and finalizing of local cost investigation report,

for the Total additional Sum of 2,800.00EM

This Certificate is drown up entitling USB KEDLY to the relevant payments.

Sarajevo, 19th of July 99 -----(place and date)

FOR AND BEHALF OF:

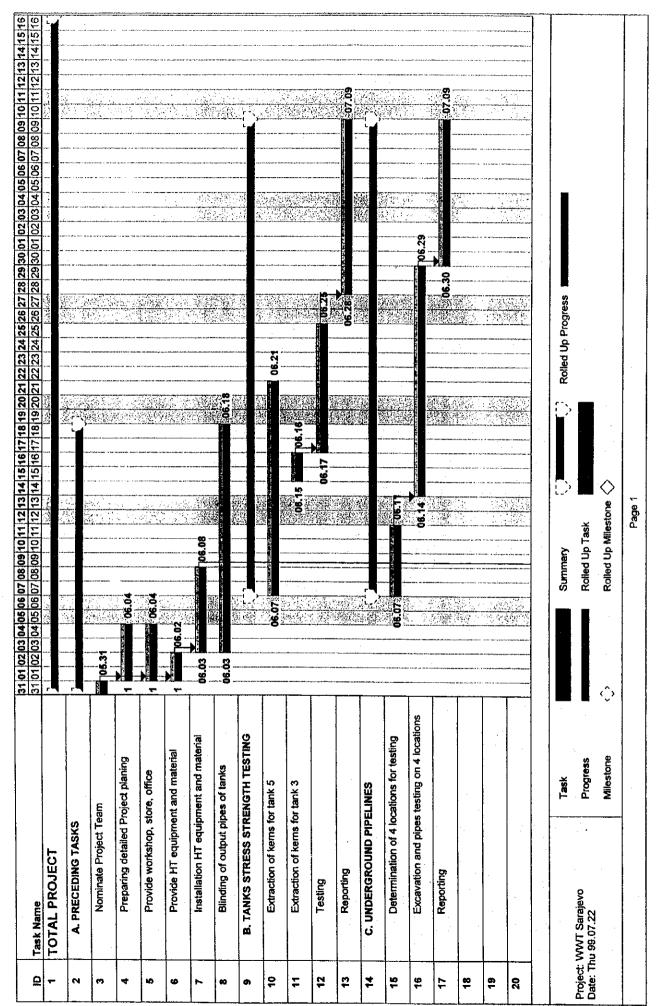
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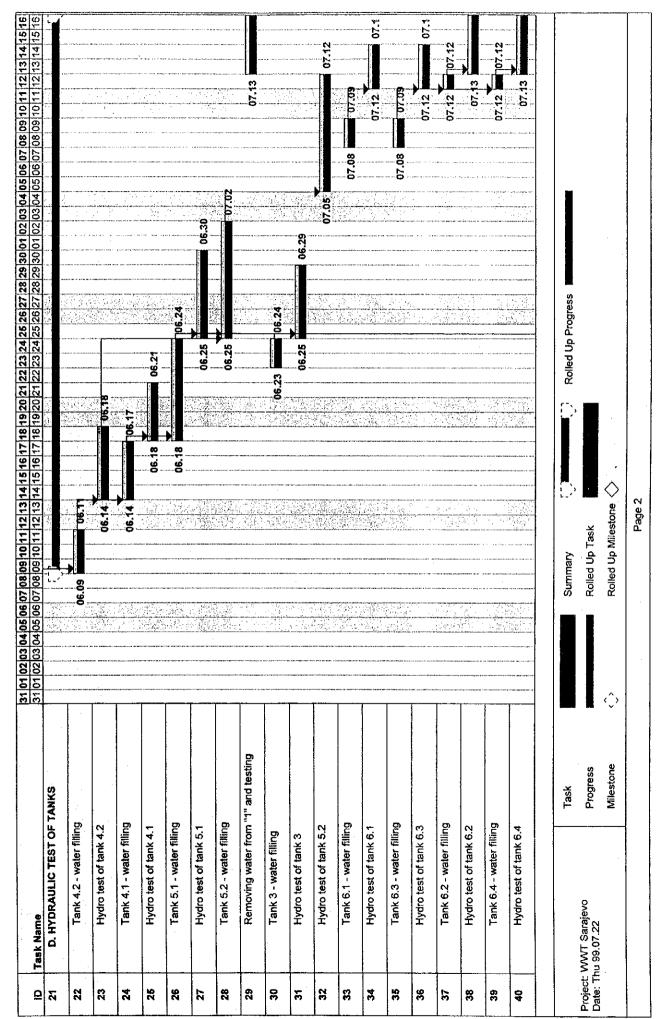
JICA Study Team

USB KEDLY DOO, Sarajevo

Mr. Ekrem VELAGIC, I

Mr. Kaoru SUZUKI Team Leader





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