J. Vik's ORGANIZATION DATA



APPENDIX J. VIK'S ORGANIZATION DATA

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1. ViK's Organization	Data	J -	2

Page

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LIST OF TABLE

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Table J.1	HUMAN RESOURCE REQ	UIREMENT AND DEI	PLOYMENT	J - 2	2
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1. Vik's ORGANIZATION DATA

Table J.1 HUMAN RESOURCE REQUIREMENT AND ACTUAL DEPLOYMENT As of End of 98

-	· · · ·	Qualification		huce:	100	U.O.				mbero				line -	line -	1.1917	Tele	Actual # of	
			V55	VSS/ VIS	VIŞ .	VISI	VI\$7 922	VXV	VXV/ SSS	VXV/ KV	\$55	SSS/ KV	κV	RV/	PKV (NKV	Tota	slafí	
		Number of Employee	126		53		46	68				10	452		84	66	1328		
;#	Section Name	Job Title		<u>†</u>														†	Ť
	Higher Management	General Manager	1											<u> </u>			1	1	ſ
		Technical Director													··		1	1	í†-
	Higher Management			;	I	<u> </u>											·	5	-
	Technical Advice	Technical Advisor	<u> </u>					ļ					<u> </u>				:		
2	General Alfairs	General Secretary	<u> </u>					ļ							 				4-
2	General Affairs	Secretary									1		<u> </u>			<u> </u>	1	1	4
2	General Affairs	Driver								1							1	l!	<u> </u> _
)3	Comptroller Office	Comptroller	3	, <u> </u>													3	3	3
	Water Supply Works	Director	1	1		t		—-		1			-				1	1	i
		· · · · · · · · · · · · · · · · · · ·									2				<u> </u>	1	2	1	Ť
	General Administration	Secretary						-	<u> </u>		1		<u> </u>	{					Ŧ
	General Administration	Showdown clerk			I				··· ·		<u> </u>		<u> </u>		<u> </u>	┨───		<u> </u>	÷
21	General Administration	Driver			ļ		 	I	·		·		·	<u> </u>	<u> </u>			 	
1	Production-distribution	Manager	1	1		ļ	I					ļ		1.		ļ	<u> </u>	<u> </u>	4-
10	Technical Preparation	Manager		i						L		L					1	1	1
10	Technical Preparation	Engineer of distribution	3	<u>با</u> لا		1				ł						1	3	4	4
	Technical Preparation	Supervisor of distribution	-		1								1			1	1	1	1
	Dispatcher's Center	Engineer of distribution	1	1				[·					1	1	1	1	1	1
			·	f		2		İ						1	1	+	2		2
1	Dispatcher's Center	Chief	+	-				ł	5	<u> </u>			<u> </u>	·		<u>+</u>	5	·	3
	Dispatcher's Center	Co-ordination		+		 	ł	 	·		 	 		·	1-				5
	Dispatcher's Center	Backroom dealer I		·		 	I	1	5						+				-
1	Dispatcher's Center	Backroom dealer II					L		14				ļ	 		·	14		
11	Dispatcher's Center	Technician				L	1	1		1	1		L	1	1	 	1	·	0
~~~~	Dispatcher's Center	Backroom d. driver			1		1	1					15	5		<u> </u>	15	5 1	5
	W.Production follow up	Tehnicar	1-	T	<u> </u>	T	1	<u> </u>		1	4		1	1		<b>[</b>	1	1	1
21	Subcenter Bacevo	Chief		1	1-	1		<b>†</b> ~~~		1		[		1		<u> </u>	1	1	1
<u> </u>				+		<u> </u>	<u> </u>	1	<u>†</u> -		<u> </u>	I—	†—·	1	1	1		1—	1
121	Subcenter Bacevo	Deputy Chief			<b>!</b>	┣─	$+ \cdot \cdot \cdot$	<u> </u>	<u> </u>			<u> </u>		+					1
1211	Subcenter Bacevo	Machine Operatoril						·						+	╂──	•		8	6
1211	Subcenter Bacevo	Machine Operatorill	.	<u> </u>		<b> </b>	<b> </b>	1	8	<u>'</u>	<u> </u>	<u>-</u>					<u>+</u>	4_	븱-
211	Subcenter Bacevo	Supervisor of well	<u> </u>		<u> </u>	<u> </u>	ļ		<b>_</b>		ļ	2	! 	<b>_</b>	- <u> </u>	<u> </u>	1	<u>'</u>  '	4
212	Subcenter Stup	Main machine operator					<u> </u>		1			L.				<b>_</b>		1	1
212	Subcenter Stup	Machine operator			1				3	1 ÷								3	3
1213	Subcenter Vlakovo	Supervisor	-	1		1.						1		1			1	1	1
1214		Machine operator		1	1	1		1				1	1	1	-	T	1	1	0
122	Subcenter Sokolovici Chief	Chief		+	·	+			1 -	1	1			1	+	1		1	1
		·····	+	+	+—	┨───		<u>+</u>	1				1-		+	+	-1	i 📃	1
1221		Main machine operator	+	<u>+</u>		·	+				1			·· <del>  · - · · ·</del>	+	+		3	1
1221		Machine operator I	_	-	<u> </u>				<u> </u>						- <u> </u>			4	÷
1221	Sokolovici welts	Main machine operator 1/2		<u> </u>		<b> </b>	- <b> </b>						<u> </u> '			<u>+</u>		-	÷ŀ
1222	Subcenter Hrasnica	Main machine operator	1		<u> </u>	1			1_1	<u> </u>	ļ		ļ	1		- <b> </b>	-	1	4
1222	Subcenter Hrasnica	Machine operator	1			·				1				<u> </u>	_			1	4
1222	Subcenter Hrasnica	Machine operator			1						!	ł		2				2	1
	Subcenter Igman	Main machine operator		-	1		1		1	1					T	T		1	1
1223		Machine operator	1		1	-		-	1	3	1	1	1		1		1	3	1
E+05		Main machine operator			+	·{-···	1			1	1 -	~~~	1		-	1	1-	1	0
	· · · · · · · · · · · · · · · · · · ·					+		1	1	1			-	+	+	-	+	1	1
123	Subcenter Alipasin Most	Machine operator					·		<u>' </u>	<del>. </del>	+					+			÷
	Subcenter Alipasin Most	Main machine operator	_	+	-		·							+					井
1231	Subcenter Alipasin Most	Machine operator I	<u> </u>	4	<u> </u>			·	1	9	┫	1		_					-1
1231	Subcenter Alipasin Most	Machine operator II		_	_ <b>_</b>					1		1		3			4_	3	3
1232	Kobilja Glava	Main machine operator							·	1		1	<u> </u>					1	1
	Kobilja Glava	Machine operator	1							1							<b>_</b>	1	1
	Kobije Glava	Fitter	1	1		1		1	T		-			2	1	1		2	2
	Subcenter Buca Potoki+II	Main machine operator	1		~1	1	1	1	1	1	1	1	1	1.		1	1	1	1
	Subcenter Buca Poloki+il	Fitter						+	-		-[	-	1	3	1	-1	-1	3	2
			-	+	+			+	+	1			-		-+	+		1	1
	l Moimilo	Main machine operator			+-	+	+					+		3				3	+
~~	i Mojmito	Fitter		+	+	+		-	-	-1		+		<u> </u>	+	<u> </u>			-1
	Vogosca I+II	Main machine operator				1	-  ····			1	+		-				4-	1	4
1235	Vogosca I+II	Fisher				1			1				1	3	_		-	3	2
_	Subcenter Brijesce	Main machine operator	T							1		L					1	1	1
	5 Subcenter Brijesce	Fitter	1		1	1	T	T	· [ ·	1	1	1		1	1	Ţ		1	1
	7 Subcenter Polalici	Main machine operator	-+	+	-	1	1	1-	-1	1	-1	1	T	1	1	1	T	1	1
				-1-	+-	+	-		-t	1	1	-1	+	3 .	-	1	1-	3	0
	7 Subcenter Polalici	Fitter		+			-+			1								1-	
	8 Subcenter Novi Potalici	Main machine operator	_	+			+			-4			+		-+-			3	3
1238	8 Subcenter Novi Pofalici	Fitter	_		4_		-				+			3		+-	+-	4	
11239	9 Filter Vogosca	Main machine operator			_	_	1			1					_			4	1
	9 Filter Vogosca	Machine operator								4		1				1		4	4
	9 Filler Vogosca	Fitter		1	-1	-1	1-		1		1	1	7-	3	T	T	-	3	1
· · · · ·		Chief	-+-	-†	-+	1	-1		1			1			-1	-1-	-1	1	1
124	and the second se	/ /	-1-	- -	+	+	-+	-+	- <del>  -</del> -	1						-		1	1
	1 Subcenter Hrasno	Main machine operator					-	-1-	- <u> </u>		+	+	-		-+	-+-	-+	-1	3
11241	1 Subcenter Hrasno	Machine operator	+-	_ <b> </b>				1-		3	+		+	÷.		—	<u> </u>	-1-	3
11241	1 Subcenter Hrasno	Filter	_L.		1				-	<u>.</u>	4_	_		4	_ļ_			4	4
104	2 Subcenter Skenderija	Main machine operator		1				1	1	1					_			1	1
1124							-T	-	1	1	-T				-1				1

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1126       Annual and SixL Lawes       Machine operator											• • • • • •		1		γ				-		
Intel         Notation (Same)         Pair Amount (Same)	1242 S	ubcenler Skenderija	Fitter											2	_	-			<u>-</u>	_  -	']
Intel       Normal Processing       Normal Process			Main machine operator							1							-				
Number         Numer         Numer         Numer <td></td> <td></td> <td>Finer</td> <td></td> <td></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3</td> <td></td> <td>_ </td> <td></td> <td>_ </td> <td>3</td> <td></td> <td></td>			Finer					<u> </u>						3		_		_	3		
Data       Autor			Main machine operator	1		1.				1							_ _		븨_	1	
Nome         Adde:						-								3	1_			_	3	1	2
Intel       Antonin openant       Antonin op								1		1		· !				_			1	1	0
1010       System       Parte       Image: System       Image: Sy						-1-								3	i				3	3	0
International product       Image of the second secon				-[				-1			1								1	1	0
Diam       Main Transform       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I						-		-						1		-			1	Ð	1
Inter       Plant       Plant <th< th=""><th></th><th></th><th></th><th>1</th><th></th><th>- </th><th></th><th></th><th>- </th><th></th><th>1</th><th></th><th></th><th></th><th></th><th></th><th>1</th><th></th><th>1</th><th>1</th><th>0</th></th<>				1		-			-		1						1		1	1	0
Diese Aussender Carlais       Cheff       1       1       1       1         Die Aussender Carlais       Machine operate       1       1       1       1       1         Diese Aussender       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <td< th=""><th>i1247 H</th><th>lid</th><th></th><th>-{</th><th></th><th></th><th></th><th></th><th>- </th><th></th><th></th><th></th><th></th><th></th><th>3</th><th></th><th>-1-</th><th></th><th>3</th><th>3</th><th>0</th></td<>	i1247 H	lid		-{					-						3		-1-		3	3	0
1110:       Main captor graphin       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <td>1247  </td> <td>lrid</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td><b> </b></td> <td></td> <td> <u> </u></td> <td></td> <td> '</td> <td>1-</td> <td></td> <td></td> <td></td> <td>1</td> <td>1</td> <td>0</td>	1247	lrid								<b> </b>		<u> </u>		'	1-				1	1	0
No.1106       Median Separatic       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D       D <thd< th=""> <thd< th=""> <thd< th=""> <thd< th=""></thd<></thd<></thd<></thd<>	125 8	jubcenter Centar				-			-	<u> </u>					-				1		
Intel       Intel Repetitor       Intel Reptitor       Intel Repetitor       Intel Repet	1251 \$	Subcenter Centar	Main machine operator			-				<b> </b>	<u>.</u>				-			~		- 1	
Eless Files       Mara medine operator       Image: Second	11251 \$	subcenter Centar	Machine operator		<b>_</b>				-	1-	1					- -	-	·[			
Intel 5         Print         Advance	1E+05 F	Ther Moscanica	Main machine operator				_	_			<u> </u>				-						- <u>`</u>
Hirds         Find         Sector         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         <	1E+05 F	iter Moscanica	Machine operator		_						3	<b> </b>			<u>.</u>				귀-	_ <u>-</u>  -	<u> </u>
Herol Subors       Manueline gestar			Fitter	Τ.										<u> </u>	4	-+		_ _	<u>-</u>		
Eds. 5. Marcine       Marchen ogender       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <th1< th=""> <th< th=""><td></td><td></td><td>Main machine operator</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td> </td><td></td><td></td><td>_ </td><td></td><td></td><td></td><td>4-</td><td></td><td></td></th<></th1<>			Main machine operator								1				_				4-		
Biologi       For       1       2       2       1         Biologie Probleshol       Main machine operator       1       3       -       3       -       3       3         Biologie Probleshol       Main machine operator       1       3       -       3       -       3       3       3         Biologie Probleshol       Main machine operator       1       -       -       3       -       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3			Machine operator	-		Τ.					1								1-		
1133       11       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <td></td> <td>2</td> <td>_ _</td> <td></td> <td></td> <td>2</td> <td>_1</td> <td>-1</td>															2	_ _			2	_1	-1
1012       Discont problemated       4       3       4       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3 <td></td> <td></td> <td>······</td> <td></td> <td>Γ</td> <td>1-</td> <td>1</td> <td>7</td> <td>1</td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td>0</td>			······		Γ	1-	1	7	1		1								1		0
1033       Books       Naturation operator       1       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       1       -       1       -       1       -       1       -       1       -       1       -       1       -       1       -       1       -       1       1       1       1       0       1       1       1       0       1       1       1       0       1       1       1       0       1       1       1       0       1       1       1       1       0       1       1       1       0       1       1       1       1       1       1				-	1	7	[	·	1		3								3	3	0
111103       Determ       Prior       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3					1			-	-		1								1	1	0
10124       Normo       Fer       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <td< th=""><td></td><td></td><td></td><td>1</td><td>-</td><td>-1-</td><td></td><td>- </td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td>3</td><td></td><td></td><td></td><td>3</td><td>3</td><td>0</td></td<>				1	-	-1-		-	1	1					3				3	3	0
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11212     Subscript / Beföl     Spenhor     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1					+	-1-				1	~ 🕇 –	1	<b> </b>	1	1				1	0	i
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1229         Debetige         Sperior         11         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1					┢				-				1	1.	4				4	- 3	1
1126         Annual and Six Lawes         Machine operator         15         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         35         36         36         36         36         36         36         36         36         36         36         36         36         36         36         36         36         36         36         36					+		-ŀ-				-	1.		1.	1	-			1	0	1
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1126       Annual and Sek Leaves       Interfine operation       Interfine operation       Interfine operation         1131       Water Network Control       Manager       1       1       1       1         1131       Water Network Control       Controler 1.2.3       3       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6 <t< th=""><td></td><td></td><td></td><td></td><td>┿</td><td></td><td>-+-</td><td></td><td></td><td>-1-</td><td><u>-</u> </td><td></td><td></td><td></td><td>35</td><td>-1-</td><td>-</td><td></td><td>35</td><td>32</td><td>3</td></t<>					┿		-+-			-1-	<u>-</u>				35	-1-	-		35	32	3
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131       Water Network Control       Plumber       29       29       29       29       29       29       29       29       29       29       29       29       29       29       29       29       29       1       1         133       Water Network Control       Minager       1       1       2       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1<					+									-		<u> </u>				0	
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1132       Messurement       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	1131	Water Network Control					-+-						┼╌	+			-+			2	0
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1132       Measurement       Controller       -       -       -       -       -       -       -       -       1         1133       Measurement       Technical       -       -       -       1       -       -       1         1134       Measurement       Orner       1       -       -       1       -       -       1         120       Technical Preparation       Manager       1       1       -       -       1       1         120       Technical Preparation       Enclosed Preparation       Technical Preparation       1       1       1       -       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <td>1132</td> <td>Measurement</td> <td></td> <td></td> <td>- </td> <td></td> <td><u> </u></td> <td></td> <td>+</td> <td>╧╢╾╍</td> <td></td> <td></td> <td>+-</td> <td></td> <td>-ŀ</td> <td></td> <td>. <b>†</b></td> <td></td> <td></td> <td>5</td> <td>0</td>	1132	Measurement			-		<u> </u>		+	╧╢╾╍			+-		-ŀ		. <b>†</b>			5	0
113     Medicurrenetic     Driver     1       12     Pipe line and Facily Maintanance     Ina     1       12     Tephe line and Facily Maintanance     Ina     1       120     Technical Preparation     Manager     1       120     Technical Preparation     Engineer for preparation 1     1       120     Technical Preparation     Technical for preparation 1     1       120     Technical Preparation     Technical for preparation 2     1       121     Technical Preparation     Technical for preparation 2     1       121     Technical Preparation     Administrative clerk     1       121     Repaining damages on Water Network     Main Manager for repearation     2       121     Repaining damages on Water Network     Manager 1     4       121     Repaining damages on Water Network     Manager 2       121     Repaining damages on Water Network     Monager 1.2       121	1132	Measurement											-1-	+	<u> </u>						0
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120       Technical Preparation       Manager       1         120       Technical Preparation       Engineer for preparation 1       1       1         120       Technical Preparation       Technical Preparation       Technical Preparation       1         120       Technical Preparation       Technical for preparation 1       3       1       1         120       Technical Preparation       Technical for preparation 2       1       1       1         121       Repaining damages on Water Network       Main Manager for excervation       2       2       2         121       Repaining damages on Water Network       Main Manager for excervation       2       2       2         121       Repaining damages on Water Network       Manager 1       3       3       3         121       Repaining damages on Water Network       Manager 2       2       2       2         121       Repaining damages on Water Network       Monager 1,2       3       4       6       1         121       Repaining damages on Water Network       Monager 1,2       3       3       3       3         121       Repaining damages on Water Network       Monager 1,2       2       2       2       1       1					_ _								+		-		— ·				0
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120       Technical Preparation       Engineer for preparation 1       3       1         120       Technical Preparation       Technical Preparation       1       1         120       Technical Preparation       Technical Preparation       1       1         120       Technical Preparation       Administrative definition for preparation 2       1       1         121       Reparing damages on Water Network       Main Manager for reparation       2       2       2         121       Reparing damages on Water Network       Main Manager for excavation       2       2       2         121       Reparing damages on Water Network       Main Manager for excavation       2       2       2         121       Reparing damages on Water Network       Manager 1       3       3       3         121       Reparing damages on Water Network       Montager 1.2       2       2       2       2         121       Reparing damages on Water Network       Montager 1.2       3       3       3       3         121       Reparing damages on Water Network       Driver       3       3       3       3         121       Reparing damages on Water Network       Driver       1       1       1       1       <	120	Technical Preparation							_ -							-+			- 1	! 0	+
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121       Repairing damages on Water Network       Assistant of montager       15       15         121       Repairing damages on Water Network       Assistant worker       2       2         121       Repairing damages on Water Network       Storage worker       2       2         121       Repairing damages on Water Network       Worker       2       2         121       Repairing damages on Water Network       Storage worker       2       2         121       Repairing damages on Water Network       Assistant of storage worker       2       2         121       Repairing damages on Water Network       Assistant of storage worker       2       2         121       Repairing damages on Water Network       Montager 3       2       2         122       Facility maintenance and protect area       Manager for facility       1       1         122       Facility maintenance and protect area       Bricklayer       1       1       1         122       Facility maintenance and protect area       Gardener       1       1       1         122       Facility maintenance and protect area       Gardener       1       1       1         122       Facility maintenance and protect area       Gardener       2		Repairing damages on Water Network	Driver										-	+							:]
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121       Repairing damages on Water Network       Storage worker       2       2       2         121       Repairing damages on Water Network       Assistant of storage worker       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2			Worker							$\perp$		_	-		_2		لي ا				<u></u>
121       Repairing damages on Water Network       Assistant of storage worker       45       45         121       Repairing damages on Water Network       Montager 3       1       1       1         122       Facility maintenance and protect area       Manager for facility       1       1       1         122       Facility maintenance and protect area       Bricklayer       1       1       1         122       Facility maintenance and protect area       Bricklayer       1       1       1         122       Facility maintenance and protect area       Bricklayer       1       1       1         122       Facility maintenance and protect area       Gardener       1       1       1         122       Facility maintenance and protect area       Gardener       1       1       1         122       Facility maintenance and protect area       Gardener       1       1       1         122       Facility maintenance and protect area       Driver       2       2       2       2         13       Electric and Mechanical Services       Manager       1       1       1       1         13       Electric and Mechanical Services       Coordinator for mechanician works       1       1       <	1		Storage worker				<b></b> .										L				8
121       Repailing damages on Water Network       Montager 3       45       45       45         122       Facility maintenance and protect area       Manager for facility       1       1       1         122       Facility maintenance and protect area       Bricklayer       1       1       1         122       Facility maintenance and protect area       Bricklayer       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       1       1       1       1       1         122       Facility maintenance and protect area       Worker       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2<																	<u> </u>				4—
122       Facility maintenance and protect area       Manager for facility       1       1       1         122       Facility maintenance and protect area       Bricklayer       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       1       1       1       1         122       Facility maintenance and protect area       0       1       1       1         122       Facility maintenance and protect area       0       1       1       1         122       Facility maintenance and protect area       0       1       1       1         122       Facility maintenance and protect area       0       1       1       1         13       Electric and Mechanical Services       Coordinator f	· · · · · ·		Montager 3										_		· .			45	45	4	4
122       Facility maintenance and protect area       Bricklayer       1       1         122       Facility maintenance and protect area       Gardenet       1       1         122       Facility maintenance and protect area       Worker       1       1         122       Facility maintenance and protect area       Worker       2       2         122       Facility maintenance and protect area       Driver       2       2         122       Facility maintenance and protect area       Driver       2       2         13       Electric and Mechanical Services       Coordinator for mechanician works       1       1         13       Electric and Mechanical Services       Coordinator for mechanician works       1       1         13       Electric and Mechanical Services       Coordinator for mechanician works       1       1       1	1								· [		1						<u> </u>		$\vdash^1$	<u> </u>	뷔
122       Facility maintenance and protect area       1       1         122       Facility maintenance and protect area       Gardenet       1       1         122       Facility maintenance and protect area       Worker       1       1         122       Facility maintenance and protect area       Worker       2       2         13       Electric and Mechanical Services       Manager       1       1         13       Electric and Mechanical Services       Coordinator for mechanician works       1       1         13       Electric and Mechanical Services       Coordinator for mechanician works       1       1       1         13       Electric and Mechanical Services       Coordinator for mechanician works       1       1       1				-	T						1						<u> </u>		<u>[ 1</u>	·	1
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13     Electric and Mechanical Services     Manager     1       13     Electric and Mechanical Services     Coordinator for mechanician works     1       13     Electric and Mechanical Services     Coordinator for electro-works     1       13     Electric and Mechanical Services     Coordinator for electro-works     1		TEATHING INSUMERANCE AND INDECLATED												-†	2			1	1.7	2	2
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10       Object       Description       Desc																				
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313         Action methods         Action methods         Action methods         Columb         Columb <thcolumb< th="">         Columb<th></th><th></th><th></th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>5</td><td></td><td></td><td></td><td>5</td><td>4</td><td>1</td></thcolumb<>														5				5	4	1
131       Boland worklog       Columb worklog </td <th></th> <th></th> <th></th> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2</td> <td></td> <td></td> <td></td> <td>2</td> <td>2</td> <td>0</td>								-						2				2	2	0
131       exclam webshop       Accha bestorin 2       Image: Constraint of the second accha bestorin 2       Image: Constraint occha bestorin 2			Locksmith -welder 2							<b> </b>				1				1	1	
131       dotypin worksop       Monitor Multiple       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1														1				1	1	<u> </u>
101       column 1			Machin-locksmith 2			•		_						1				1	1	<u> </u>
191         Website Service pages and othere method backwirds for ulter methods. 32.         1         1         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2			Locksmith 1						1					1				1	1	(
100         Verticity of water pages and choice method backwater for allot         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2 </td <th></th> <th></th> <th>Blacksmith 2</th> <td></td> <td>1</td> <td></td> <td>1</td> <td>1</td> <td></td>			Blacksmith 2													1		1	1	
192         Wickstop for ware project of closine matche locationian for closin					<u> </u>				1					L				· · ·	1	
200         Morkhop for using ranges and obtain matching for using methods.         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2<	32	Workshop for water gauges and chlorine machin	Mechanician for chlor									2		ļ	<b> _</b>	;			1	ļ'
132         Michaely or wate pages and obtain matchel Canadian	32	Workshop for water gauges and chlorine machin	Mechanician for water meters 1,2,3						<u> </u>										1	<u> </u>
122       Workshop is water spaces and cluster march [Christian march and the spaces and cluster march [Christian Laboration 1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1						ļ		ļ	<b></b>	<u> </u>		L		8	<b> </b>			8	6	<u> '</u>
124         Protecting to water pages and obtained multi-interpreter and obtained and obta	32	Workshop for water gauges and chlorine machin	Technician	ļ			<u> </u>	ļ	<u> </u>		L		ļ	11	1	l		1	0	1-
124         Production of weak page and encommentation preclamation at a set of the set o				<u> </u>	L			<u> </u>	<b> </b>	ļ			ļ		+	· · ·		_		
33       With Herr Vorking       Changing of water meteres 1       -       -       1       -       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1			Demontage mechanician 2			<b> </b>	ļ	<b> </b>	<u> </u>	<b> </b>	<b> </b>				2				0	ł
133       Wite Neer Vorking       Administrative definition       Image: Second Seco					ļ	<u> </u>				<u>  1</u>	<u>-</u>		<u> </u>		<b> </b>			· ·	1	
33         Wate Media         Amenda and Oets         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1 <th></th> <th></th> <th></th> <td>1</td> <td> </td> <td> </td> <td><b> </b></td> <td><b> </b></td> <td></td> <td><b> </b></td> <td>⊢!</td> <td></td> <td></td> <td><u> </u></td> <td> </td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td>				1			<b> </b>	<b> </b>		<b> </b>	⊢!			<u> </u>		<u> </u>				
133         Wite Neuron         Neuron         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2 <th2< th=""> <th2< th="">         2</th2<></th2<>			· · · · · · · · · · · · · · · · · · ·					ļ	<b> </b>						<u> </u>			<u> </u>	11	<u> </u>
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134         Electro Workshop         Madage         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 <th0< th="">         0         0         0&lt;</th0<>					<b>i</b>	ļ		┨		+		<u> </u>		<b> </b>						<u>.</u>
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134         Electric Workshop         Risko-mechanickal espenser II         3         3         4           134         Electric Workshop         Radio-mechanickal espenser II         1         1         1           135         Verkie Maintenauer Workshop         Maan manager         1         1         1         1           135         Verkie Maintenauer Workshop         Maan manager         1         2         2         2           136         Verkie Maintenauer Workshop         Car mechanickan 1,2         2         2         2         2           136         Verkie Maintenauer Workshop         Car mechanickan 1,2         2         1         1         1           137         Verkie Maintenauer Workshop         Car werkher         1         1         1         1         1           138         Verkie Maintenauer Workshop         Cagather         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         <						<u> </u>		+	· · · ·	<u>'</u>									0	1
Jack         Control Receive Monstrage         A         A         A           13         Electric Monstrage         Receive Monstrage         1         1         1           13         Electric Monstrage         Names All manage         1         1         1           13         Venice Mainenace Workshop         Mainenace Workshop         All manage         1         1         1           13         Venice Mainenace Workshop         Car mechanizan 1.2,         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2							·		+	<u>'</u>	+				- 1	<u>├</u>	-	3	1	1-
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136         Vehicle Maintenance Workshop         Car mechanizan 1,2,         2         1         2           138         Vehicle Maintenance Workshop         Car electronic         1         1         1         2           139         Vehicle Maintenance Workshop         Car venisher         1         1         2         2           139         Vehicle Maintenance Workshop         Car vanisher         1         1         1         1           130         Vehicle Maintenance Workshop         Car vanisher         1         1         1         1           131         Vehicle Maintenance Workshop         Car planther         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1				<u> `</u>					1		2	ļ			1	1		2	1	2
135       Vehide Maintenance Workshop       Car electronic       1       1         135       Vehide Maintenance Workshop       Controller of lectricia right       2       1       1         135       Vehide Maintenance Workshop       Car yumikher       1       1       1         136       Vehide Maintenance Workshop       Car yumikher       1       1       1         136       Vehide Maintenance Workshop       Car yumikher       1       1       1         137       Vehide Maintenance Workshop       Driver       2       2       2         135       Vehide Maintenance Workshop       Driver       2       2       2         135       Vehide Maintenance Workshop       Trafic mechanician       4       4       4         135       Vehide Maintenance Workshop       Trafic mechanician       1       1       1         135       Vehide Maintenance Workshop       Trafic mechanician       1       1       1       1         135       Vehide Maintenance Workshop       Trafic mechanician       1       1       1       1         141       Technogy and Sanitary protection       Manager       1       1       1       1         141       Technogy an				+				1-		2				1	1	1	1	2	:	2
135       Vehide Maintenance Workshop       Controller of technical right       2       1       2       1         135       Vehide Maintenance Workshop       Degather       1       1       1         136       Vehide Maintenance Workshop       Degather       1       1       1         136       Vehide Maintenance Workshop       Degather       2       2       2         137       Vehide Maintenance Workshop       Electro-mechanic       2       2       2         136       Vehide Maintenance Workshop       Priver       2       2       2         135       Vehide Maintenance Workshop       Fried mechanic       2       4       4         137       Vehide Maintenance Workshop       Traffe mechanican       2       1       1         138       Vehide Maintenance Workshop       Traffe mechanican       1       1       1         14       Senice for samilary protection       Marager       1       1       1       1         14       Technoograf & Saniary protection       Marager       1       1       1       1         141       Technoograf & Saniary protection       Clerk for saniary supervision 1       2       2       2       2       2	_			1	1		1	-	-	1	1	1	1	-				1	. (	2
135       Vehicle Maintenance Workshop       Car vanisher       1       1       1         135       Vehicle Maintenance Workshop       Disputcher       1       1       1         135       Vehicle Maintenance Workshop       Early onechnic       2       2       2         135       Vehicle Maintenance Workshop       Early onechnic       1       1       1         135       Vehicle Maintenance Workshop       Tell mechanician       2       2       2         135       Vehicle Maintenance Workshop       Trell mechanician       4       4       4         135       Vehicle Maintenance Workshop       Trell mechanician       5       5       5         135       Vehicle Maintenance Workshop       Trell mechanician       1       1       1       1         141       Service Resultary protection       Manager       1       1       1       1         141       Technopy and Saritary protection       Clerk for saritary supervision 1       2       2       2       2         141       Technopy and Saritary protection       Clerk for saritary supervision 1       2       2       2       2       2       2       2       2       2       2       2       2				1		1		1		2								2		1
135       Vehick Maintenance Workshop       Departure       1       1         135       Vehick Maintenance Workshop       Car jumber       1       1         135       Vehick Maintenance Workshop       Driver       2       2         135       Vehick Maintenance Workshop       Acatati worker       1       1         135       Vekick Maintenance Workshop       Acatati worker       2       4         135       Vekick Maintenance Workshop       Tatel mechanician       5       5         135       Vekick Maintenance Workshop       Tatel mechanician       5       5         135       Vekick Maintenance Workshop       Tatel mechanician       5       5         135       Vekick Maintenance Workshop       Tatel mechanician       1       1         14       Technogy and Sarity protection       Manager       1       1       1         141       Technogy and Sarity protection       Main Technologyst       1       1       1         141       Technogy and Sarity protection       Technologyst       1       1       1         141       Technology and Sarity protection       Technologyst       2       2       2       2         141       Technologyst <t< td=""><th></th><th></th><th></th><td></td><td></td><td></td><td>1</td><td></td><td></td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td>1</td></t<>							1			1	1							1		1
135         Vehice Maintenance Workshop         Cal printer         1         1         1           135         Vehice Maintenance Workshop         Driver         1         1         1         1           135         Vehice Maintenance Workshop         Assistant worker         1         1         1         1           135         Vehice Maintenance Workshop         Assistant worker         1         4         4           135         Vehice Maintenance Workshop         Trafic mechanician         1         1         1           135         Vehice Maintenance Workshop         Trafic mechanician         1         1         1           141         Technoogy and Sanity protection         Manager         1         1         1           141         Technoogy and Sanity protection         Main Technoogyst         2         1         2         2           141         Technoogy and Sanity protection         Clerk for sanitary supervision 1         2         2         2         2           141         Technoogy and Sanity protection         Clerk for sanitary supervision 2         8         8         8           141         Technoogy and Sanity protection         Clerk for sanitary supervision 2         2         2         2		Vehicle Maintenance Workshop	Dispatcher		1	1		1				1		1		1				1
135       Velicle Maintenance Workshop       Driver       2       2         135       Velicle Maintenance Workshop       Assistant worker       4       4         135       Velicle Maintenance Workshop       Traffic mechanician       5       5         135       Velicle Maintenance Workshop       Traffic mechanician       1       1         135       Velicle Maintenance Workshop       Tre man       1       1         14       Service for sanitary protection of Manager       1       1       1         141       Technogy and Sanitary protection       Chief       2       2       2         141       Technogy and Sanitary protection       Chief for sanitary supervision 1       2       2       2         141       Technogy and Sanitary protection       Clerk for sanitary supervision 1       2       2       2         141       Technogy and Sanitary protection       Clerk for sanitary supervision 2       8       8       8         141       Technogy and Sanitary protection       Clerk for sanitary supervision 2       8       2       2       2         141       Technogy and Sanitary protection       Driver for taking patterns       1       1       1         142       Chemistry and Microbiology <th></th> <th>Vehicle Maintenance Workshop</th> <th>Carplumber</th> <td></td> <td>1</td> <td>ł</td> <td></td> <td>Π.</td> <td></td> <td></td> <td></td> <td></td> <td>:</td> <td>2</td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td>2</td>		Vehicle Maintenance Workshop	Carplumber		1	ł		Π.					:	2				1		2
135       Velicle Maintenare Workshop       Assistant worker       4       4         135       Velicle Maintenare Workshop       Traffic mechaniclan       1       1         135       Velicle Maintenare Workshop       Traffic mechaniclan       1       1         135       Velicle Maintenarce Workshop       Traffic mechaniclan       1       1         141       Senice for sanitary protection       Manager       1       1         141       Technoogy and Sanitary protection       Manager       1       1         141       Technoogy and Sanitary protection       Main Technologyst       1       1         141       Technoogy and Sanitary protection       Main Technologyst       1       1         141       Technoogy and Sanitary protection       Technicia -	135	Vehicle Maintenance Workshop	Electro-mechanic		1		<u> </u>								1				· · · · ·	<u> </u>
135       Vertice Mamintation Voltation       Postability and Markananaes Workshop       Traffic mechanician       5       5         135       Vehicle Maintenance Workshop       The man       1       1       1         14       Service for sunitary protection and water control Manager       1       1       1         141       Techonogy and Sanitary protection       Chief       2       2       2         141       Techonogy and Sanitary protection       Chief       2       2       2         141       Techonogy and Sanitary protection       Clief for sanitary supervision 1       2       2       2         141       Techonogy and Sanitary protection       Clief for sanitary supervision 1       2       2       2         141       Techonogy and Sanitary protection       Clief for sanitary supervision 1       2       2       2         141       Techonogy and Sanitary protection       Clief for sanitary supervision 2       8       8       8         141       Techonogy and Sanitary protection       Diver for taking patems       1       1       1         142       Chemistry and Microbiology       Chief for sanitary supervision 2       2       2       2       2         142       Chemistry and Microbiology <t< td=""><th>135</th><th>Vehicle Maintenance Workshop</th><th>Driver</th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>ļ</td><td></td><td></td><td>-</td><td><u> </u></td><td></td><td></td><td></td><td>2</td></t<>	135	Vehicle Maintenance Workshop	Driver									ļ			-	<u> </u>				2
135       Vertice Administrative Version       1       1         135       Vertice Maintenace Workshop       Tire man       1       1         141       Service for sanitary protection       Manager       1       1         141       Techonogy and Sanitary protection       Manager       1       1         141       Techonogy and Sanitary protection       Manager       1       1         141       Techonogy and Sanitary protection       Cheif       2       2       2         141       Techonogy and Sanitary protection       Cheif       2       2       2       2         141       Techonogy and Sanitary protection       Clerk for sanitary supervision 1       2       2       2       2         141       Techonogy and Sanitary protection       Clerk for sanitary supervision 2       8       8       8         141       Techonogy and Sanitary protection       Clerk for sanitary supervision 2       9       9       9       9         141       Techonogy and Sanitary protection       Clerk for sanitary supervision 2       1       1       1         142       Chemistry and Microbiology       Cheif       1       1       1       1         142       Chemistry and Microbiology<	135	Vehicle Maintenance Workshop					-	1	1		-		1_		-		.		1	3
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213	Repairs and Reconstruction of Sewer Network	Chief I	1			4	-	2		I				ļ	1	·		$\vdash$	<u> </u>
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213	Repairs and Reconstruction of Sewer Network	Electrician							۱ <u>۱</u>			<u> </u>		┟┈┯	┝	<u> </u>			
213	Repairs and Reconstruction of Sewer Network	Bricklayer	Ŀ				_ `	_	1	<u> </u>	ļ			┣	I	<u> </u>		0	<u> '</u>
213	Repairs and Reconstruction of Sewer Network	Driver of excavator			_ <u>_</u>					1	ļ	· · · ·		<b>}</b>	<b> </b>	<u> </u>		<u> </u>	<u> </u>
213	Repairs and Reconstruction of Sewer Network	Technician for repearing							<b>_</b>	. 4	<u> </u>				<u> </u>	ļ			· · · · ·
213	Repairs and Reconstruction of Sewer Network							1		2		<b></b>	ļ	<u> </u>	<u> </u>	1.1		4	
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213	Repairs and Reconstruction of Sewer Network		1_	_		Ļ.				3	<u> </u>	I	L	<u> </u>	ļ	Į		-	
213	Repairs and Reconstruction of Sewer Network			1		_	·	_	<u>  · ·</u>		<b> </b>		1	· · · ·	<u> </u>			· · · · ·	<u>+-</u>
213	Repairs and Reconstruction of Sewer Network				<u> </u>				4		<b> </b>		1	<u> </u>		<u> </u>		1	1 0
213	Repairs and Reconstruction of Sewer Network	Electro-mechanic	_						<u>  </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u>                                     </u>		<u> </u>
213	Repairs and Reconstruction of Sewer Network	House Painter		_				_	<u> </u>				ļ		<u> </u>		-	<u> </u>	
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213	Repairs and Reconstruction of Sewer Network	Installer		_						i		<u> </u>	<u> </u>	<u>ا ا</u>	<u> </u>	·		<u>}</u>	
213	Repairs and Reconstruction of Sewer Network	Operator for generators with pumps	_							-			₋	1	-		┢╌┥	<u> </u>	" <u> </u>
213	Repairs and Reconstruction of Sewer Network				-			_			<u> </u>			- <u> </u>		┢		<u> </u>	'
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213	Repairs and Reconstruction of Sewer Network	Carpenter			_ -			-   ·					+	1	- <b>-</b>	+		<u> </u>	e
213	Repairs and Reconstruction of Sewer Network	Bricklayer		<u> </u>							·		<u>+</u>	1	-		┼┶		
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213	Repairs and Reconstruction of Sewer Network	Cleaner for chanel						_		+-	4—	+	-		1-1	<u> </u>	╌┤╌╵	<u>'</u>	1 0
22	Mechanical and Vehicle Maintenance	High Official	-+-	1					-			+					<u> </u>	;├	<del>;  ;</del>
220	Technical Preparation	High Official		1-				_			- <b>-</b> -								<u>i</u> - c
220	Technical Preparation	Referent Leader				-4					-1		<u> </u>	+			+		1-7
220	Technical Preparation	Clerk for technical right								1	+		-		+		+	1	1-
220	Technical Preparation	Traffic clerk (safety)	-+-		-	+				<u>'</u>			-{ <del>~</del>	-	┵┠┿━━	+	-	2	1
220	Technical Preparation	Administrativ clerk			- -		·				┼─	 1				+-	+	1	1
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220	Technical Preparation	Referent	•				_ _			- <b> </b>			-{	+-	-	+-		1	1
221	Special Vehicle Repair Workshop	Main worker								1				-	+-		+	<u>.</u>	1
221	Special Vehicle Repair Workshop	Auto mechanician					_ -	+		4-		+	+	+		-+-	-i	1	1
221	Special Vehicle Repair Workshop	Managèr	<u> </u>					_	-				+					1	0
221	Special Vehicle Repair Workshop	Car Mechanician	_ <b> </b> -		+				- -		+			-+-	- <u> </u> -	-	+		1 -
221	Special Vehicle Repair Workshop	Car Electrician											-+	-+-	+-	- <del> </del> -		1	0
221	Special Vehicle Repair Workshop	Driver	<u> </u>							<u> </u>	1		╋						1
221	Special Vehicle Repair Workshop	Locksmith		-+-		-		-+-			1				- <u> ·</u>	- <u>+</u>	- -		
221	Special Vehicle Repair Workshop	Locksmith weld man		_		<u> </u>				+-	-			2	+		+-	2	1
221	Special Vehicle Repair Workshop	Туте плал	-+-			- -				+	-						+-	1	0
221	Special Vehicle Repair Workshop	Car plumber		_		+				-					-		-+-	+	1
222	Vehicle Maintenance Workshop	Main colordinator		-	_					·   ·		-			-				1
222	Vehicle Maintenance Workshop	Storage man	_								·			-+-				2	2
222	Vehicle Maintenance Workshop	Chief		_	_				2.	4-		<u> </u>	+					4-	
222	Vehicle Maintenance Workshop	Auto mechanician		_						4-						-			
222		Machin Locksmith								<u> </u>	4-	+-					÷	-1	1
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222		Worker Assistant				_							_ _	1				-뭐	-1
222		Cleaner Grease man								_ _				2	_			2	2
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-lî	/ehicle Maintenance Workshop	Car Etectrician											2				2	<u> </u>	
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	WWTP Restoration	Main Co-ordinator								—†							1	1	
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v	General Affairs	Secretary	-		+		<u> </u>						2				2	;	ŀ
_[0	General Affairs	Driver	·			<u> </u>		[			-				_				-
ł	Water Supply	Manager	<u>  1</u>			1	<u> </u>	<u> </u>											
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ic	Connection	Chief	1 1	1													1	0	L
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2 6	Plan and Land Office	Chief			1	·	1	<u> </u>						L			1	1	L
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3	Supervision	Chief			1	1		1		<u> </u>			L	ļ		l	1	1	1
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22	Plan and Land Office	Engineer for sewerage network and connection		4		_					ļ					· ······			╬
22	Plan and Land Office	Clark for sewerage network and agreement				2			4				ļ		ļ		2		4
22 -	Plan and Land Office	Clark for connection								[	3	L	1	L	ļ		3	1	1
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	Supervision	Chief		- <b> </b>					-	1	·	1			1	·	2		2
23 🦯	Supervision	Supervisor	1				-			2	╂	<b> </b>		+		–			
23	Supervision	Higher Technician	_			-		1	·	- <b> </b>	1_4			1-		+	4	· · · · · · · · · · · · · · · · · · ·	2
23	Supervision	Technician			_		1		1_	1	1	·	1				4	<u>ا</u> ۔۔۔۔	3
23	Supervision	Technic Draftsman				1						L		۱ <u> </u>			1	·	1
3	Development	Manager		1	-1	1	1	1	7	1		<b></b>	1	I		1	1	1	0
-		Higher skilled assistant for water supply system	-1-	<u>-</u>			-1	-	1	-	1	1	1	1		1	1		1
3	Development		-	:	-		-+		-	+	1-		1-	+	1	1	1	1	1
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3	Development	Supervisor		_i			-1					1	+			+	<u>+_'</u>	<u>:</u>	4
3	Development	Technician for supervisor									1	1	1_	1	1		1	Ч	Û
4	Construction Project	Manager	T	1						1	1	1				1	L	1	1
		Manager	-1-	1		-1-	1	-1		1	-	1	_		-			1	1
<u>H1 .</u>	Water Supply			-1-	+	-+-	-1-				+	-	-1	1	-	+	-	1	7
41	Water Supply	Leader Planner						-+		+				-+		+		3	-
41	Water Supply	Main Planner		3	_ _			_ <del> </del> _				-							<u> </u>
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41 W	Valer Supply	Planner II	T		2													2	0	
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41 W	Vater Supply	Second group		{				·			[·				<u>†</u>	-1-				- 1
42 S	sewer	Main Planner		I													[			
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	jewer	Independent planner of 1 group			1							1			i			2	1	
		Planner 1	-i		[									-	I.			1	0	
	iewer														-	-1-		1	0	
42 S	Sewer	Independent planner of it group														-1-	~		0	
42 S	Sewer	Planner II		.	<u></u>							}							<u>*</u>	
42 S	Sewer	Planner III		Ι.							2				<u> </u>	_			2	
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43 P	Project Supervision	Chief of Projecting																	0	
43 P	Project Supervision	Main Planner		<u> </u>		ļ												-1		
43 P	Project Supervision	Independent planner and gropus		1]		1		I							<b>_</b>					
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5 C	Disaster Prevention	Manager		<u>' </u>					·					–						
5 C	Disaster Prevention	Supervisor for mechanic works		1	-	ļ	<b>_</b>		<b> </b>					<b>∤</b>	+					
	Disaster Prevention	Clerk for electricity work protection				1		<u> </u>	ļ		<u> </u>			<b> </b>			_			Ļ
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	Disaster Prevention	Supervisor for construction works	-	1-	+	·	-	·[						1-	+	+			1	1
10 E	Economic and Legal Department	Director		1		+	<u>  </u>			<u> </u>	<b>⊢</b>			+						1
01 0	General Administration	Technical Secretary		_ <b>_</b>		-		⊢	<b> </b>	┣	<u>  1</u>							1	]	
	General Administration	Driver											1	<b></b>	+-			1	ļ1	1
	Accounting	Manager		1	1	1	T			1						1	. 1	1	1	L
		Main book-keeper		1		1		1			1			1			· .	1	1	i - I
	Main Bookkeeping			4		+		-			3			+	+	-†~		3	3	1
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11	Main Bookkeeping	Accountant				+		- <b> </b>	<u> </u>			ļ			╋	-+-				
11	Main Bookkeeping	Book-keeper for total books		_				ļ			1			<u> </u>						<u> </u>
11 1	Main Bookkeeping	Documentation keeper			1						1	Ŀ	L				<u> </u>	1	<u> </u>	<u>ч</u>
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12	Financial Bookkeeping	Accounter II			<u> </u>			- <b> </b>		1_		<u> </u>	ŀ			+	····			1-
112	Financial Bookkeeping	Total Accounter			<u> </u>			_	<u> </u>					+ -	حانه				<u> </u>	¥
112	Financial Bookkeeping	Finance book-keeper of the main book				•					1		· ·					1	<u>  • • • •</u>	<u>1</u>
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45	Legal Affairs	Higher expert for economic works	1	I	<b></b>							·					<u>1</u>	0	·
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	Legal Affairs	Administration clerk	Į	<b> </b>	<b> </b>		┝┦										<u>-</u> '	[•]	-1-
	General Alfairs and Welfare	Manager	1 1	<b></b>	I	ļ				.					ļ		<u>1</u>	¹	<u> </u>
461	General Alfairs	Leader worker of standard works	1														1	1	<u>! </u>
461	General Affairs	Journalist	1						1								1	1	1
461	General Aflairs	Doctor Specialist Consultant	1														1 1	(	5
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461	General Affairs	Archivist									1								9
461	General Affairs	Typist			L						1				L		1	1	1
461	General Alfairs	Clerk for protocol			1						1	]	-				1	1	1
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461	General Atlairs	Driver		I	1								5		ļ	L -	5		-
461	General Alfairs	Janitor of business offices											2				2		3
461	General Affairs	Janitor of buildings		1		<u> </u>							1				1	1	0Ì
461	General Affairs	Telephonist					1								3		3	j	2
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_	General Affairs	Worker for copying materials	+	+								_			3			í	-
461	General Affairs	Cleaning Lady	<u> </u>	<b>_</b>	ļ				· .						3	<b> </b>	1	<u>'</u>  '	J.
161	General Aflairs	Archivist													11	I	11		1
61	General Affairs	Caffe cooker Is		Ţ							1					:		1	3
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462	Welfare	Clerk for defence II	1									2			<u> </u>		:	-	1
462	Welfare	Security worker				1							57				5	7 5	3
47	Collection	Manager		1		1	1							[	1		1	1	1
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471	Charge Collection	Expert collaborator	1	2					I—						-		_	<u> </u>	-
471	Charge Collection	Operator for informatic center		1	1	<u> </u>			<b>_</b>									1	1
471	Charge Collection	Expert collaborator			1													1	1
471	Charge Collection	Clerk for payment	1					1					1					4	3
	Charge Collection	Clerk for payment		-					<b></b>		2					1		2	2
		Controller of account		-			1		-		3	<u> </u>						3	2
471	Charge Collection		-		· · · ·	+	-	_			2	[ <u> </u>	<u> </u>						2
471	Charge Collection	Clerk for account	_	4—				<u> </u>			· · · · ·					+ -	· · · · · · · · · · · · · · · · · · ·		2
471	Charge Collection	clerk of cash documents		- I				<u> </u>			2		L	<u> </u>		ļ	_	<u> </u>	-
471	Charge Collection	Inspector of profil-amount documents			_	1		$\square$			7	L	<u> </u> .	1				·	7
471	Charge Collection	Inspector for profit data's KDS-a	1	1					1	L	2	L						2	2
471	Charge Collection	Supply of bills	1	1	Ĩ.			1		1			7	1	T	<b>—</b>	1	7	8
472	Payment and Complaint	Expert collaborator	1	1	1	1		1	1	<u> </u>	1	1		1	1	1	-	1	1
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472	Payment and Complaint		+-	-		1		-	·	<b> -</b>	<u> </u>		· ·	1-				-	÷
472	Payment and Complaint	Main liquidator	_	-		1.	- (	·	<u>+</u>					+					⊹⊢
472	Payment and Complaint	Clerk for advertising and informations I			1		1	<b> </b>	·	<b> </b>	1	<u> </u>	<b> </b>	$\vdash$		+		1	井-
472	Payment and Complaint	Liquidator			<u> </u> .	1	J	1.	L -	1	7			L.		-			7
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472	Payment and Complaint	Clerk for advertising and informations II	1	1	T		1			<b>—</b>	2		<b></b>	-	1	1		2	2
472	Payment and Complaint	Clerk for calculate	+	1-	1-	1	1	1	1	1	1	1	1 ~			1	1	1	1
						+	+	+		+	<b>├</b> ──'	<b>†</b>	1		-+		-[	1-	0
473	Evidance	Work leader			4—	+	·   · · ·					1		·		-	+-		
4731	Evidance and control of Evidance	Main worker			4	+	+		1 1	ł		1.	<b> </b>	_			-+	<u>-</u>	1
4731	Evidance and control of Evidance	Administrative clerk					1	-	1			1.	1	<u> </u>	_	1	_	4	1
4731	Evidance and control of Evidance	Water meter evidentist			T	T	1		1	1	1			1		1		1	1
			+-	-1		1	1	1		1	1	1	2	3				3	23
			-		+	1-		-1		; —	1	1	1	1		1-		1	1
					-		+	. <del> </del>	+'	·	+		+			+		+	1
4732			_ _	_			+	4	-{	1	Į	+				+		<del>.</del>	4
4732	Control of Evidance	Controller									1:	3				_		3	3
					Τ	1	1	1	1	1	1			7	T			7	6
4731 4732 4732	Evidance and control of Evidance Control of Evidance Control of Evidance	Meter reader Chief III Main controller						1										1 1 3	

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## K. ViK's FINANCIAL DATA



### APPENDIX K. VIK'S FINANCIAL DATA

	Page
1. ViK's Financial Data	K - 2

### LIST OF TABLES

Table K.1	FIXED ASSETS OWNED BY EACH DEPARTMENT	K - 2
Table K.2	CAPITAL INVESTMENTS IN 1996	K - 3
Table K.3	CAPITAL INVESTMENTS IN 1997	K - 4
Table K.4	CAPITAL INVESTMENTS IN 1998	K - 5
Table K.5	CAPITAL INVESTMENT NEEDS IN 1999	K - 6
	SUMMARY OF CAPITAL INVESTMENT NEEDS IN 1999	
Table K.7	EXPECTED SOURCE TO FINANCE OPERATING COSTS IN 1999.	K - 8
Table K.8	MAJOR FACILITIES AND EQUIPMENT	K - 9

### 1. ViK'S FINANCIAL DATA

Plant and buildings	Gradevine	Net value	Water supply	Sewage
		Neto vriednost		Kanalizacija
Concrete tank	Kaptaze	69,372	69,372	
Wells	Bunari	31,371,502	31,371,502	
Reservoirs	Rezervoari	77,810,791	77,810,791	
Pumping stations	Pumpne stanice	36,823,821		······································
Filters	Filteri	1,188,908	1,188,908	
Water network	Vodovodna mreza	269,417,885	269,417,885	
Sewage network	Kanalizaciona mreza	465,065,639		465,065,639
Concrete shelter	Betonska sklonista	55,540	55,540	
WWTP	Uredjaj za preciscavanje	182,079,922		182,079,922
Bridges	Mostovi	247,557		247,557
Roads	Putevi	14,998,644	2,757,978	12,240,667
Streamlets	Potoci	5,895,477	5,895,477	
Administration buildings	Upravne zgrade	10,284,319	6,515,216	3,769,103
Barrack	Barake	493,801		
Civil objects of	Gradj. Objekti	3,868,240	3,868,240	*************************************
power plant	energetskih postrojenja	, ,	, ,	
Underground cable,	Podzemna kabl.kanal	5,932,057		5,932,057
sewage telemetry	telemetrija			
Total plant & equipment	efer an er	1,105,603,475	436 161 739	669,441,735
roiarpiant a equipment	onupro gradorino	100%	39%	Monthle 12, 214 (27) 22, 233 (23) (23)
Equipment	Oprema		Water supply	
Machines	Masine	4,464,467		
Transport means	Transportna sredstva	4,532,505	**********	***************************************
**** **********************************	Labaratorijska oprema i	8,005		***************************************
Labaratory equipment		0,000	0,000	
and medical apparatus	medicinski aparati	1,892,627	1,814,279	78,347
Instruments	Instrumenti	80,399		***************************************
Power inventory	Pogonski inventar			j
Business inventory	Poslovni inventar	1,999,708	***************************************	434,737
Imported equipment at	Uvozna oprema iz "ZCS"	1,730,660	1,730,660	- - 
water supply dept.	Vodovod			44 700 044
Imported equipment at	Uvozna oprema iz "ZCS"	14,732,619		14,732,619
sewage dept.	Kanalizacija			
Domestic equipment	Domaca oprema iz	505,723		505,723
at sewage dept.	"ZCS" Kanalizacija			
Total equipment	Ukupno oprema	29,946,712	10,298,861	6 19,647,85
1997年,此外国家的委员会将马克达的"马克特马克"的第三人称单数		100%	34%	669
计目标 网络马克尔德马克洛尔德马克	11.10月17日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日,11月1日月1日月1日月1日月1日月1日月1日月1日月1日月1日月1日月1日月1	A STATE AND A STATE AND A STATE AND A STATE	<ul> <li>A STATE OF DEPARTMENT OF DEPARTMENT</li> </ul>	
Total plant, buildings	Ukupno gradevine	1,135,550,186	1. Dougle resident	689,089,58

 Table K.1
 Fixed Assets Owned by Each Department
 As of March 1999

Source: ViK

able K.2 Capital Investments in 1996 /	Napitalila ulaganja u 1990
roject name	Fund source
ne Projekta	Izvor fondiranja
Vater work equipment ( 2 vechicle Citroen C15)	French Government
Different material for maintainence	ODA -Sarajevo
Sas chlorine 4.000 kg.	MVV"Vodovod"-Manhajm, Germany
/ehicle DAIMLER-BENZ 2L	Austrian Gouvernment through Company SEBA
xcavator JCB	Trust fond through DORS
Diesel agregat 5,4kw	
Diesel agregat 11,2kw	
/ehicle for dumping pit	
/ehicle for transport of workers	
/ehicle for transport of workers and material	
Combined vehicle	
/ehicle for suction apparatus	
Different Material for maintainence	Austrian Gouvernment through Company SEBA
Material for PS"Bacevo"	UMCOR-Sarajevo
Replacement 80 m of water network in Sipska street	UMCOR-Sarajevo
/ehicle CITROEN C 15	French Government
Material, tools	ICRC-Sarajevo
nstalation of pumps and el. material on PS"Pogledine"	UMCOR-Sarajevo
Different material for maintenance	ODA-Sarajevo
NISSAN PATROL/89	Barcelona Water Company
NISSAN PATROL/90	Spain
Vehicle CANAL JET	Trust fund through DORS
Water pumps for PS"Center" and "Podhrastovi"	UNICEF-Sarajevo
Different material for maintenance	UNICEF-Sarajevo
Works on filter station "Moscanica"	UMCOR-Sarajevo
Different material for maintenance	Austrian Government through Company SEBA
Fiat panda	
Fiat comby	Public Company
Fiat cistem	"ACEA"-Roma-Italy
Fiat iveco	
Fiat -lorry	
Fiat antonelifalcon	
Fiat iveco	
Money fond for gas chlorine	UMCOR-Sarajevo
Chlorinatiors	UMCOR-Sarajevo
Excavator BENAT 2000	Public Comp. "ACEA"-Roma
Money fund for gas chlorine	IFOR-ARCC
Payment of bills for repearing of water pumps	ICRC,IFOR-ARC,UMCOR
Water meters control	UNICEF-Sarajevo
Payment of bills for repearing of water pumps	ICRC-Sarajevo
Mobile hand-radio station 2 pcs.	ODA/EEU-Sarajevo
Electrical material for PS Bacevo necessities	IMG-Sarajevo
	Trust fund through DORS
Works on cleaning of sewage network	UNICEF-Sarajevo
Equipment for service for repearing of water pumps	French Government through SOGEA Company
Different material for maintenance	Austiran Government through SEBA Company
Compressor	
Pipe connections	
Water work material for maintenance	Austiran Government through SEBA Company
Rehabilitation of "Kanalizacija" building	Trust fond throught DORS
Computer equipment	Austiran Government through SEBA Company
Total	4,784,000 DM

Table K.2 Capital Investments in 1996 / Kapitalna ulaganja u 1996

Project name	Amount (KM)	Fund source
Ime Projekta	Vrijednost (KM)	Izvor fondiranja
Bacevo spring rebuilding	3,000,000	EU
Bacevo spring demining	950,000	EU
Water supply analysis	2,000,000	EU
Water network distribution program	9,300,000	EU
Reconstruction of P.S. Alipasin Bridge	3,000,000	Danish Gov.
Rehabilitation of source Moscanica(old)	690,524	Trust f.
· ·	161,098	Canton
	5,663	ViK
	57,902	Electrodistrib.
Rehabilitation of P.S. Bogusevac	120,000	Canton
Rehabilitation of P.S. Vlakovo	30,000	UMCOR and IMC
Rehabilitation of P.S: Lukavac	30,000	Trust f.
Pipeline reconstruction Vlakovo	200,000	Trust f.
Rehabilitation of P.S. Faletici	93,000	UMCOR
Pipeline reconstruction Moscanica-Skaljica Brdo	80,000	GRC
Pipeline reconstruction Pofalici	250,000	GRC
Rehabilitation of roof on source facility Bacevo	150,000	UMCOR
Rehabilitation of bridge A.Most	20,000	Canton
	5,000	ViK
Reconstruction of laboratory with equipment	1,000,000	Trust f.
Supplying of vehicles	150,000	ACEA
Rehabilitation of P.S. Kromol	30,000	Trust f.
Leak repairing on water network-supplying of material	250,000	Sarajevo Cantor
Garage rehabilitation in Sibenik street	50,000	ViK
Rehabilitation of house for workers Hrasno	159,820	ViK
Rehabilitation of ambulance	30,000	ViK
Rehabilitation on reservoir Mojmilo	23,000	ViK
Repairing of pumps	34,000	Sarajevo Cantor
Source Sokolovici-finishing	400,000	Sarajevo Cantor
Rehabilitation of objects within waterworks on Moscanica	4,000	ViK
Rehabilitation of R.Hladivode	22,000	Sarajevo Cantor
Dislocation of plant Miljacka. End of 1997 execution of project and dismantling works	1,500,000	USAID
Reconstruction of pipeline Dobrosevici-1,2 km	250,000	BiH water compa
Demining for new water penetration in Moscanica	6,200	
Building service for repairing of pumps-I faze	203,000	Sarajevo Canto
Works will be transfered in 1998	31,435	ViK
Rehabilitation of P.S. Bojnik	40,000	BiH water compa
Electrical project for Bojnik	2,500	ViK
Rehabilitation of filter station Moscanica	91,000	UMCOR
Rehabilitation P and PS Igman	15,000	BiH water compa
Repairing of leaks on water network, supplying of material, equipment	1,400,000	
Pipeline Brus-Hrid-works will be transformed to 1998	400,000	1
Adaptation of "kutic"(part for cash service)	20,000	
Reconstruction of engine-room within VIK	21,900	
Reconstruction of concrete chamber on pipe FI 500 mm on K.Glava	13,700	
Service for PS Bacevo, Konaci, Bunari, Igman and grounding	19,000	
Adaptation of working space in A.Sacirbegovic street	188,950	1
Rehabilitation of roof on PS Center	20,714	
Delivery and assembly of plant for continuously feeding	17,096	
THERVELY AND ASSEMDLY OF DIALITION COMPANIACIES IN ISCUINC	11,000	1 111

#### Table K.3 Capital Investments in 1997 / Kapitalna ulaganja u 1997

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Table K.4 Capital Investments in 1998 / Kapitalna	ulaganja u 19	98
Project name	Amount (KM)	Fund source
ime Projekta	Vrijednost (KM)	Izvor fondiranja
Bacevo spring rebuilding	3,000,000	EU
Bacevo spring demining	800,000	EU
	15,000	UMCOR
Water supply analysis	2,000,000	EU
Reconstruction of PS.A bridge	3,500,000	Danish Gov.
•	21,000	ViK
Dislocation of Treatment plant from Miljacka to Vogosca	1,500,000	USAID
	300,000	Sarajevo Canton
Reconstruction of Water Network in Section I	2,277,000	Finnish Gov.
Water network rehabilitation of Velesici, Pofalici, Hum	264,000	UMCOR
	294,000	Sarajevo Canton
Sewerage system reconstruction	475,000	Finnish Gov.
Reconstruction of BRUC-HRID water network	400,000	ICRC
Information system reconstruction project	700,000	Finnish Gov.
	100,000	ViK
Partial reconstruction of Grdonj, Sedrenik, Cebedzije, and PS area	200,000	UMCOR
	15,000	
Infiltration Konaci program	50,000	
PS Vrelo Bosne rehabilitation	40,000	
Researching works and B8a water well building	120,000	
Dobrosevici-II phase pipe network building		BiH Water Company
A. Brauna and Dzidzikovac streets sewerage reconstruction	115,000	
Repairing of the city network pipe damage	6,000,000	
Reconstruction of 21 km water network	9,000,000	
Sokolovic water management supply project	7,000,000	
Moving out water entrance Moscanica	1,300,000	
Building services for repairing pumps - I phase	75,000	
	34,000	
Reconstruction of worker's houses in Hrasno and Kovacima	120,000	
	330,000	
Sewerage in Faletici	250,000	
Expansion and storing objects in Terezija	361,000	
Purchasing and building of some three phases	104,000	
Building lift in dispatcher center	78,000	
Works on protecting equipment	54,000	
Rehabilitation of destroyed garages in Sibenska street	184,000	
Rehabilitation of business offices in A. Sacirbegovica street	25,000	
Purchasing dredges	220,000	
Project GIS-a	62,000	
Rehabilitation of dispatcher center and PS Center	270,000	
Total	41,903,000	

### Table K.4 Capital Investments in 1998 / Kapitalna ulaganja u 1998

Project name	Amount (KM)	Fund source	Finance
me Projekta	Vrijednost (KM)	Izvor fondiranja	Finansiran
Rehabilitation of water distribution network	5,000,000	Sarajevo Canton	Likely
Supplying of pipes and FF peaces according Contract between			
Canton Gov. and Thyssen Comp. Credit means 25%		Sarajevo Canton	Likely
Nater distribution reconstruction and sewage network		Sarajevo Canton	Likely
Reconstruction of main pipeline from PS*Aqlipasin Bridge* to R. *Kobilja Glava*		Sarajevo Canton	Likely
nclusion of water from source "Peracko Vrelo" into water system of Sarajevo		Sarajevo Canton	
Realization of other works(under the point 2.)		Sarajevo Canton	Likely
Reconstruction of joining-pipeline R*Pogledine*-PS*Hambina Car.*		Sarajevo Canton	
Construction of new reservoir space(R*Kobilja Glava*, "Kromolj", "Vitkovac*, "Hum")		Sarajevo Canlon	
Construction of sewage network on area Vrutci, Vrelo Bosne, Vreoce		Sarajevo Canton	Likely
Construction of sewage network in area Falelici		Sarajevo Canton	
Rehabilitation of water treatman plan-I faze		Sarajevo Canton	
preparation work		Sarajevo Canton	
Rehabilitation of source Bacevo (Tender WSS1)	800,000	EU	Likely
Construction of house-business facilities in Terazija street 38	415,000	ViK	Likely
Construction of workers house in Hrasno and Kovacici	270,000	ViK	Likely
Delivery, montage and seeting free in function of telemetric and computer equipment			
or sub-center "Center"	27,000	ViK	Likely
Construction of treatmant plant component on source Bacevo (well B-6)	42,000	ViK	Likely
Construction of programs for protection of water sources in Sarajevsko Polje	29,000	ViK	Likely
Rehabilitation works on source ' Moscanica'-security house	80,000	ViK	Likely
Supplying of excavator and fork lift truck-credit	164,000	ViK	Likely
Protection from water hammer in PS A. Most	52,000	ViK	
Protection from water hammer in in PS Centar	46,000	ViK	
Reconstruction of hydrotechnic and electro equipment in PS Hrasno, supplying and			
assembling of equipment	280,000	ViK	ļ
Construction of new building instead of old ambulance	300,000	ViK	
Replacement of low-tension closet on wells	300,000	ViK	
Replacement of high-tension plant on wells	170,000	ViK	
Replacement of NN plant Stup	50,000	ViK	<u> </u>
Construction of main controle project	30,000	ViK	L
Replacement of NN plant Stari Pofalici and Buca Potok	30,000	ViK	Likely
Replacement of NN plant Hambina Carina	15,000	ViK	Likely
Repearing of signal-cable	25,000	ViK	Likely
Supplying of electric-motor valves on wells o 300, 16 bars	160,000	ViK	Likely
Measuring equipment in PS Center	60,000	ViK	Likely
Measuring equipment Hrasno	45,000	ViK	1.11
Measuring equipment wells Bacevo, filow meters, level meters, pressure equip.	180,000		Likely
Measuring equipment Skenderija	30,000		
Moscanica old filter, compresor	25,000	ViK	
Monitoring	000.000		
Bacevo, Mojmilo, A.Most, Igman, Hrasnica, V.Bosne, Sokolovici, Bacevo-Konaci	200,000		<u>  </u>
Compenzation of energy on objects of Vodovod	150,000		. Likolu
Telemetry and measure-regulation equipment for Igman and Bjelasnica	200,000		Likely
Cathode protection of pipeline K. Glava-Vogosca	40,000		likolu
Rehabilitation of signal cable R. Hladivode- Ps Medjureservoir	15,000		Likely
Cathode protection wells Sokolovici	35,000	ViK	
Measuring equipment on pumping stations and reservoirs:			
PS Kovacici PS Pofalici, new and old			
R Vraca R Bakarevac, Hum I and Hum II			
PSH Carina R. Kobilja glava			1 · · · ·
Pogledine R Vogosca I and II			
Hrid PS Brijesce			
R Lukavac R Vitikovac			
r Hladivode PS Vlakovo with reservoir		1	
PS Stup with wells spring Nahorevo	AFA 444	1.000	
PSB Potok with reservoirs plant Moscanica	650,000	ViK	<b>.</b>
Electrical conection on objects			1
Spring Crnil, R Bakarevac, Hum I and Hum II, R Hum	15,000		Likely
Searching works	330,000		<b></b> _
Study construction for two new wells on source Sokolovici	90,000		_ <b>_</b>
Study construction for water engagement	150,000		
Construction of two wells on source Sokolovici	600,000		
Works on equippping of absorbent wells in exploatacion on source Bacevo	800,000	) ViK	Likel

Construction of invest technical documentation for :			
second chamber R. Kobilja Glava water work for area Mojmilo			
reservoir Kromolj reconstruction of pumping station	170,000	ViK	Likely
water work for area Hum changing og absorbent wells into exploatation Continuation of works on service for repearing of pumps-Stup and construction and			
adaptation of storage for chlorine bottle	220,000	ViK	Likely
Expense for introduction of system on ISO 9000 standards	30,000	ViK	Likely
Construction and reconstruction of sewage network: Total 6,447,400			
Jaserevica farma	60,000	ViK	Likely
Velesici	700,000	ViK	Likely
Velesici- in direction to barracs	400,000	ViK	Likely
Kobilja Glava -Hotonj	305,000	ViK	Likely
Vegosca	500,700	ViK	Likely
Brijesce-ato base Centrotrans	15,000	ViK	Likely
Sewage between schools-Vogosca	65,000	ViK	Likely
Left side of river Miljacka	1,400,000	ViK	Likely
Sifon Bendbasa	25,000	ViK	Likely
Sulejman Ef. Musica	108,000	ViK	Likely
Sewage Alipasina for bouth side	1,343,800	ViK	Likely
Blazuj colector from Karamusica till Mostar cross road	950,000	ViK	Likely
Igman colector	105,000	ViK	Likely
Soukbunar	32,000	ViK	Likely
Sirokaca-Hadziabdnica-Mjedenica	86,000	ViK	Likely
Mlade Bosne	85,000	ViK	Likely
Bardakdzije nearly by student house	4,300	ViK	Likely
Bardakdzije bus station	4,300	ViK	Likely
Vijecnica	7,200	ViĶ	Likely
Velesici	4,300	ViK	Likely
Bistrik	5,800	ViK	Likely
Vrbanjusa-Sagardjije-Logavina	2,900	ViK	Likely
Bolnicka-Stjepana Tomica-Visnjik	4,300	VIK	Likely
Vratnik Mejdan	11,500	ViK	Likely
Adema Buce by Zrak	10,800	ViK	Likely
H.Kresevljakovica-Safeta Hadzica	2,900	ViK	Likely
Mladih Muslimana way-Huremusa	4,300	VIK VIK	Likely Likely
Gradacacka	4,300	VIK	Likely
Outbuilding of ilegal sowege network	200,000	¥IN	LINGIY
Repearing of objects for cleaning of waste waters Butile : Total 737,200	30,100	ViK	Likely
Engine-room	30,700	ViK	Likely
Pressdeg Energetic object	36,300	ViK	Likely
Pumping station	7,400	ViK	Likely
Digestori	345,700	ViK	Likely
Administration building	32,100	ViK	Likely
Rehabilitation of fence	35,000	ViK	Likely
Reconstruction of outside sewage	81,900	ViK	Likely
Construction of temporarily drains	45,000	ViK	Likely
Roofs works on building Terazija	30,000	ViK	Likely
Supplying of hangar in storage Brijesce	48,000	ViK	Likely
Setting of new fence on entrance doors	15,000	ViK	Likely
Adaptation of existing working space in Kolodvorska street	12,000	ViK	Likely
Adaptation of restorant in administration building Terazija	25,000	ViK	Likely
Fixing of space in Administration building Terazija	120,000	VIK	Likely
Construction of working house in Faletici	200,000	ViK	
Adaptation association space in J. Cernija street	100,000	ViK	Likely
Rehabilitation of storage in Stup	50,000	ViK	Likely
Aspahlting of road to storage Stup	60,000	ViK	Likely
Construction of storage space for chlorine bottle Faletici-Butila	100,000	ViK	Likely
Conservation of working space in construction-Kolodvordka street	70,000	ViK	<u> </u>
Rehabilitation of working space in Paromilinska str.	400,000	ViK	
Adaptation of working resting house in Srebreno	500,000	ViK	121-1
Maintaining of network LAN and Wan on all locations	40,000	VIK	Likely
Maintaining of software aplication, PIS and MONV-making of contract	60,000		Likely
Training of staff for VIK for FORMS; REPORTS, administration base ORACLE, DESIGNER2000	8,500		Likely
Conecting of all location in J.Cernija street with optical server	30,000		Likely Likely
Supplying PSION-WORKABOUT for readers	25,000		Likely
Construction of roofs on administration building in J.Cernija str.	150,000 30,000		Likely
Construction of memories drinking-fountain in J.Cernija str. Total			
1013	001,000,100		00,072,100

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# Table K.6 Summary of Capital Investment Needs in 1999Tabela K.6 suma potreba kapitalnih ulaganja u 1999

Types of capital investments and financial sources	Amount (KM)
Tipovi kapitalnih ulaganja i finansijskih izvora	Vrijednost (KM)
Investment works financed by Canton	38,400,000
Investicioni radovi finansirani od strane Kantona	
Reconstruction of water-network financed by EC	1,000,000
Rekonstrukcija vodovodne mreze-finansirani od strane EC	
Projects carried over from year 1998	1,827,000
Prebaceni projekti i 1998	
ViK's own investment	5,487,000
ViK licna ulaganja	
Acquisition of basic equipment financed by various sources	1,500,000
Glavna oprema finansirana iz vise izvora	
Total capital investment needs	48,214,000
Ukupne potrebe kapitalnih ulaganja	
Source: VIK	

# Table K.7 Expected Source to Finance Operating Costs in 1999 Tabela K.7 Ocekivani izvori za finansiranje operacionih troskova u 1999

Types of operating expenses and its sources	Amount (KM)
Tipovi djelotvornih aktivnosti i njihovi izvori	Vrijednost (KM)
Water and sewage service charge collected from customers	23,800,000
Prikupljene naplacene usluge od potrosaca za vodu i kanalizaciju	
Grants from Canton for salaries	9,234,000
Sredstva od Kantona za plate	
Grants from Canton for leak repair	5,000,000
Sredstva od Kantona za opravku kvarova	
Additionally expected grants	2,000,000
Dodatna ocekivana sredstva	
Total operating expenses without depreciation	40,034,000
Ukupni djelotvorni troskovi bez amortizacije	
Source: Vik	

Source: ViK

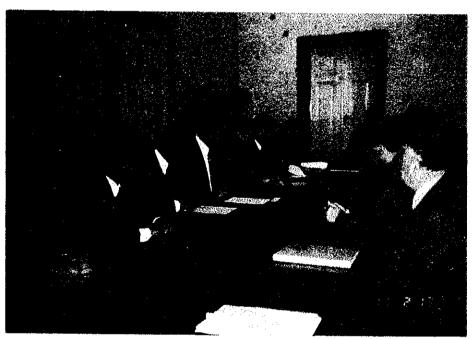
## Table K.8 Major Facilities and Equipment

Facilities and Equipment	Acquisition	Accumulated	Net Value
admies and Equipment	Value	Depreciation	
Orodovina i Oproma	Bruto	Amortizacija	Neto
Gradevine i Oprema	Diulo	711101012401ja	
	206,432,170	24,532,125	181,900,045
WWTP	88,437,240	22,768,315	65,668,925
Collector V Transfersale-M.Dvor		19,929,097	57,529,298
Collector XII TransVogosca	77,458,396	39,636,348	8,497,507
Pipeline Bacevo-A.Most	48,133,855		33,858,238
Collector Grbavica-Hrasno	45,591,424	11,733,186	
Collector Marijin Dvor-Vijecnica	38,244,497	9,845,295	28,399,202
Collector Hrasnica-Ilidza	34,548,038	8,894,180	25,653,858
Collector XII transversale	34,267,055	8,819,767	25,447,288
Pipeline Bacevo-Mojmilo	27,201,953	13,921,271	13,280,682
Collector Ilidza -Plant	22,718,652	5,838,973	16,879,679
Sewerage network in M. Tita street	21,316,280	5,499,392	15,816,888
Reservoir Mojmilo	20,586,320	7,585,170	13,001,150
PUT-bridge for plant	20,047,847	7,807,181	12,240,667
Pipeline PS Hrasno	19,780,069	6,492,607	13,287,462
Pipeline Breka-Grdonj	15,848,792	7,117,170	8,731,622
Reservoir Skenderija	14,985,226	3,953,376	11,031,850
PS Bacevo	14,589,293	4,959,262	9,630,031
Water network Hrid-Komatin-Cicin H.	13,804,527	7,102,115	6,702,412
Reservoir A.Most	13,533,852	7,974,154	5,559,698
Sewerage network of A.Polje area	11,872,296	4,001,257	7,871,039
Water network Kobilja Glava	10,009,614	5,130,864	4,878,751
Reservoir K.Glava	9,970,283	4,464,391	5,505,892
Distribution lines Reservoir Mojmilo	9,628,898	3,158,814	6,470,084
Pipeline PS Bacevo-Luzani	8,711,177	2,857,591	5,853,586
PS Hrasno	8,481,583	1,583,804	6,897,779
Reservoir Igman-new	8,267,699	1,871,316	6,396,38
Reservoir Crni Vrh	8,203,216	4,897,260	3,305,95
Reservoir Bacevo	7,710,182	3,933,247	3,776,93
Reservoir Centar	7,709,409	4,127,650	3,581,75
Sewerage network Ilidza road	7,671,808	1,950,988	5,720,82
Collector Bosna river	7,103,456	1,547,594	5,555,86
Collector from street 1.Maj	6,467,022	1,422,746	5,044,27
Sewerage network Dobrinja-ZGP	5,948,604	1,578,111	4,370,49
Sewerage network cross road Poljice	5,923,548	1,571,444	4,352,10
Reservoir Podhrastovi	5,923,486	1,553,608	4,369,87
Pipeline Vogosca-Semizovac	5,698,318		2,488,05
Sewerage network X transv.	5,502,764		
Direction building-Terazije	5,376,114		
Sewerage network Mladicko Polje	5,110,158		
Distribution zone Reservoir Lukavac	5,095,589	A second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second se	the second second second second second second second second second second second second second second second se
Equipment			A STAR STAR
Motors on gas and oil-equipment	5,901,700		2,685,52
Motors on gas and oil-equipment	4,876,439		
Electromechanic equipment	1,278,143		
Total	0.10.000.00		

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K -9

## L. MINUTES OF MEETINGS



### APPENDIX L. MINUTES OF MEETINGS

	Page
1. Minutes of Meeting of Inception Report	L- 2
2. Minutes of Meeting of Interim Report	L- 6
3. Minutes of Meeting between ViK and JICA Study Team	L-11
4. Minutes of Meeting between MOAMF, ViK and JICA Study Team	L-21
5. Record Note of Main Laboratory	L-32
6. Minutes of Meeting between Electric Distribution Sarajevo,	
ViK and JICA Study Team	L-44
7. Minutes of Meeting of Draft Final Report	L-51

## MINUTES OF MEETING OF INCEPTION REPORT FOR THE FEASIBILITY STUDY ON SEWERAGE SYSTEM OF SARAJEVO IN BOSNIA AND HERZEGOVINA

## AGREED UPON BETWEEN

#### SARAJEVO

#### AND

#### JICA STUDY TEAM

Sarajevo, February 12, 1999

**Prof. Dr. Mehmed SARIC** 

Assistant Minister, Ministry of Agriculture, Water Management and Forestry of Federation of Bosnia and Herzegovina

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Mr. Munib BULJINA Minister, Canton Ministry of Urban Planning, Housing and Utilities in Sarajevo

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Mr. Pilavdzic FAHRUDIN General Manager, Canton Public Communal Company, "Water Supply and Sanitation"

Mr. Kaoru SUZUKI Team Leader JICA Study Team

Witnessed by

Mr. Mihovil MALBASIC Assistant Minister, Bosnia and Herzegovina, Ministry of Foreign Affairs, Department for Multilateral Relations

2. The Study Team explained the scheme on training of the counterpart to the Bosnia and Herzegovina side with full understanding from them. The Study Team noted the request of the Bosnia and Herzegovina side for one personnel to undergo the counterpart training programme in Japan.

3. The Bosnia and Herzegovina side agreed to provide adequate office space, furniture and electricity to the Study Team.

4. The Bosnia and Herzegovina side also agreed to the request of the Study Team to provide them for utilities such as water and power supply necessary for the site survey at the WWTP.

5. Regarding the water quality equipment as listed in Appendix C of IC/R, the Study Team has arranged to deliver the above mentioned equipment to the place to be designated. In this regard, the Bosnia and Herzegovina side will arrange exemption to Customs duties.

6. The Bosnia and Herzegovina side agreed that all Study Reports would be open for disclosure.

7. The Study Team raised the concern about ethnic conflict issue that could affect the smooth implementation of the Study. The Bosnia and Herzegovina side assured that no negative impact arise to that effect, and that, in case any negative impact occur, the Bosnia and Herzegovina side will take full responsibility.

7-1.6

In accordance with the Scope of Work agreed between the Council of Ministers of the Bosnia and Herzegovina and Japan International Cooperation Agency (JICA) on August 26, 1998, JICA selected a study team for the Study on The Feasibility Study on Sewerage System of Sarajevo in Bosnia and Herzegovina and dispatched the Study Team to the Bosnia and Herzegovina side to commence the Study.

The Study Team submitted 20 copies of the Inception Report (IC/R) for the Feasibility Study on the Wastewater Treatment Plant (WWTP) of Sarajevo City to the Bosnia and Herzegovina and had a series of discussions on the report from February 10 to 12, 1999.

The participants of meeting are listed in the Attachment. The IC/R was in principle accepted and agreed by the Bosnia and Herzegovina side with the following comments.

1. The Bosnia and Herzegovina side and the Study Team fully agreed the contents of the IC/R, with further explanations from the JICA Study Team on such issues as follows;

a) The procedure of site survey for Sarajevo WWTP was presented in order to realize the present status of WWTP.

b) The Study Team requested the Bosnia and Herzegovina side to designate the counterpart personnel to cover the aspects on Civil, Architectural, Mechanical, and Electrical works and Management that will collaborate the Study Team in the duration of the Study.

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Attachment

#### ATTENDANCE LIST

#### **Bosnia and Herzegovina Side:**

Bosnia and Herzegovina, Ministry of Foreign Affairs

Mr. Mihovil MALBASIC	Assistant Minister,
	Department for Multilateral Relations
Mr. Mithat PASIC	Head of Unit,
	Department for Multilateral Relations,
	Unit for Reconstruction
Mr. Aziz HADZIMURATOVIC	Counselor,
	Department for Multilateral Relations,
Ms. Jasna CEHIC	International Aid Coordinator,
	Department for Multilateral Relations,
	Unit for Reconstruction

Ministry of Agriculture, Water Management and Forestry of Federation of Bosnia and Herzegovina

Prof. Dr. Mehmed SARIC	Assistant Minister
Mr. Stjepan BAGARIC	The Head Inspector of Water Management of
	Federation of Bosnia and Herzegovina

#### Cantonal Ministry of Urban Planning, Housing and Utilities in Sarajevo Mr. Nusret CAUSEVIC Deputy Minister Mr. Karamehmedovic SALIH Public Utility Department Assistant

Public Water Management Enterprise Bosnia and Herzegovina Mr. Mirsad LONCAREVIC Deputy Director

Canton Public Communal Company, "Water Supply and Sanitation"Mr. Pilavdzic FAHRUDINGeneral ManagerMr. Drace ZULFIKARHigher Advisor of the DirectorMr. Biscevic MIDHATDirectorMr. Hasanovic HIKMETTechnical Director

#### Japanese Side:

JICA Study Team Mr.Kaoru SUZUKI Mr.Renato Q. CRISOSTOMO Mr.Mitsuhiro DOYA

Advisory Committee Mr.Kazunori KOINUMA

JICA Headquarters Mr. Takayuki NAKAGAWA

Team Leader Facility Design Economist

Department of Sewerage, Tokyo Metropolitan Government

Task Management

L- 5

## MINUTES OF MEETINGS OF INTERIM REPORT FOR THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO CITY IN BOSNIA AND HERZEGOVINA AGREED UPON BETWEEN THE MINISTRY OF FOREIGN AFFAIRS, FEDERAL MINISTRY OF

# AGRICULTURE, WATER MANAGEMENT AND FORESTRY, CANTONAL

## MINISTRY OF URBAN PLANNING, HOUSING AND UTILITIES

#### **IN SARAJEVO**

#### AND

#### JICA STUDY TEAM

Sarajevo, May 31, 1999

ZA Prof. Dr. Mehmed SARIĆ Assistant Minister, Ministry of Agriculture, Water Management and Forestry of Federation of Bosnia and Herzegovina

**Stjepan BAGARIĆ** General Water Inspector for the Federation of BiH

Mr. Fahrudin PILAVDŽIĆ General Manager, Canton Public Communal Company, "Water Supply and Sanitation"

Mr. Kaoru SUZUKI Team Leader JICA Study Team

Mr. Munib BULJINA Minister, Canton Ministry of Urban Planning, Housing and Utilities in Sarajevo

Witnessed by

Mr. Mihovil MALBAŠIĆ Assistant Minister, Bosnia and Herzegovina, Ministry of Foreign Affairs, Department for Multilateral Relations

L-6

In accordance with the Scope of Work agreed between the Council of Ministers of the Bosnia and Herzegovina and Japan International Cooperation Agency (JICA) on August 26, 1998, the Study Team submitted 20 copies of the Interim Report (IT/R) for the Feasibility Study on the Wastewater Treatment Plant (WWTP) of Sarajevo City to the Bosnia and Herzegovina and had a series of discussions on the report from May 26 to 28, 1999.

The participants of meeting are listed in the Attachment. The IT/R was in principle accepted by the Bosnia and Herzegovina side with the following comments.

- 1. The BiH side and the Study Team fully agreed to the contents of the IT/R, with further explanations by the Study Team on following issues;
  - a)The Study Team explained to the BiH side the findings of the Study to date and assured that two parties have the same understanding in terms of the purpose and basic idea of rehabilitation plan.
  - b)The procedure of the second site survey for Sarajevo WWTP was presented in order to carry out the detail survey of WWTP. Waterworks and Sewerage Company of Sarajevo (ViK) confirmed that they have arranged necessary cooperative measures such as a site office, laboratory, personnel, and other required actions. The Study Team has made a site survey contract with the local contractor to carry out the detail survey.
  - c)The Study Team has identified the other sewerage projects for Sarajevo Sewerage System that have been assisted by foreign countries and international agencies. The Study Team has also confirmed that only this Study as a JICA's technical cooperation is aimed for the reconstruction program of Sarajevo WWTP. The Study Team explained that they consider the "Kuwait Fund Long Term Solutions of Water Supply and Wastewater

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Drainage and Treatment in the Canton Sarajevo" as a superordinate program and may refer to the "Compilation and Implementation of the Master Plan for the Restoration of the Sarajevo Wastewater Treatment Plant" to determine the framework and design criteria for the Feasibility Study. The BiH side agreed the proposed framework and design criteria.

- 2. In accordance with the discussion of February 1999, JICA will accept one counterpart personnel for a training program in Japan, to be held for one month starting in the mid August 1999.
- 3. The BiH side confirmed that the Mine Clearance Project in Sarajevo WWTP, Phase I had been completed and no obstacle is expected for a smooth execution of the site survey. The BiH side also reassured that full responsibility of mine clearance lies with the BiH side, and confirmed that they request to the responsible organization the earliest issue of a mine clearance certificate of the whole project area.
- 4. The BiH side expressed their interest for the project implementation through Japanese ODA. The Study Team reassured that they would make utmost effort to finalize the Study together with the BiH side. The Study Team also indicated that the BiH side's early decision making to apply Japanese ODA is important for the Project to be smoothly implemented. Incidentally the Study Team explained that Japanese ODA includes provision of a Japanese Yen loan and that JICA is not mandated for its approval.

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Attachment

#### ATTENDANCE LIST

#### **Bosnia and Herzegovina Side:**

Bosnia and Herzegovina, Ministry of F	oreign Affairs
Mr. Mihovíl MALBAŠIĆ	Assistant Minister,
	Department for Multilateral Relations
Mr. Mithat PAŠIĆ	Head of Unit,
	Department for Multilateral Relations,
	Unit for Reconstruction
Ms. Jasna ČEHIĆ	International Aid Coordinator,
	Department for Multilateral Relations,
	Unit for Reconstruction

Ministry of Agriculture, Water Management and Forestry of Federation of Bosnia and Herzegovina

Prof. Dr. Ahmed SMAJIĆ	Minister
Prof. Dr. Mehmed SARIĆ	Assistant Minister
Mr. Stjepan BAGARIĆ	The General Water Inspector for the
	Federation of BiH

Cantonal Ministry of Urban Planning, Housing and Utilities in Sarajevo Mr. Nusret ČAUŠEVIĆ Deputy Minister Mr. Salih KARAMEHMEDOVIĆ Public Utility Department Assistant

Public Water Management Enterprise Bosnia and Herzegovina Mr. Mirsad LONČAREVIĆ Deputy Director

Canton Public Communal Company,	"Water Supply and Sanitation"
Mr. Fahrudin PILAVDŽIĆ	General Manager
Mr. Tarik BADNJEVIĆ	Vice General Manager
Mr. Jakub DREKOVIĆ	Financial Manager
Mr. Zulfikar DRAČE	Higher Advisor of the Director
Mr. Osman SULJAGIĆ	Director of Rehabilitation and Development Sector
Mr. Midhat BIŠČEVIĆ	Director
Mr. Hikmet HASANOVIĆ	Technical Director

#### Japanese Side:

JICA Study Team Mr.Kaoru SUZUKI Mr.Renato Q. CRISOSTOMO Mr.Robert DESPAULT Mr.Hajime Sakai Mr.Koichi OTA Mr.Mitsuhiro DOYA Mr.Koichi YAMASHITA

Team Leader Facility Design Structure Design / Facility Design Mechanical Design / Plant Design Electrical Design / Plant Design Economist Supporting Staff

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Advisory Committee Mr.Kazunori KOINUMA

Chief Advisor

JICA Headquarters Mr.Takayuki NAKAGAWA

Task Management



3. Minutes of Meeting between ViK and JICA Study Team

#### THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO

#### MINUTES OF MEETING BETWEEN VODOVOD I KANALIZACIJA (VIK) AND JICA STUDY TEAM

#### 1. DATE: 17 June 1999

#### TIME: 1:00 PM

2. VENUE: VIK Office, Terezija

#### **3. ATTENDANCE LIST**

3.1 Mr. M. Biscevic	Vodovod I Kanalizacija (ViK) – Director
3.2 Mr. Z. Drace	Vodovod I Kanalizacija (ViK) - Director
3.3 Mr. J. Rudalija	Vodovod I Kanalizacija – WWTP Superintendent
3.4 Mr. K. Suzuki	JICA Study Team – Team Leader
3.5 Mr. R. Crisostomo	JICA Study Team - Facility Design/O&M Planning
3.6 Mr. R. Despault	JICA Study Team - Facility/Structure Design
3.7 Mr. S. Kugaprasatham	JICA Study Team - Environment/Water Quality

#### 4. MINUTES OF MEETING

4.1 Mr. K. Suzuki opened the meeting with a short briefing regarding the progress of the 2nd Site Survey of the Sarajevo WWTP in Butila.

4.2 The following important issues were discussed

- Treated Effluent Quality
- Sludge Disposal from the WWTP
- Preliminary Evaluation of Sludge Treatment Processes and Disposal Alternatives
- 4.3 Treated Effluent Quality. The Study Team presented the following treated effluent criteria that will be adapted for the study.

Parameter	Concentration (monthly average)
BOD ₅ , 20°C	20
SS	30
pH	6-8
FC (Fecal coliform count), No./100ml	200

The BOD and SS values are the same values that were adopted during the design of the WWTP in 1985, and concern was raised by the Study Team since these values do not satisfy the Class III River Quality Standards of the Bosnia River during very low flow. Satisfying the above standards, require tertiary treatment, which is considered to be an extreme financial burden for the rehabilitation work. The Study Team requests confirmation of this issue with The Ministry of Agriculture, Water Management and Forestry.

Another concern raised by the Study Team is the limitation of the Nematode, eggs No./L to be less than 1 and fecal coliform standard as set in the report "Longterm Solutions for the Water and Wastewater Drainage and Treatment in Canton Sarajevo, 1999" that require additional treatment. The Study Team proposed that fecal coliform standards which require disinfection be evaluated as an option. Due to some effects of chlorine and other disinfectant, ViK has suggested that they will consult with the authorities particularly with The Ministry of Agriculture, Water Management and Forestry on this matter and will liase with the Study Team.

4.4 Sludge Disposal from WWTP. The Study Team has raised the concern on the compliance to existing regulations regarding disposal of sludge from the WWTP. ViK suggested that since there is no existing regulations about sludge disposal in Bosnia and Herzegovina, it might be helpful to the Study Team to refer to some European Standards for guidance.

Previously, there had been an agreement entered between ViK and the management of the Sarajevo Sanitary Landfill regarding sludge disposal, but suggestion has been made to make preparations for a new agreement to be made to that effect, where necessary.

ViK will arrange a meeting with the local transportation company and sanitary landfill authorities responsible with the transport and disposal of sludge cakes and other wastes.

#### 4.5 Preliminary Evaluation of Sludge Treatment Processes and Disposal

Alternatives. A draft (please see attached) has been presented by the Study Team to the ViK for discussion and information. A brief explanation on the basis of selection such as, compliance to regulation requirement, flexibility of operation, energy requirement, and ease in operation have been used in the preliminary evaluation of the options presented. Final evaluation will be made on the 3 selected option based on their economic viability will be made.

#### 5. Other Matters.

5.1 Influent Wastewater Quality. The Study Team has presented to the ViK management for confirmation the following influent wastewater quality.

Parameter	Concentration	Remarks
BOD ₅ , 20°C, mg/l	200	60 g BOD/person in 2000
		75 g BOD/person in 2015
SS, mg/l	270	80 g SS/person in 2000
		95 g SS/person in 2015
NH ₄ -N, mg/l	23	Proportion to BOD
T-P (Total Phosphorous), mg/l	8	concentration.
COD _{cr} , mg/l	350	

Note: NH4-N, T-P and COD values shown in the Interim Report are corrected

The ViK management has no objection to the above data presented, however suggestion was made to present the same to The Ministry of Agriculture, Water Management, and Forestry for action/approval.

- 5.2 ViK clarified that the current rehabilitation works being done to the WWTP facilities through in-house budget are just minor repairs to the buildings to prevent them from further deterioration.
- 5.3 The main laboratory building (Facility 25) was used to be under the responsibility of The Ministry of Agriculture, Water Management, and Forestry. The Study Team requested ViK to clarify the status of the building whether it should be included in the rehabilitation works of the WWTP.
- 5.4 There is an existing, underground, high voltage transmission line with a capacity of 3.2 megawatts from the Azici S/S that used to supply the WWTP. Another emergency power supply source is coming from Rajlovac S/S at capacity of 1.5 megawatts to be used only in case of power outages from Azici. In case the power requirement exceeds 3.2 megawatts, a new transmission line has to be laid parallel to the Azici transmission line under the WWTP responsibility.
- 6. NEXT MEETING: To be announced later.

Decision variables for sludge treatment & disposal options

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Draft for discussion

Decision variables		Advantages	Disadvantages	Application		Selected for evaluation
Non-stabilized, thickened liquid sludge	•	Does not require expensive treatment process.	- Health and environmental implications of pathogenic organism	<ul> <li>Disposal of non-stabilized liquid sludge in landfills is prohibited in most countries</li> <li>The European Union (EU) countries will</li> </ul>	quid sludge in t countries suntries will	OII
			<ul> <li>Vector attraction at disposal site</li> <li>Increased mass &amp; volume add to hauling cost</li> </ul>	prohibit discharge to landfill of all sewage sludge by 2005.	of all sewage	
Non-stabilized de-watered	. 1	easier to handle than liquid shudge	- Health & environmental implications of pathogenic	<ul> <li>Sludge cannot be land applied</li> <li>Landfilling requires careful control of</li> </ul>	d ontrol of	ОП
suuge			organisms - Vector attraction at disposal site	<ul> <li>Reachare, runort and daily cover.</li> <li>Feasible but not recommended because future EU regulations will prohibit discharge of bio-solids to landfill site.</li> </ul>	ver. ed because ohibit dfill site.	
Stabilized liquid sludge	· · · ·	reduced pathogenic content reduced odor potential no expensive de-watering	<ul> <li>disposal of liquid sludge to landfill</li> <li>can increase vector attraction</li> <li>potential increase in risk of</li> </ul>	<ul> <li>Feasible but there is no experience with land application of liquid sludge in Bosnia.</li> <li>Liquid sludge for land application must</li> </ul>	rience with dge in Bosnia. ation must	о <mark>г</mark>
	r	process stabilized liquid sludge can be land applied by injecting below the surface	ground/surface water contamination, and odor potential. mass and volume of liquid sludge adds to disposal costs	meet stringent requirements for attenuation of pathogenic content, and site specific application conditions. - This option is also rejected because it is difficult to immement control and monitor	for attenuation te specific ecause it is	
Stabilized de- watered sludge	111	<ul> <li>retuced pathogenic content</li> <li>reduced odor potential</li> </ul>	- de-watering is potentially expensive and difficult to operate		watered bio-	yes
		high beneficial re-use potential greatest reduction in volume		<ul> <li>Peasible boasticial reuse has been popular in the past</li> <li>This option mean existing tegulatory</li> </ul>	sebæn popular sulatory	
		& nuss easter to handle than liquid sludge		requirements and provides llexibility for enhancing level of treatment if more stringent requirements for biosolids are required	r nore if more ssolids are	

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processes
stabilization
Comparison of

America obie digestion     Cood reduction of volatile suspective       America obie digestion     Cood reduction of volatile suspective       America of the submerical state of the reduced if     Decreting oostic can be reduced if       Bio saids anitable for agreeding     Decreting oostic can be reduced if       Acrobic digestion     Low initial cost       Acrobic digestic     Low initial cost       Acrobic digestic     Low initial cost	Cood reduction of volatile suspended solids			evaluation
Acrobic digestion - Low initial contrast of - simple operation - simple operation - monoscing (in-vessel) - high quality is application - can be combined on	and tabul sludge mass Operating costs can be reduced if gas is used to generate electricity Dio-solids mitable for agnouthand use Jow and aneary requirements	<ul> <li>requires skilled operators</li> <li>high mital cost</li> <li>process is sensitive to loading and temperature</li> <li>process is sensitive to loading and temperature</li> <li>recovers slowly from upset</li> <li>cleaning is difficult (scurn &amp; grit)</li> </ul>		14
	st onal control judge mass	<ul> <li>high cnergy costs</li> <li>lower volatile suspended solids destruction</li> <li>bio-solids are typically difficult to de-water by mechanical means</li> <li>cold temperatures adversely affect performance</li> </ul>	<ul> <li>Typical for small plants Q&lt; 19,000 m3/d</li> <li>This method is rejected because of the high energy costs required for large flows.</li> </ul>	8
- high mittel cost	high quality product suitable for land application can be combined with other processes high initial cost	<ul> <li>requires 18 to 30% de-watered solids</li> <li>requires 18 to 30% de-watered solids</li> <li>requires forced air system and temperature control</li> <li>high operational costs for power, labor and chemicals</li> <li>requires carbon source</li> <li>co-generation of electricity is not possible</li> </ul>	<ul> <li>used to convert shudge into high quality fertilizer</li> <li>capacity ranges from 5 to 45 dry tons per dry tons</li> <li>This method is rejected because the large quantities of daily sludge exceed practical limits of application.</li> </ul>	8
Littue-stabilization loss constrained cost easy 3pecifican peod as antermu of superior yamile peod as antermu of superior yamile medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medical medic	low texpital cost easy operation motion motion motion autostant autostant produces wolune produces wolune produces wolune produces wolune produces and quarky recontes a finant autocolor con use gas from autocolor digestion is source of eacry	byb-rolids and lwarys suitable for similar application abmine of laterative interest co-generation of statisticity is not possible produced in off-gas i the ministic treated produced in off-gas i the ministic treated	Lyryset tot amate part actor and predication large applications at a score species as an of the manufacturan at a score schrift process of the manufacturan process while process consisted as a score of the part of the manufacturan available and manufacturants the receiver and manufactu	

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Comparison of sludge-dewatering methods

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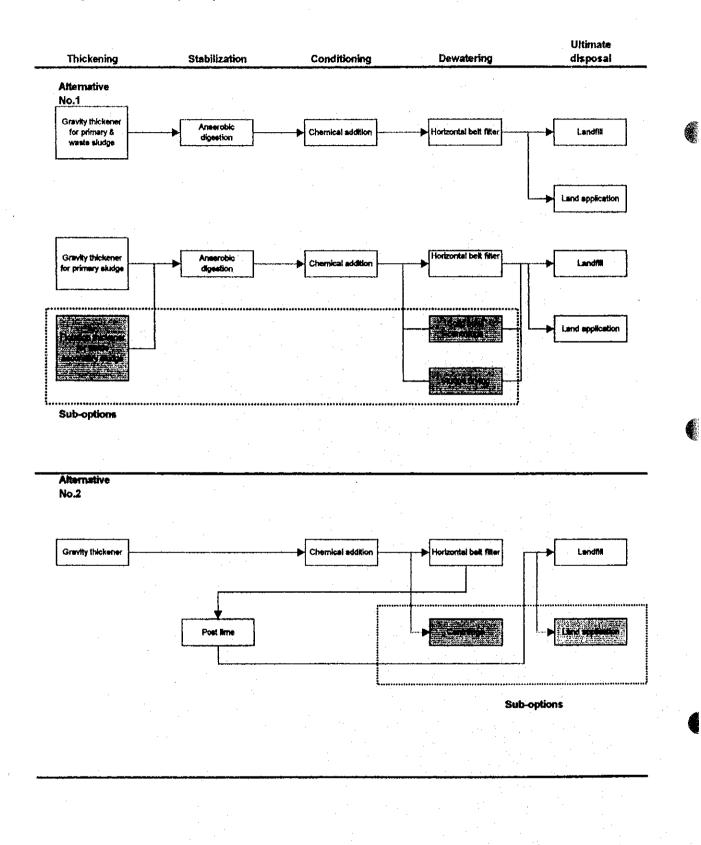
Draft for discussion

Process	Advantages	Disadvantages	Application	Selected for
Vacuum filter	<ul> <li>Skilled personnel is not required</li> <li>Maintenance requirements are low for continuously operating equipment</li> </ul>	<ul> <li>Highest energy consumer per unit of sludge</li> <li>Continuous operator attention required</li> </ul>	<ul> <li>Rejected because of high energy</li> <li>&amp; operational requirement</li> <li>18 to 25% alvive rate</li> </ul>	Evaluation - no
Solid bow	<ul> <li>Oleans and minimed 1 odor y problems</li> <li>cerry to unitall</li> <li>full shift can and almothown canabilities</li> <li>produces infatroely advisition calce 15,50%</li> <li>buw tapibisi coordio- sapasaty ratio</li> </ul>	<ul> <li>secoli went na singh maintenance problem</li> <li>requires good gui removal and possibly a sludge guider fa the food at semi skilled maintenance</li> <li>performet required</li> </ul>		
importionale basiket centrifuge Boik filter	<ul> <li>chemical conditioning may not be required</li> <li>easy to install</li> <li>fast start-up and shurdown capabilities</li> <li>vary flexuble in meeting process requirements</li> <li>not affected by grit</li> <li>excedient results for difficult sludge</li> </ul>	<ul> <li>limited size capability</li> <li>except for vacuum filters, consumes more energy per unit of shudge de-watered</li> <li>for easily de-watered sludge, has highest capital cost-to-capacity ratio</li> <li>significantly high recycle loads</li> </ul>	<ul> <li>rejected because of low cake solids. For most sludges, produces lowest cake solids concentration 8 tol 4%</li> </ul>	8
	relatively flow capital and specarity costs feet complete transmissibly and easier (commutant	Tyrminen Junneo unolopyt Periodike printer in (ed. inen Very Schiftyr (Eriooning Aloge feel Abertreisies	<ul> <li>considered for further evaluation</li> <li>http://pressure.institutes.are</li> <li>ophile.if producing-sery.dry</li> <li>oke</li> </ul>	
Recessed plate filter press	<ul> <li>highest cake solids concentration 20 to 25%</li> </ul>	lition	<ul> <li>rejected because of high capital, O&amp;M costs.</li> </ul>	- No
		bootechbyersecold(1)/s likts inhemice produces in of gas that must be brauch mergy inframes folgener gas us pot available	this optics produces a good quality shuge that tam be farther processed as fertilizer	
situdge drying beds Siludge Lagoons	<ul> <li>lowest capital cost method where land is readily available</li> <li>strail amount of operator attention and skill required</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>no tentical consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> <li>low energy consumption</li> </ul>	<ul> <li>requires large area of land</li> <li>requires stabilized studge</li> <li>design requires consideration of climactic effects</li> <li>siudge removal is labor intensive</li> <li>potential for odor and vector problems</li> <li>potential for groundwater pollution</li> <li>design requires consideration of climactic effects</li> </ul>	<ul> <li>trjected because of unfavorable climatic conditions.</li> <li>rejected because of unfavorable climatic conditions.</li> </ul>	9X -
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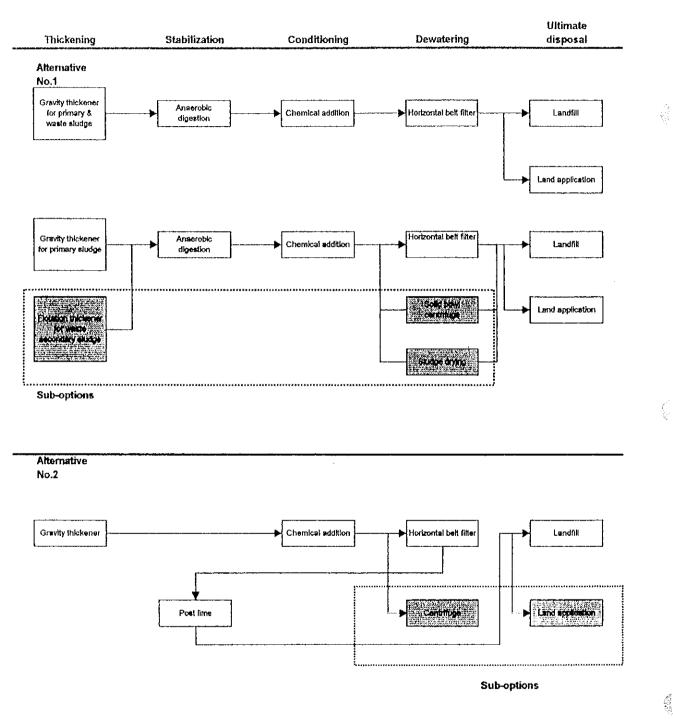
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L -16

#### Sludge treatment and disposal options



#### Sludge treatment and disposal options



THE JICA STUDY TEAM OFFICE FOR THE REHABILITATION OF THE SEWERAGE SYSTEM OF CANTON SARAJEVO VODOVOD I KANALIZACIJA Tel.:++387-71-458-630 Fax:++387-71-458-630 Mobile:++387-90-160-190 Date : 25,06,99

#### Prof. Dr. Mehmed SARIC

Assistant Minister,

Ministry of Agriculture, Water Management and

Forestry of Federation of Bosnia Herzegovina (MOAWMF),

St. Hamdije Kresevljakovic 3,

Sarajevo 71000

Bosnia i Herzegovina

Tel: ++387-71-443-338

Fax :++387-71-663-659

Re: Report for Meeting with Vodovod i Kanalizacija (ViK) regarding the Sarajevo WWTP Project in Butila

#### Dear Sir,

To

The Study Team had commenced the second site survey for the Feasibility Study of the Sarajevo WWTP. As per our discussion during the meeting held on 26 to 28 May 1999, the activities of our team stationed in ViK office at Terezija and WWTP site at Butila, are now in full swing.

The study team and ViK had a meeting regarding the fundamentals of this project for preliminary design on 17 June 1999. We have confirmed several important issues as per our Minute of Meeting (M/M). We, however, were directed to ask MOAWMF the important matters in order to finalize for proceeding this Project towards the next Project phase. The Study Team would like to confirm the following:

- 1. Are there any "National Treated Effluent Standards", as mentioned in the "Long Term Solutions Report"?
- Consent of the Water Management Authority to renew discharge permit for WWTP effluent to Bosna River. Effluent quality for the design of WWTP is as follows:

counted...../2

Flow rate	196,000 m3/d (dry weather flow, year 2015)
BOD5	20 mg/l
S.S.	30 mg/l
pH	6-8

- 3. Industrial effluent standards to the public sewerage system as shown in IT/R as per page 4-7 & 8 and its adoption for future legislation and implementation.
- 4. Consent of the Canton Sarajevo to accept digested dewatered sludge cake for final disposal at landfill site. Estimated dewatered sludge cake quantity and mass are as follows:

Quantity : 144 m3/day Mass :160,000 kg/day

5. Does MOAMF have any reconstruction programme of "Main Laboratory" building?

Awaiting for your prompt reply and thank you very much indeed.

Sincerely yours,

Kaoru SUZUKI Team Leader, ЛСА Study Team

encl.: As above.

c.c. 1. Mr.Fahrudin PILAVZIC General Manager, Canton Public Communal Company, Vodovod i Kanalizacija 8 J. Cernija St. Sarajevo 71000 Bosnia i Herzegovina Tel : ++387-71-447-741 Fax :++387-71-440658

counted...../3

2. Mr.Midhat BISCEVIC Director,
Canton Public Communal Company,
"Vodovod i Kanalizacija",
Tel : ++387-71-668-260
Fax : ++387-71-204-574

Mr.Zulfikar DRACE
High Advisor,
Canton Public Communal Company,
"Vodovod i Kanalizacija",
Tel : ++387-71-668-260
Fax : ++387-71-204-574

4. Minutes of Meeting between MOAMF, ViK and JICA Study Team

### THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO

# MINUTES OF MEETING BETWEEN THE MINISTRY OF AGRICULTURE, WATER MANAGEMENT AND FORESTRY, VODOVOD I KANALIZACIJA AND JICA STUDY TEAM

### 1. DATE: 16 July 1999

TIME: 11:00 AM

2. VENUE: VIK Conference Room, Terezija 38

### **3. ATTENDANCE LIST**

3.01 Prof. Dr. M. SARIC	Ministry of Agriculture, Water Management and
	Forestry (MOAWMF) – Assistant Minister
3.02 Mr. S. BAGARIC	Ministry of Agriculture, Water Management and
	Forestry – BiH General Water Inspector
3.03 Mr. F. PILAVDZIC	Vodovod I Kanalizacija (ViK) – General Manager
3.04 Mr. Z. DRACE	Vodovod I Kanalizacija – High Advisor
3.05 Mr. J. DREKOVIC	Vodovod I Kanalizacija – Director
3.06 Mr. M. AVDIC	Vodovod I Kanalizacija – Section Chief
3.07 Mr. K. ARIFHODZIC	Vodovod I Kanalizacija - Section Chief
3.08 Mr. F. ASCIC	Vodovod I Kanalizacija – Section Chief
3.09 Mr. K. SUZUKI	JICA Study Team – Team Leader
3.10 Mr. R. CRISOSTOMO	JICA Study Team – Facility Design/O&M Planning
3.11 Mr. R. DESPAULT	JICA Study Team – Facility/Structure Design
3.12 Mr. Y. TAKADA	JICA Study Team - Structure/Architectural Design
3,13 Mr. H. SAKAI	JICA Study Team – Structure/Mechanical Design
3.14 Mr. K. OTA	JICA Study Team - Structure/Electrical Design
3.15 Dr. S. KUGAPRASATHAM	JICA Study Team – Environment/Water Quality
3.16 Mr. M. DOYA	JICA Study Team - Management/Finance/
	Economic Analysis/Institution/Organization

4. PURPOSE: Presentation of the Proposed Plan of the WWTP.

### 5. MINUTES OF MEETING

- **5.1** Mr. K. Suzuki opened the meeting at 11.00 A.M. by stating the purpose of the meeting to provide highlights of the Study Team's progress and findings to date. Mr. Suzuki presented the following agenda.
  - Progress of the Second On-site Work
  - Alternatives for the WWTP Rehabilitation
  - Proposed Plan & Layout (Conceptual)
  - Water Quality and Environment
  - Economic & Financial Aspects
  - Schedule and Activities for the Final Report

### 5.2 Progress of the Second On-site Work.

The Study Team presented the activities and progress of the second field survey and assessment of the WWTP facilities in all aspects both done by the Study Team and the local contractor, USB Kedly Doo.

### 5.3 Alternatives for the WWTP Rehabilitation.

The Study Team presented to the MOAWMF and ViK the alternatives for the rehabilitation including repair/replacement of equipments, repair and reconstruction of buildings and facilities, upgrading/replacement of treatment facilities. The Study Team also discussed the selection criteria and the advantages and disadvantages to show the feasibility of each alternative. Further elaboration on the following alternatives were done.

- a.) <u>Aerators.</u> The existing surface aerators can be utilized provided they will be rehabilitated. The Study Team is evaluating an option to replace the existing aerators with more energy-efficient technology using fine bubble air diffusers. A final recommendation will be made based on the results of cost comparison and financial evaluation.
- b.) <u>Sludge Treatment</u>. The existing anaerobic digesters will be rehabilitated since other treatment options are not feasible.
- c.) <u>Sludge Dewatering</u>. At the request of ViK, the Study Team evaluated the use of centrifuges for dewatering. Investment cost for centrifuges are found to be about 2.5 times higher than the filter presses, polymer consumption is double, and utilises about 415 kW more energy. Therefore, the Study Team recommends the use of new filter presses for dewatering.

The construction of new pre-treatment and pre-screening facilities is recommended to address the serious operational problems caused by grit. Operational and maintenance problems previously encountered are also addressed by providing winter protection covers to facilities such as grit removal and screening facilities and raising the operational level of the facilities for flood prevention.

For proper site planning, the Study Team introduced options include effluent chlorination, and odour control. These are not required for the year 2000, but could be implemented in the future to meet new regulatory requirements.

The Study Team accepted the request of ViK for an investigation/alternative option for the floating cover of the Gas Holding Tank.

#### 5.4 Proposed WWTP Site Plan.

The Study Team presented the Proposed Plan and Layout (Conceptual) of the WWTP for the year 2000 and 2015.

#### 5.5 Water Quality and Environment

The Study Team presented and discussed the results of the water quality tests for the river and raw sewage samples taken at different sampling points for June/July in comparison with that taken last March. The Study Team recommended that discharge of raw sewage to Miljacka River be stopped for the protection of the receiving rivers.

The Study Team recommended to ViK the need to coordinate with RAD in regards to the disposal of sludge cake from the WWTP.

The Study Team also recommended the monitoring and control of industrial wastewater discharge into the sewerage system.

#### 5.6 Economic and Financial Analysis

The Study Team presented and discussed the results of the survey on industrial, commercial, and institutional consumers of ViK. It was stressed that, generally the companies and institutions surveyed are willing to pay about 42% for the cost of wastewater treatment in addition to their current sewerage bill.

#### 5.7 Schedule and Activities of the Final Report

The Study Team presented the schedule and activities in relation to the fulfilment of the Final Report and possible loan application.

### 6. OTHER MATTERS

- 5.1 The ViK clarified to the Study Team that the current rehabilitation works being done to the WWTP facilities through in-house budget are just minor repairs to the buildings to prevent them from further deterioration.
- 7. NEXT MEETING: 3 August 1999 at 11:00 AM, ViK Conference Room

# Prof. Dr. Mehmed SARIC

Assistant Minister, Ministry of Agriculture, Water Management and Forestry

### **MR. Fahrudin PILAVDZIC** General Manager, Vodovod I Kanalizacija

Mr. Kaoru SUZUKI Team Leader, JICA Study Team



### KANTONALNO JAVNO KOMUNALNO PREDUZEĆE "VODOVOD I KANALIZACIJA" SARAJEVO

PREDUZEĆE ZA PROIZVODNJU I DISTRIBUCIJU VODE, ODVOĐENJE I TRETMAN OTPADNIH VODA Sjedište: ul. Jaroslava Černija br. 8, tel: 531-655, 447-741; fax: 440-658

### THE MANAGING DIRECTOR SOCIAL DEVELOPMENT STUDY DEPARTMENT JAPA INTERNATIONAL COOPERATION AGENCY

### RE: <u>REQUEST FOR TRANSFER OF EQUIPMENT – THE FEASIBILITY STUDY ON THE</u> WASTEWATER TREATMENT PLANT OF SARAJEVO CITY IN BOSNIA AND HERZEGOVINA

We hereby have the honour to confirm a request for transfer of the equipment supplied by Japan International Cooperation Agency (JICA) to the Water and Sanitation Company ("Vodovod i Kanalizacija") after the completion of survey work in Sarajevo in relation the above study.

Water and Sanitation Company ("Vodovod i Kanalizacija") will be responsible for control and storage of the equipment in order to facilitate them duly the development studies on wastewater managment.

Enclosed is a list of the equipment under the custody of JICA for the above mentioned Study in Sarajevo.

We presume that this list will be clarified in detail, if the request of Bosnia and Herzegovina counterparts is approved positively.

Water and Sanitation Company ("Vodovod i Kanalizacija") will organize donation ceremony on the 22.09.1999.g. at 13,00 in Butila – laboratory.

Sarajevo 16,07,1999 Mr. Fahrudin PILAV

General Manager, Water and Sanitation Company ("Vodovod i Kanalizacija"

ProbDr. Mehmed SARIĆ

Assistant Minister Ministry of Agriculture, Water Management and Forestry of Federation of Bosnia and Herzegovina

Co.

- Mr. Keiji MIURA Charge d' Affairs, Embassy of Japan Sarajevo, Bosnia and Herzegovina
- 2. Mr. Kouji OTABE First Secretary Embassy of Japan Vienna, Austria
- 3. Mr. Ikufumi TOMIMOTO Resident Representative, JICA Austria Office

# LIST OF EQUIPMENT

### FOR

# THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT

# OF

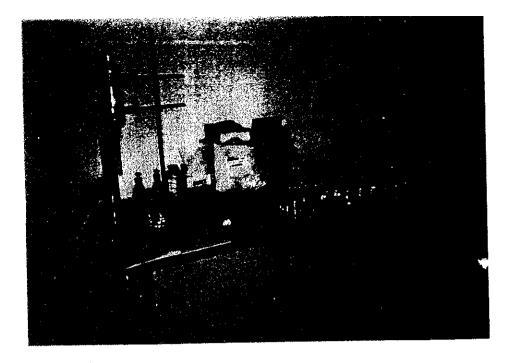
### SARAJEVO CITY

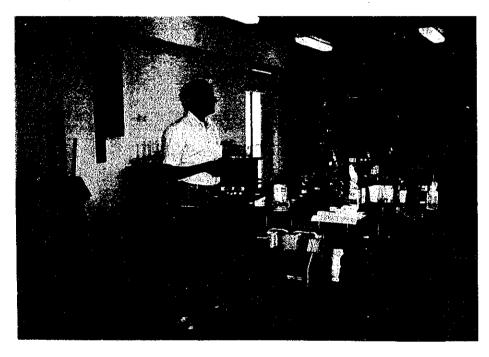
IN

# **BOSNIA AND HERZEGOVINA**

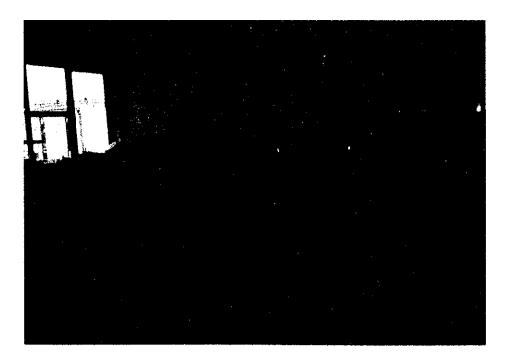
ITEM	TYPE	QUANTITY
(a) Analytical Balance	HM-200	1
(b) pH Meter	IOL-30	1 set
(c) DO Meter	DOL-40	1 set
(d) BOD ₅ Tester (Winkler Method)	8053-02	1 set
(e) Incubator for BOD ₅	IS400	l set
(f) SS (suspended solids) Tester	SS-064	1 set
(g) Drying Oven (for SS)	DV-400	1 set
(h) Water distiller	WS-23	1 set
(i) Water sampler	8052-251	1 set
(j) Electrical transformers (220 V $\Rightarrow$ 110 V)	SU-550,1000,1500	1 set
(k) Schmmit Concrete Test Hammer		2
(l) Test Anvil		1
(m) Micro Pipette	Juster 1100DG	1 set
(n) Thermometer	Alcoholic Liquid	2
(o) Kim Wipe	S-200	1 box
(p) Sample Bottle	No.1800	1 set
(q) Pipette, Volumetric		1 set
(r) Flask, Volumetric		1 set
(s) Spatula	SUS	1 set
(t) Weighing Paper		1 set
(u) Cylinder, Volumetric		l set
(v) Cooler Boxes		1 set
(w) Refrigerator		1

L -26

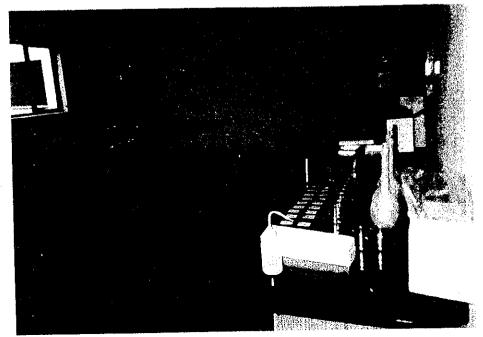












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### THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT **OF SARAJEVO**

# MINUTES OF MEETING **BETWEEN** THE MINISTRY OF AGRICULTURE, WATER MANAGEMENT AND FORESTRY, VODOVOD I KANALIZACIJA AND JICA STUDY TEAM

#### 1. DATE: 03 August 1999

**TIME:** 12:00 PM

2. VENUE: VIK Conference Room, Terezija 38

#### **3. ATTENDANCE LIST**

3.01 Mr. F. PILAVDZIC 3.02 Mr. Z. DRACE 3.03 Mr. M. BISCEVIC 3.04 Ms. H. BUSULADZIC 3.05 Mr. J. DREKOVIC 3.06 Mr. H. HASANOVIC 3.07 Mr. T. BADNJEVIC 3.08 Mr. M. AVDIC 3.09 Mr. F. ASCIC 3,10 Mr. R. JASMIN 3.11 Mr. K. SUZUKI 3.12 Mr. R. CRISOSTOMO 3.13 Mr. R. DESPAULT 3.14 Mr. Y. TAKADA 3.15 Mr. H. SAKAI 3.16 Mr. K. OTA

Vodovod I Kanalizacija (ViK) - General Manager Vodovod I Kanalizacija - High Advisor Vodovod I Kanalizacija - Director Vodovod I Kanalizacija - Section Chief Vodovod I Kanalizacija - Section Chief Vodovod I Kanalizacija - WWTP Superintendent JICA Study Team - Team Leader JICA Study Team - Facility Design/O&M Planning JICA Study Team - Facility/Structure Design JICA Study Team - Structure/Architectural Design JICA Study Team - Structure/Mechanical Design JICA Study Team - Structure/Electrical Design 3.17 Dr. S. KUGAPRASATHAM JICA Study Team - Environment/Water Quality

#### 4. PURPOSE: Presentation of the Proposed Rehabilitation Plan of the WWTP.

#### 5. MINUTES OF MEETING

- **5.1** Today's meeting, which is a continuation of last July 16th was opened by Mr. K. Suzuki at 12.00 P.M. by reiterating its purpose. Mr. Suzuki presented the following agenda.
  - Contents of the Draft Final Report (DF/R)
  - Drawings of the Preliminary Design
  - Project's Cost Estimate
  - Procedure for OECF Loan Application

#### 5.2 Contents of the DF/R

The Study Team presented to the ViK management the contents of the DF/R to include as follows:

Volume I	Summary Report (Written in English Language)
Volume II	Main Report
Volume III	WWTP Assessment Work Report (Done by the Contractor,
	USB Kedly Doo and the Study Team)
Volume IV	Supporting Report (Appendix)
Volume V	Summary Report (Written in Japanese Language)

#### 5.3 Preliminary Design Drawings.

The Study Team presented the preliminary design drawings, which are categorised into general, civil, architectural, mechanical and electrical aspects. Although the drawings presented are incomplete as per the attached list, completion of outstanding drawings will be done in Tokyo and will be compiled in the DF/R.

#### 5.4 Project's Cost Estimate

The Study Team presented and discussed the preliminary project's cost estimate, a total sum of DEM 77.55M. The total construction cost (DEM 65.50M), categorised as civil, architectural, mechanical, and electrical works is broken down into the local and foreign component at DEM 21.34M and DEM 44.16M, respectively. The engineering services cost and contingency cost (10%) amounted to DEM 5.00M and DEM 7.05M, respectively. A direct cost on works such as the high voltage transmission cable to be undertaken by BiH side is valued at DEM 1.0M. All of these costs are preliminary estimate based on International Competitive Bidding (ICB) and are subject to change after the final review in Tokyo.

A preliminary cost estimate on Operation and Maintenance (O&M) was also presented valued at DEM 5.77M annually. The computed cost will again be reviewed in Tokyo.

#### 5.5 Procedure for OECF Loan Application

The Study Team presented the OECF Loan Information that include the Procedure for Application of Japan's Yen Credit Loan. Due to the absence of Dr. M. SARIC or any of the representative from the Ministry of Agriculture, Water Management and Forestry, the Study Team suggested to ViK to take the initial steps in reminding the Ministry of taking the necessary formalities in the realisation of the OECF loan application.

The ViK in behalf of the BiH side expressed their thanks and appreciation to the Japanese government and to the JICA Study Team in particular for their sincere cooperation and assistance to the WWTP project.

The ViK further explained the importance of the project in the protection of the environment, but the current economic condition does not warrant them to be burdened with paying a credit loan of such magnitude. If however, there will be funds available, it will be used instead to a more priority projects since the WWTP project is not in the top priority list of the Sarajevo Canton government. The BiH side will be more grateful if the project will be financed by grant aid.

After a brief discussion on the project, the ViK realised the significance of the WWTP in the improvement of the sanitary condition and the protection of the environment.

7. NEXT MEETING: 3rd Field Survey in mid-September 1999 during the presentation of the DF/R.

Mr. Fahrudin PILAVDZIC General Manager, Vodovod I Kanalizacija Mr. Kaoru SUZUKI Team Leader, JICA Study Team

# 5. Record Note of Main Laboratory

# ZAVOÐ ZA VOÐOPRIVREÐU SARAJEVO

ТО	JJCA Study team	ATTN:	Mr. Drače Mers. Takada and Suzuki
<b>COPIES</b> to			
FAX NO.	668 258		

# FAX COVER SHEET

FROM	Zavod za vodoprivredu	NAME	Adnan Bijedic
DATE	23.6.1999.	FAX REF.	
FAX NO.	213 858	No of pages.	2. uklj. prvu

# SUBJECT. Main Laboratory and Administration Building

If problems occur during transmission please call tel no. 387 71 213 858

#### MESSAGE:

Dear Mr. Suzuki,

Thank you for your fax, message which you sent to us on 2 F⁴ of June. Regarding the matter: Main Laboratory and Administration Building, please find our comment:

• Detailed drawings of the building are in Public Enterprise Vodoprivreda, and cau be presented with estimation and programme for rehabilitation. Some kind of rehabilitation is completed, such as roofing and windows installing.

• At the moment we have no detailed programme for the Main Laboratory, but we can inform you that this kinds of institutes is necessary in scope of water pollution controlling. In this view, we would recommend water and waste water analyse as very starting activity. Attached is the main information about laboratory from pre war period;

We would be very glad if you can fixed a meeting, where we can discuss this subject. For us, the best date could be next week, after  $27^{tb}$  of June, respectively.

If you have any kind of comments, please don't hesitate to contact us.

With regards,

Adnan Bijedic Zavod za vodoprivredu, Sarajevo

Man addrass: Zavod za vodoprivredu, Livanjska 42, 71 000 Sarajavo Phone: +4 387 71 213 858, +4 387 71 213 863, ++ 387 71 612,385, ··· Fax: ++ 387 71 213 858

1.

### The main information's about laboratory of the Public Enterprise

#### Vodoprivreda BiH from period hefore the last war

#### 1. Number of employees:

20

(3 Ph.D., 3 M.Sc., 1 B.Sc. of technology, 4 B.Sc. of biology, 2 B.Sc. of chemistry, 7 assistance's);

#### 2. Scope of activity

#### a) Analyses of waste water and specific pollutant according standard American methods

- issuing certificates for all kind of treatment plants;
- maintaining and controlling the process of town's waste water treatment plant;
- giving technological solutions;
- determination of the Ekvivalent Number of Inhabitants;

#### b) Water analyses

- Natural water analyses;
- giving technological solutions;
- bacteriological analyses according the methods recommended by WHO;
- toxic analyses using fishes, daphnias etc.;

#### 3. Laboratory equipment

- atomic absorber, (AAS);
- gas cromatograph;
- thermostat, range 20-37 °C;
- vessels for samples;
- fridges;
- precise analytical scaling weight, type Sattorius Meler, up to 200 g;
- technical analytical digital scaling weight, up to 1000 g;
- equipment WTW for determination of dissolved oxygen;
- field equipment for determination of dissolved oxygen;
- turbidity meter;
- conductivity meter;
- pH metor, laboratory and field device;
- devices for distillation and re-distillation of water;
- pumps for samples taking
- set for samples taking with 24 bottles;
- device for Kyeldal nitrogen determination;
- spectrophotometer;
- device for determination of Chemical Oxygen Demand;
- laboratory heaters;...
- centrifugal device;
- drying device;
- glowing device up to 1100°C;
- device for Jaar testing;
- aquarium for testing organisms;
- PC equipment;
- 4 cars, four wheel drive;

### ZAVOD ZA VODOPRIVREDU d.d. SARAJEVO (enterprise for research, studies, design and consulting)

JICA STUDY TEAM Sarajevo Wastewater Treatment Project

SARAJEVO

(Attn. Mr. Kaoru SUZUKI)

### Re: Rehabilitation of the central laboratory of Vodoprivreda

Dear Sir,

According to conclusions from our last meeting, which we have had in our office, please find our short Programme of the Central Laboratory activities in two phases:

- 1. Phase one, as very beginning phase;
  - Determination of the Equivalent Number of Inhabitants for industrial and municipal pollutants, what is obligation by our law;
  - An investigation activity for potential water sources, rivers, ground waters and wastewater. These investigations would cover physical, chemical and microbiological analyses;
  - Supervising and monitoring of existing, or new, treatment plants in Federation of Bosnia and Herzegovina;
  - Monitoring and controlling of natural water quality of rivers, lakes and ground water, in Federation;
- 2. Phase two;
  - Preparation of the Studies of general development regarding the protection and organization of natural water resources;
  - Water quality management for catchment area of the main rivers in Federation;
  - Development and application of the new information systems for multidisciplinary approach in scope of environment protection, specially for water quality protection;

Pre-condition for realization of these two phases needs rehabilitation of laboratory building, as well as providing of necessary equipment.

1

Attached to this letter is: Programme of Vodoprivreda's laboratory rehabilitation, prepared in 1998. Programme is still valid and comprising civil works and required equipment. In the mean time some activities are conducted, such as roofing and outside windows installing, so these items have to be neglected in attached Programme.

Programme is on Bosnian language, and needs to be translated. If it is problem for your translator, let us know. We can try to arrange translation work.

If you have any kind of questions, please contact us.

Yours truly,

A. Bijedić

Zavod za vodoprivredu

Sarajevo, 1th July 1999

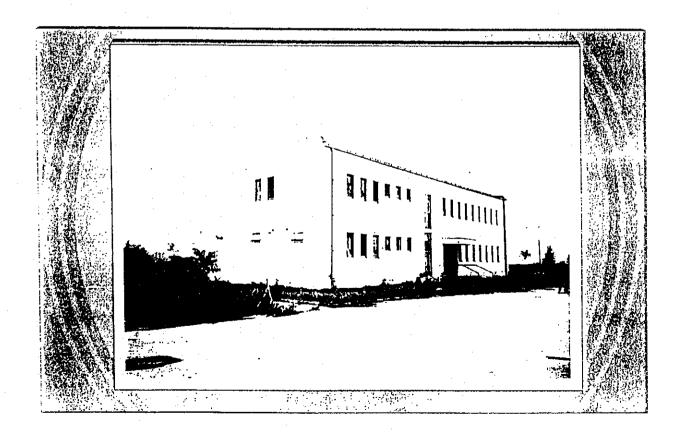
2

FEDERACIJA BOSNE I HERCEGOVINE FEDERALNO MINISTARSTVO POLJOPRIVREDE VODOPRIVREDE I ŠUMARSTVA



JAVNO VODOPRIVREDNO PREDUZEĆE 'VODOPRIVREDA BOSNE I HERCEGOVINE' SARAJEVO

# ELABORAT O SANACLIN VODOPRIVREIDNE LABORATORIJE U BUTILAMIA



### SARAJEVO, 1998.godine L -36

THE JICA STUDY TEAM OFFICE FOR THE REHABILITATION OF THE SEWERAGE SYSTEM OF SARAJEVO CITY VODOVOD I KANALIZACIJA Tel.:++387-71-458-630 Fax:++387-71-458-630 Mobile:++387-90-160-190 Date : 01st July, 1999

Mr. A. BIJEDIC Zavod za Vodoprivreda d.d. Sarajevo, Brace Begic 42-46, Sarajevo 71000 Bosnia i Herzegovina Tel : ++387-71-213-863 Fax :++387-71-213-858

Re: Report of Meeting withVodovod i Kanalizacija (ViK) Regarding The Sarajevo WWTP Project in Butila

Dear Sir.

То

This is to follow-up our previous correspondence dated 25 June 1999 regarding the above-mentioned subject, in which one of the issues (Item No.5) considered is the status Main Laboratory Building (Facility No.25) located of the WWTP site.

We received a letter dated Olst July 1999, and a copy of "Elaborate Rehabilitation Programme of the Central Laboratory of Vodoprivreda" by hand. Thank you very much indeed for your quick response. We, then, have gone through this rehabilitation programme.

Based on the our observation from the programme, the Study Team may study and consider the possibility of funding sources for your rehabilitation costs of the Main Laboratory building for the preliminary design of JICA study. You are kindly requested to inform us the funding of this programme. We would like only to know whether VBH is able to manage to fund by your own finance or not.

Awaiting your prompt reply, we remain.

counted...../2

Sincerely yours,

Kaoru SUZUKI Team Leader, JICA Study Team

encl.: As above.

c.c. 1. Prof. Dr. Mehmed SARIC

Assistant Minister, Ministry of Agriculture, Water Management and Forestry of Federation of Bosnia Herzegovina (MOAWMF), St. Hamdije Kresevljakovic 3, Sarajevo 71000 Bosnia i Herzegovina Tel : ++387-71-443-338 Fax :++387-71-663-659

2. Mr.Midhat BISCEVIC Director,

Canton Public Communal Company, "Vodovod i Kanalizacija", Tel : ++387-71-668-260 Fax : ++387-71-204-574

3. Mr.Zulfikar DRACE

High Advisor,

Canton Public Communal Company,

"Vodovod i Kanalizacija", Tel : ++387-71-668-260

Fax: ++387-71-204-574

# FACSIMILE COVER PAGE

Date: Time: Pages:

To:Mr. Kaoru SUZUKICompany:The JICA Study Team Office SarajevoFax #:458 630

From:	Adnan Bijedic
Title:	User
Company:	Home
Address:	Grbavicka 14 B
	Sarajevo, FBiH 71000
	BiH
Fax #:	522243
Voice #:	522243

7/2/99

12:30:18 2

Message:

Dear Mr. Suzuki,

Please find attached our comments for your letter, from 1st July 99, regarding the Central Laboratory rehabilitation,

Regards,

A. Bijedic

### ZAVOD ZA VODOPRIVREDU d.d. Sarajevo (enterprise for research, studies, design and consulting)

JICA STUDY TEAM Sarajevo Wastewater Treatment Project

Sarajevo (Altn. Mr. Kaoru Suzuki)

Dear Sir,

Regarding the your letter, dated 1st of July 1999, whereas you are requesting information about funding programme of Central Laboratory of Vodoprivreda, please find our comments:

- Our company, Zavod za vodoprívredu, as owner of the Laboratory building, has no available funds for rehabilitation programme;
- All relevant organizations, such as: "Vodoprivreda", (the correct titles are: Public enterprise for catchment area of Sava river, and Public enterprise for catchment area of Adriatic sea), responsible ministry, and of course Zavod za vodoprivredu, are interested, to have one central Laboratory which could serve Federation of Bosnia and Herzegovina;
- In financial programme of Vodoprivreda, for 1999, there is no planned funds for rehabilitation of Central Laboratory. The same situation is with financial plans of other relevant organizations;

Hope that these information are good enough for your purposes.

With regards

A. Bijedic Zavod za vodoprivredu

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# THE JICA STUDY TEAM OFFICE FOR THE REHABILITATION OF THE SEWERÂGE SYSTEM OF SARAJEVO CITY VODOVOD I KANALIZACIJA Tel.:++387-71-458-630 Fax:++387-71-458-630 Mobile:++387-90-160-190 Date : 05th July, 1999

#### То

Director,

Mr.Faruk SABETA

Fax :++387-71-664-861

Public Water Management Enterprise, "Vodoprivreda Bosnia i Herzegovina" (VBH), H.Cemerlica 25, Sarajevo 71000 Bosnia i Herzegovina Tel : ++387-71-651-646

Re: Report of Meeting with "Zavod za Vodoprivreda d.d. Saraevo" Regarding

The Sarajevo WWTP Project in Butila

Dear Sir,

This is to follow-up our previous meeting with above institute dated 28th June, 1999 regarding the above-mentioned subject, in which one of the issues (Item No.5, kindly see attached sheets) considered is the status of the Main Laboratory Building (Facility No.25) located of the WWTP site.

We received a letter dated 01st July 1999, and a copy of "Elaborate Rehabilitation Programme of the Central Laboratory of Vodoprivreda" by hand. We, then, have gone through this rehabilitation programme.

Based on the our observation from the programme, the Study Team may study and consider the **possibility of funding sources for rehabilitation** costs of the Main Laboratory building for the preliminary design of JICA study. You are kindly requested to inform us the funding of this programme. We would like only to know whether VBH is able to manage to fund by your own finance or not.

Awaiting your prompt reply, we remain.

counted...../2

Sincerely yours,

Kaoru SUZUKI Team Leader, JICA Study Team

encl.: As above.

c.c. 1. Prof. Dr. Mehmed SARIC Assistant Minister, Ministry of Agriculture, Water Management and Forestry of Federation of Bosnia Herzegovina (MOAWMF), St. Hamdije Kresevljakovic 3, Sarajevo 71000 Bosnia i Herzegovina Tel : ++387-71-443-338 Fax :++387-71-663-659

Mr.Midhat BISCEVIC
Director,
Canton Public Communal Company,
"Vodovod i Kanalizacija",
Tel : ++387-71-668-260
Fax : ++387-71-204-574

Mr.Zulfikar DRACE High Advisor, Canton Public Communal Company, "Vodovod i Kanalizacija", Tel : ++387-71-668-260 Fax : ++387-71-204-574 JAVNO PREDUZEĆE ZA "VODNO PODRUČJE SLIVOVA RIJEKE SAVE" S A R A J E V O

Adress: ul. H. Comorlica 25, 71000 Serejevo

# FAX PORUKA

DATUM/DATE: PRIMA/TO:	05.07. 1999, godine THE JICA STUDY TEAM		13:00
	n/r Kaoru SUZUKI	FAX:	458 - 630
ŠAI JE/FROM:	JP "VODNO PODRUČJE SLIVOVA RIJEKE SAVE" S BILA J H V O	PHONE: ++387 71 0 DIREKTOR: ++387 71 0 FAX: ++387 71 0	65 16 46; 65 57 59

RÉ: CC: Predmet/Subject: Main Laboratory Building Ime/Name:

Broj strana uključujući i naslovnu/Number of pages including cover sheet: 1

#### Dear Mr. Suzuki

Regarding your letter from 05" July 1999, we send you enswer as follows:

- World Bank financed urgent works on the Main Laboratory Building in amount of 36.000 DEM for the rehabilitation of roof cover, doors and windows, in order to prevent further detoriation of the facility.
- 2. In previous period we tried to find donor to finish rehabilitation of Main Laboratory Building, but without success so far.
- This facility is of great importance for Vodoprivreda in F BIH so we consider it should be put into function as soon as possible (to complete reconstruction and procure necessary equipment).
- 4. Our company doesn't have own funds to realise this project, so we propose that you consider the possibility of finding the sources of finance for the rehabilitation of the Main Laboratory Building.

With respect,

Šabeta, dipl.inž.grad.

6. Minutes of Meeting between Electric Distribution Sarajevo,

ViK and JICA Study Team

### THE FEASIBILITY STUDY ON THE WASTEWATER TREATMENT PLANT OF SARAJEVO

# MINUTES OF MEETING BETWEEN ELECTRIC DISTRIBUTION SARAJEVO, VODOVOD I KANALIZACIJA AND JICA STUDY TEAM

#### 1. DATE: 09 June 1999

TIME: 9:00 AM

2. VENUE: VIK Office, Terezija

#### 3. ATTENDANCE LIST

a.) Mr. K. Suzuki	JICA Study Team – Team Leader
b.) Mr. K. Ota	JICA Study Team – Electrical/Plant Design
c.) Mr. R. Crisostomo	JICA Study Team – Facility Design/O&M Planning
d.) Mr. M. Biscevic	Vodovod I Kanalizacija (ViK) - Director
e.) Mr. J. Rudalija	Vodovod I Kanalizacija – WWTP Superintendent
f.) Mr. M. Brajlovic	Electric Distribution Sarajevo (EDS) - Chief,
	Energy Department

### 4. MINUTES OF MEETING

The meeting was opened by Mr.K. Suzuki with a brief introduction of the project. Mr. M. Brajlovic (EDS) answered and clarified all issues as per the Questionnaire Sheet prepared by Mr. K. Ota as follows:

- a.) A map (Fig.1) was presented showing the location of the existing electric power supply sources to the Sarajevo WWTP, the 10kV power transmission lines and the schematic diagram (Fig. 2) showing the boundary limit between the WWTP and the EDS responsibility.
- b.) When the WWTP was still in operation, EDS supplies electric power to the WWTP from 2 sources as follows:
  - Azici Sub-Station 3.2 megawatts maximum capacity due to the limitation of the 10kV transmission line.

- Rajlovac Sub-Station 1.5 megawatts and is reduced during winter season. Power supply from this source is only switch on by EDS in case of power outages from the Azici S/S.
- c.) A new transmission line parallel to the existing has to be laid (part of the WWTP responsibility) in case the power requirement of the plant exceeds 3.2 megawatts. The additional power supply would come only from Azici S/S.
- d.) A copy of the 1998 Annual Report for the Public Electric Company will be delivered to the ViK office as soon as it will become available.
- e.) Information and diagram showing the power grid lines of Canton Sarajevo will be delivered to the Vik Office as soon as they will become available.
- f.) The organization structure of the Public Electric Company, which includes EDS, is presented in Figure 3.
- 5. NEXT MEETING: To be announced later as the need arises.

MR. M. BISCEVIC Vodovod I Kanalizacija

MR. M. BRAJLOVIC **Electric Distributtion Sarajevo** 

MR. K. SUZUKI JICA Study Team

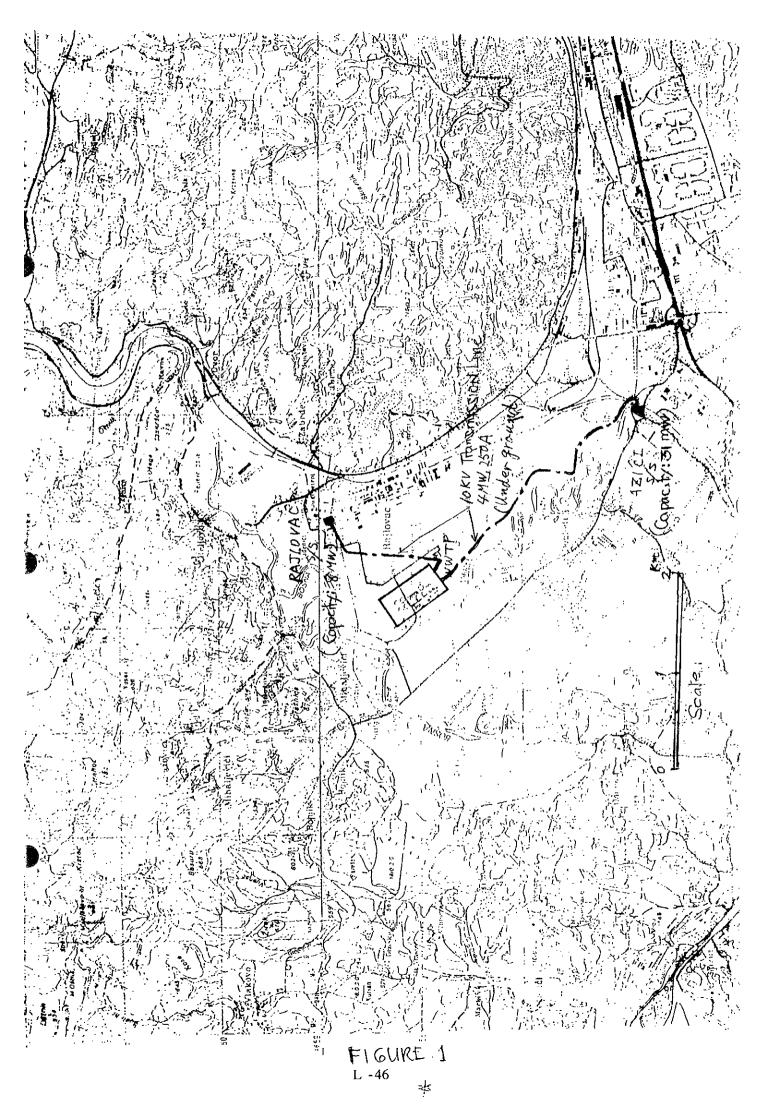


FIGURE 2

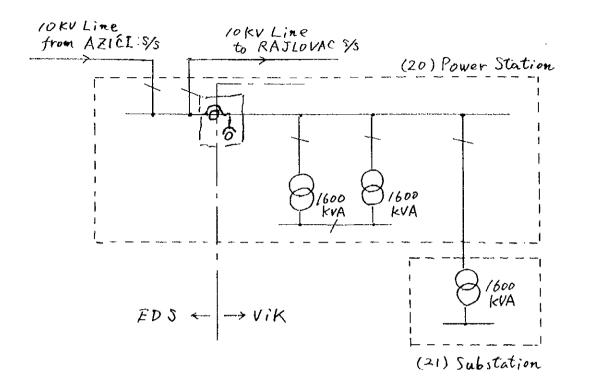
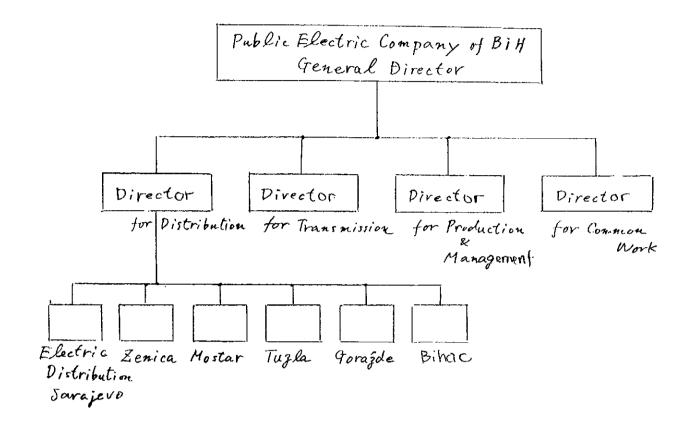


FIGURE 3

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THE JICA STUDY TEAM OFFICE FOR THE REHABILITATION OF THE SEWERAGE SYSTEM OF CANTON SARAJEVO VODOVOD I KANALIZACIJA Tel.:++387-71-20 25 33 Fax:++387-71-20 25 33

То

Mr.Fahrudin PILAVZIC General Manager, Canton Public Communal Company, Vodovod i Kanalizacija 8 J. Cernija St. Sarajevo 71000 Bosnia i Herzegovina Tel : ++387-71-447-741 Fax :++387-71-440658

Re: Power supply to Sarajevo WWTP at Butila Dear Sir,

The Study Team had commenced the second site survey for the Feasibility Study of the Sarajevo WWTP. As per our discussion during the meeting held on 26 to 28 May 1999, the activities of our team stationed in ViK office at Terezija and WWTP site at Butila, are now in full swing.

In order for us to get vital information about power supply to the WWTP, we would like to request your good office to arrange for us a meeting with pertinent officials and engineers of the Electric Power Company in Sarajevo. Attached herewith is our questionnaire sheet for their perused.

We would appreciate it very much if our meeting with them will be held the soonest possible.

Awaiting for your prompt reply.

Sincerely yours,

contd. to page 2

Kaoru SUZUKI Team Leader, JICA Study Team

c.c. 1. : Mr.Midhat BISCEVIC

Director,

Canton Public Communal Company, "Water Supply and Sanitation" Tel : ++387-71-668-260

Fax: ++387-71-204-574

c.c.2. : Mr.Takayuki NAKAGAWA

Second Development Study Department, Japan International Cooperation Agency, Tel : ++813-5352-5229 Fax : ++813-5352-5094 7. Minutes of Meeting of Draft Final Report

#### **MINUTES OF MEETINGS**

#### ON

#### THE DRAFT FINAL REPORT

### FOR

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

### AGREED UPON BETWEEN

# FEDERAL MINISTRY OF AGRICULTURE, WATER MANAGEMENT & FORESTRY, CANTONAL MINISTRY OF URBAN PLANNING, HOUSING & UTILITIES,

### CANTON PUBLIC COMMUNAL COMPANY, "WATER SUPPLY AND SANITATION"

AND

### JICA STUDY TEAM

Sarajevo, September 23, 1999

Prof. Dr. Mehmed SARIC Assistant Minister, Federal Ministry of Agriculture, Water Management and Forestry, FBiH

Ms. Vlasta MEIC Technical Adviser, Federal Ministry of Agriculture, Water Management and Forestry, FBiH

Mr. Fahrudin FILAVDZIC General Manager, Canton Public Communal Company, "Water Supply and Sanitation"

Mr. Kaoru SUZUKI Team Leader, JICA Study Team

Mr. Munib BULJINA Minister, Cantonal Ministry of Urban Planning, Housing and Utilities, Sarajevo

Witnessed by:

Mr. Mihovil MALBAŠIC Assistant Minister, Ministry of Foreign Affairs Dept. of Multilateral Relations

In accordance with the Scope of Work agreed upon between concerned organizations of Bosnia and Herzegovina (BiH) and Japan International Cooperation Agency (JICA) on August 26, 1998, the Study Team submitted 20 copies of the Draft Final Report (DF/R) for The Feasibility Study on the Wastewater Treatment Plant of Sarajevo City in BiH.

A series of discussions were held from September 20 to 22, 1999. The participants of the meetings are listed in the *Attachment*. Based on the discussions, the DF/R was accepted by the BiH side and the following issues were agreed between the BiH side and the Study Team.

1. Contents of DF/R

The Study Team explained the details of the DF/R. The BiH side and the Study Team shared the same understanding on the urgent rehabilitation works.

- (a) Urgent Rehabilitation Works include:
  - Pre-treatment Facilities this include the new construction of 3 rectangular, horizontal flow grit channels to remove heavier grit particles and 3 sets of coarse and medium screens;
  - Existing Inlet Works rehabilitation to the civil structures are necessary, such as repair of the expansion/construction joints, sealing of the cracks, application of appropriate protective layer to the exposed reinforcing bars and coating of the inside walls. The existing Screening Station will be modified with the installation of 4 sets of fine screens. Most of the electro-mechanical equipment will be newly replaced to include aeration and grit removal facilities as well as the motors;
  - Secondary Treatment Facilities the same method of rehabilitation works as above will be required for the civil structures of these facilities. However, new supplemental concrete slab and walls are essential to reinforce the deteriorated portion. Seventeen (17) new motors including gearboxes will be required for the surface aeration turbine and the rest of the 19 can be used;
  - Sludge Treatment Facilities the same manner of rehabilitation works as above will be done for the civil structures of these facilities. Appropriate heat-retaining insulation and anti frozen materials will be required for the digestion tanks and other sludge treatment facilities. New mechanical & electrical equipment for sludge dehydration, recirculation and gas collection systems are necessary to replace the heavily damaged existing equipment; and
  - Building Facilities rehabilitation works on the buildings should continue to complete what the ViK had started. A new building for the boilers & engine generators will be constructed close to the sludge digesters.
- (b) The Study Team explained the breakdown of the estimated total project cost (DEM 76.0 million), the operation and maintenance cost (DEM 6.1 million annually) and the financial plan of the project.
- (c) In order for the BiH side to fully understand the financial viability of the project, the Study Team elaborated various assumptions, emphasizing necessary rate increases and improvement of collection efficiency.

- (d) The Study Team assured that they would make utmost effort to finalize the Feasibility Study in cooperation with the BiH side. In order to finalize the Final Report (F/R), the Study Team reiterated to the BiH side the submission of their comments to the DF/R within one (1) month through the Embassy of Japan in Sarajevo.
- (e) The BiH side expressed their interest for the project implementation through Japan's ODA. The Study Team suggested that BiH should take early decision to apply for Japan's ODA, which is very important for the smooth implementation of the Project. In response, the BiH side stated that they would take the necessary procedure that includes taking the domestic consensus of the concerned organizations.

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2. Counterpart Training

The JICA Study Team mentioned to the BiH side that the counterpart training is going on smoothly in Japan to last until the end of September. The BiH side expressed their appreciation and acknowledged the effort of the Japanese side in sharing with their wastewater treatment technology. In addition, the BiH side showed their intention to apply and maintain within their organization the technology and know-how learned from Japan.

3. Donation of Equipment

The ceremony for the donation of the Water Quality Equipment to Canton Public Communal Company, "Water Supply and Sanitation" was officially held on Wednesday, 22nd September 1999 at Wastewater Treatment Plant, in Butila. Prior to the ceremony, the JICA Study Team performed the final inspection of the equipment to make sure that all are properly maintained. The document for donation and the acceptance letter were handed over by both sides.

Attachment

# ATTENDANCE LIST

### Bosnia and Herzegovina Side:

Ministry of Foreign Affairs Bosnia and Herzegovina	
Mr. Mihovil MALBAŠIC	Assistant Minister, Department of Multilateral Relations
Mr. Mithat PAŠIC	Head of Unit, Department of Multilateral Relations, Unit for Reconstruction
Mr. Aziz HADZIMURATOVIC	Counselor, Department of Multilateral Relations
Ms. Jasna CEHIC	International Aid Coordinator, Department of Multilateral Relations, Unit for Reconstruction
Ministry of Foreign Trade and Economic Bosnia and Herzegovina	Relations
Mr. Reuf HADZIBEGIC Mr. Elmir CAJO	Department Manager Senior Official
Ministry of Agriculture, Water Managen Federation of Bosnia and Herzegovina (F	
Prof. Dr. Ahmed SMAJIC	Minister
Prof. Dr. Mehmed SARIC	Assistant Minister
Ms. Vlasta MEIC	Technical Adviser
Federation of Bosnia and Herzegovina (F	'BiH)
Mr. Nedeljko DESPOTOVIC	Minister
Ms. Branka MEKIC	Technical Assistant
Sarajevo Canton Government	
Mr. Beriz BELKIC	Prime Minister
Mr. Munib BULJINA	Minister,
	Cantonal Ministry of Urban Planning,
	Housing and Utilities
Mr. Salih KARAMEHMEDOVIC	Public Utility Department Assistant
Public Water Management Enterprise, Fe	ederation of Bosnia and Herzegovina
Mr. Munever IMAMOVIC	Director
Ms. Aida BEZDROB	Project Manager
Ms. Sabaheta HAFIZOVIC	Project Manager
Canton Public Communal Company, "W	ater Supply and Sanitation"

Canton Public Communal Company, "Water Supply and Sanitation" Mr. Fahrudin PILAVDZIC General Manager Mr. Jakub DREKOVIC Mr. Zulfikar DRACE Mr. Midhat BIŠCEVIC Mr. Hikmet HASANOVIC Mr. Ahmed BRKIC Mr. Mirsad AVDIC Financial Director Higher Advisor to the General Manager Director Technical Director Section Chief Section Chief

### Japanese Side:

JICA Study Team Mr. Kaoru SUZUKI Mr. Renato Q. CRISOSTOMO Mr. Mitsuhiro DOYA

Team Leader Facility Design/O&M Planning Management, Finance, Economic Analysis (

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Advisory Committee Mr. Kazunori KOINUMA

Chief Advisor

JICA Headquarters Mr. Takayuki NAKAGAWA

Task Management