Table E.35 Data for Financial Analysis of Apa Canal Soroca-Balti (Case 2 of 2008 Case)

(1) 2002 Price

(USD)

	Total	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Water Production	m3 / day		0	0	0	45,100	48,800	54,500	54,500	54,500	54,500	54,500	54,500	54,500	54,500
Electricity	7,562,000		0	0		717,000	776,000	867,000	867,000	867,000	867,000	867,000	867,000	867,000	867,000
Chemical for WTP	531,000		0	0		50,000	54,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000
Personnel and Repairing for WTP	1,657,000		0	0		157,000	170,000	190,000	190,000	190,000	190,000	190,000	190,000	190,000	190,000
O/M cost for Pumping Station	1,188,000		0	0		132,000	132,000	132,000	132,000	132,000	132,000	132,000	132,000	132,000	132,000
OM Total	12,188,000		0	0	0	1,056,000	1,132,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
GeneAdmi	424,945		0	0	0	36,818	39,468	43,582	43,582	43,582	43,582	43,582	43,582	43,582	43,582
OM&GA Total	12,612,945		0	0	0	1,092,818	1,171,468	1,293,582	1,293,582	1,293,582	1,293,582	1,293,582	1,293,582	1,293,582	1,293,582
OM&GA Total 70%						1,240,027	1,378,163	1,578,510	1,638,032	1,700,530	1,766,153	1,835,057	1,907,406	1,983,372	2,063,137
Land	140		140	0	0	0									
M&E	11,260,122		495,986	8,210,029	2,554,107	0									
Civil Works	567,878		25,014	270,971	271,893	0									
Investment Total	11,828,140		521,140	8,481,000	2,826,000	0									
Billing	m3 / day				0	36,080	39,040	43,600	43,600	43,600	43,600	43,600	43,600	43,600	43,600
Billing / Production					0%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%

(2) Current Price

Annual Inflation Rate			7.23%	6.28%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%
GDP Deflator	2002=100		107.2%	114.0%	119.9%	126.2%	132.9%	139.8%	147.2%	154.9%	163.1%	171.6%	180.6%	190.1%	200.1%
Annual Growth Rate			3.50%	4.50%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
GDP Real Growth	2002=100		103.5%	108.2%	113.6%	119.2%	125.2%	131.5%	138.0%	144.9%	152.2%	159.8%	167.8%	176.2%	185.0%
OM&GA Total						1,565,464	1,831,196	2,207,515	2,411,020	2,634,419	2,879,724	3,149,156	3,445,164	3,770,450	4,127,995
Investment Total			558,818	9,665,291	3,389,707	0									
Water Tariff (lei / m3)		1.62	1.80	2.00	2.21	2.44	2.70	2.98	3.29	3.64	4.02	4.44	4.91	5.43	6.00
Exchange Rate (lei / USD)						13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
Revenue 100%						2,361,472	2,823,823	3,485,183	3,851,563	4,256,458	4,703,918	5,198,418	5,744,901	6,348,834	7,016,255
OM &GA / Revenue						66%	65%	63%	63%	62%	61%	61%	60%	59%	59%
Revenue (2002 Price) 100%					0	1,870,556	2,125,217	2,492,122	2,616,728	2,747,564	2,884,943	3,029,190	3,180,649	3,339,682	3,506,666

OM Total (2002 Price)	20,492,080		0	0	0	1,056,000	1,132,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
GeneAdmi (2002 Price)	1,470,011		0	0	0	36,818	39,468	43,582	43,582	43,582	43,582	43,582	43,582	43,582	43,582
OM&GA (2002 Price)	21,962,091					1,092,818	1,171,468	1,293,582	1,293,582	1,293,582	1,293,582	1,293,582	1,293,582	1,293,582	1,293,582

Table E.36 Data for Financial Analysis of Apa Canal Soroca-Balti (Case 3 of 2008 Case)

(1) 2002 Price

(USD)

	Total	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Water Production	m3 / day		0	0	0	45,100	46,500	47,800	47,800	47,800	47,800	47,800	47,800	47,800	47,800
Electricity	6,776,000		0	0		717,000	739,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000
Chemical for WTP	473,000		0	0		50,000	52,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000
Personnel and Repairing for WTP	1,481,000		0	0		157,000	162,000	166,000	166,000	166,000	166,000	166,000	166,000	166,000	166,000
O/M cost for Pumping Station	1,023,000		0	0		126,000	120,000	111,000	111,000	111,000	111,000	111,000	111,000	111,000	111,000
OM Total	10,843,000		0	0	0	1,050,000	1,073,000	1,090,000	1,090,000	1,090,000	1,090,000	1,090,000	1,090,000	1,090,000	1,090,000
GeneAdmi	424,945		0	0	0	36,818	39,468	43,582	43,582	43,582	43,582	43,582	43,582	43,582	43,582
OM&GA Total	11,267,945		0	0	0	1,086,818	1,112,468	1,133,582	1,133,582	1,133,582	1,133,582	1,133,582	1,133,582	1,133,582	1,133,582
OM&GA Total 70%						1,233,219	1,308,753	1,383,268	1,435,428	1,490,196	1,547,702	1,608,083	1,671,484	1,738,054	1,807,953
Land	140		140	0	0	0									
M&E	11,260,122		495,986	8,210,029	2,554,107	0									
Civil Works	567,878		25,014	270,971	271,893	0									
Investment Total	11,828,140		521,140	8,481,000	2,826,000	0									
Billing	m3 / day				0	36,080	37,200	38,240	38,240	38,240	38,240	38,240	38,240	38,240	38,240
Billing / Production					0%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%

(2) Current Price

Annual Inflation Rate			7.23%	6.28%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%	5.25%
GDP Deflator	2002=100		107.2%	114.0%	119.9%	126.2%	132.9%	139.8%	147.2%	154.9%	163.1%	171.6%	180.6%	190.1%	200.1%
Annual Growth Rate			3.50%	4.50%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
GDP Real Growth	2002=100		103.5%	108.2%	113.6%	119.2%	125.2%	131.5%	138.0%	144.9%	152.2%	159.8%	167.8%	176.2%	185.0%
OM&GA Total						1,556,869	1,738,969	1,934,473	2,112,807	2,308,574	2,523,538	2,759,645	3,019,040	3,304,092	3,617,413
Investment Total			558,818	9,665,291	3,389,707	0									
Water Tariff (lei / m3)		1.62	1.80	2.00	2.21	2.44	2.70	2.98	3.29	3.64	4.02	4.44	4.91	5.43	6.00
Exchange Rate (lei / USD)						13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
Revenue 100%						2,361,472	2,690,733	3,056,729	3,378,068	3,733,187	4,125,639	4,559,346	5,038,648	5,568,335	6,153,707
OM &GA / Revenue						66%	65%	63%	63%	62%	61%	61%	60%	59%	59%
Revenue (2002 Price) 100%					0	1,870,556	2,025,053	2,185,751	2,295,039	2,409,791	2,530,280	2,656,794	2,789,634	2,929,115	3,075,571

OM Total (2002 Price)	20,492,080		0	0	0	1,050,000	1,073,000	1,090,000	1,090,000	1,090,000	1,090,000	1,090,000	1,090,000	1,090,000	1,090,000
GeneAdmi (2002 Price)	1,470,011		0	0	0	36,818	39,468	43,582	43,582	43,582	43,582	43,582	43,582	43,582	43,582
OM&GA (2002 Price)	21,962,091					1,086,818	1,112,468	1,133,582	1,133,582	1,133,582	1,133,582	1,133,582	1,133,582	1,133,582	1,133,582

Table E.37 Apa Canal Soroca-Balti Proforma Financial Statements (Case 1 of 2008 Case)

(USD, Current Price)

Year	2,003	2,004	2,005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Income Statement													
Revenue				2,361,472	2,823,823	3,485,183	3,964,636	4,514,189	5,144,102	5,856,566	6,651,436	7,560,355	8,586,867
O&M+GeneAdmi				1,565,464	1,831,196	2,207,515	2,470,813	2,773,516	3,117,013	3,501,862	3,927,487	4,409,918	4,950,291
Depreciation		27,383	521,459	840,405	1,123,055	1,123,055	1,123,055	1,123,055	1,123,055	1,123,055	1,123,055	1,123,055	1,123,055
Interest	12,463	241,514	453,124	600,881	600,881	600,881	600,881	600,881	600,881	600,881	600,258	588,805	578,225
Total Expenditure	12,463	268,896	974,583	3,006,750	3,555,131	3,931,451	4,194,749	4,497,451	4,840,948	5,225,797	5,650,799	6,121,778	6,651,570
Net Income	(12,463)	(268,896)	(974,583)	(645,278)	(731,308)	(446,268)	(230,112)	16,738	303,153	630,769	1,000,637	1,438,577	1,935,297
Cum Net Income	(12,463)	(281,359)	(1,255,943)	(1,901,220)	(2,632,528)	(3,078,796)	(3,308,908)	(3,292,171)	(2,989,018)	(2,358,248)	(1,357,611)	80,966	2,016,263
Fund Flow Statement													
Loan	623,156	11,452,520	10,580,539	7,387,821									
Revenue	0	0	0	2,361,472	2,823,823	3,485,183	3,964,636	4,514,189	5,144,102	5,856,566	6,651,436	7,560,355	8,586,867
Total Inflow	623,156	11,452,520	10,580,539	9,749,293	2,823,823	3,485,183	3,964,636	4,514,189	5,144,102	5,856,566	6,651,436	7,560,355	8,586,867
Investment	*623,156*	*11,452,520*	*10,580,539*	*7,387,821*									
O&M+GeneAdmi	0	0	0	1,565,464	1,831,196	2,207,515	2,470,813	2,773,516	3,117,013	3,501,862	3,927,487	4,409,918	4,950,291
Interest	12,463	241,514	453,124	600,881	600,881	600,881	600,881	600,881	600,881	600,881	600,258	588,805	578,225
Loan Repayment											31,158	603,784	1,132,811
Total Outflow	635,620	11,694,034	11,033,663	9,554,166	2,432,076	2,808,396	3,071,694	3,374,397	3,717,894	4,102,742	4,558,902	5,602,507	6,661,326
Net Inflow	(12,463)	(241,514)	(453,124)	195,127	391,747	676,787	892,942	1,139,792	1,426,208	1,753,824	2,092,534	1,957,848	1,925,540
Net Inflow (cum)	(12,463)	(253,977)	(707,101)	(511,974)	(120,227)	556,560	1,449,502	2,589,294	4,015,501	5,769,325	7,861,859	9,819,707	11,745,248
Balance Sheet													
Cash	(12,463)	(253,977)	(707,101)	(511,974)	(120,227)	556,560	1,449,502	2,589,294	4,015,501	5,769,325	7,861,859	9,819,707	11,745,248
Fixed Assets ex. Land	623,006	12,066,136	22,646,675	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496
Cum Depreciation	0	27,383	548,842	1,389,246	2,512,301	3,635,355	4,758,410	5,881,464	7,004,519	8,127,573	9,250,628	10,373,683	11,496,737
Fixed Assets ex. Land (net)	623,006	12,038,753	22,097,833	28,645,250	27,522,195	26,399,141	25,276,086	24,153,031	23,029,977	21,906,922	20,783,868	19,660,813	18,537,759
Land	150	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541
Total Assets	610,543	11,784,777	21,390,732	28,133,276	27,401,968	26,955,700	26,725,588	26,742,325	27,045,478	27,676,248	28,645,727	29,480,521	30,283,006
Loan (net)	623,156	12,075,677	22,656,215	30,044,037	30,044,037	30,044,037	30,044,037	30,044,037	30,044,037	30,044,037	30,012,879	29,440,253	28,911,226
Capital	(12,613)	(290,900)	(1,265,483)	(1,910,761)	(2,642,069)	(3,088,336)	(3,318,449)	(3,301,711)	(2,998,558)	(2,367,789)	(1,367,152)	40,268	1,371,780
Total Liabilities and Owner's Equity	610,543	11,784,777	21,390,732	28,133,276	27,401,968	26,955,700	26,725,588	26,742,325	27,045,478	27,676,248	28,645,727	29,480,521	30,283,006

Table E.38 Apa Canal Soroca-Balti Proforma Financial Statements (Case 2 of 2008 Case)

(USD, Current Price)

Year	2,003	2,004	2,005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Income Statement													
Revenue				1,870,556	2,125,217	2,492,122	2,616,728	2,747,564	2,884,943	3,029,190	3,180,649	3,339,682	3,506,666
O&M+GeneAdmi				1,240,027	1,378,163	1,578,510	1,638,032	1,700,530	1,766,153	1,835,057	1,907,406	1,983,372	2,063,137
Depreciation		24,537	452,526	597,725	597,725	597,725	597,725	597,725	597,725	597,725	597,725	597,725	597,725
Interest	11,176	204,482	272,276	272,276	272,276	272,276	272,276	272,276	272,276	272,276	271,717	262,052	258,662
Total Expenditure	11,176	229,019	724,803	2,110,029	2,248,165	2,448,512	2,508,034	2,570,532	2,636,154	2,705,058	2,776,849	2,843,150	2,919,525
Net Income	(11,176)	(229,019)	(724,803)	(239,473)	(122,947)	43,610	108,694	177,033	248,788	324,131	403,801	496,532	587,141
Cum Net Income	(11,176)	(240,195)	(964,998)	(1,204,470)	(1,327,418)	(1,283,808)	(1,175,114)	(998,081)	(749,292)	(425,161)	(21,360)	475,172	1,062,312
Fund Flow Statement													
Loan	558,818	9,665,291	3,389,707	0									
Revenue	0	0	0	1,870,556	2,125,217	2,492,122	2,616,728	2,747,564	2,884,943	3,029,190	3,180,649	3,339,682	3,506,666
Total Inflow	558,818	9,665,291	3,389,707	1,870,556	2,125,217	2,492,122	2,616,728	2,747,564	2,884,943	3,029,190	3,180,649	3,339,682	3,506,666
Investment	558,818	9,665,291	3,389,707	0									
O&M+GeneAdmi	0	0	0	1,240,027	1,378,163	1,578,510	1,638,032	1,700,530	1,766,153	1,835,057	1,907,406	1,983,372	2,063,137
Interest	11,176	204,482	272,276	272,276	272,276	272,276	272,276	272,276	272,276	272,276	271,717	262,052	258,662
Loan Repayment											27,941	511,205	680,691
Total Outflow	569,995	9,869,773	3,661,983	1,512,303	1,650,439	1,850,787	1,910,308	1,972,806	2,038,429	2,107,333	2,207,064	2,756,630	3,002,491
Net Inflow	(11,176)	(204,482)	(272,276)	358,253	474,778	641,335	706,420	774,758	846,514	921,857	973,585	583,052	504,175
Net Inflow (cum)	(11,176)	(215,659)	(487,935)	(129,682)	345,096	986,431	1,692,851	2,467,609	3,314,123	4,235,979	5,209,564	5,792,616	6,296,792
Balance Sheet													
Cash	(11,176)	(215,659)	(487,935)	(129,682)	345,096	986,431	1,692,851	2,467,609	3,314,123	4,235,979	5,209,564	5,792,616	6,296,792
Fixed Assets ex. Land	558,668	10,223,959	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666
Cum Depreciation	0	24,537	477,063	1,074,788	1,672,514	2,270,239	2,867,964	3,465,690	4,063,415	4,661,140	5,258,866	5,856,591	6,454,316
Fixed Assets ex. Land (net)	558,668	10,199,422	13,136,603	12,538,877	11,941,152	11,343,427	10,745,701	10,147,976	9,550,250	8,952,525	8,354,800	7,757,074	7,159,349
Land	150	150	150	150	150	150	150	150	150	150	150	150	150
Total Assets	547,492	9,983,764	12,648,668	12,409,195	12,286,248	12,329,858	12,438,552	12,615,585	12,864,373	13,188,505	13,564,364	13,549,691	13,456,141
Loan (net)	558,818	10,224,109	13,613,816	13,613,816	13,613,816	13,613,816	13,613,816	13,613,816	13,613,816	13,613,816	13,585,875	13,102,610	12,933,125
Capital	(11,326)	(240,345)	(965,148)	(1,204,620)	(1,327,568)	(1,283,958)	(1,175,264)	(998,231)	(749,443)	(425,311)	(21,510)	447,081	523,016
Total Liabilities and Owner's Equity	547,492	9,983,764	12,648,668	12,409,195	12,286,248	12,329,858	12,438,552	12,615,585	12,864,373	13,188,505	13,564,364	13,549,691	13,456,141

Table E.39 Apa Canal Soroca-Balti Proforma Financial Statements (Case 3 of 2008 Case)

(USD, Current Price)

Year	2,003	2,004	2,005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Income Statement													
Revenue				2,361,472	2,690,733	3,056,729	3,378,068	3,733,187	4,125,639	4,559,346	5,038,648	5,568,335	6,153,707
O&M+GeneAdmi				1,556,869	1,738,969	1,934,473	2,112,807	2,308,574	2,523,538	2,759,645	3,019,040	3,304,092	3,617,413
Depreciation		24,537	452,526	597,725	597,725	597,725	597,725	597,725	597,725	597,725	597,725	597,725	597,725
Interest	11,176	204,482	272,276	272,276	272,276	272,276	272,276	272,276	272,276	272,276	271,717	262,052	258,662
Total Expenditure	11,176	229,019	724,803	2,426,871	2,608,971	2,804,475	2,982,808	3,178,576	3,393,540	3,629,646	3,888,483	4,163,870	4,473,801
Net Income	(11,176)	(229,019)	(724,803)	(65,399)	81,763	252,254	395,259	554,612	732,099	929,700	1,150,165	1,404,466	1,679,906
Cum Net Income	(11,176)	(240,195)	(964,998)	(1,030,397)	(948,634)	(696,380)	(301,121)	253,491	985,590	1,915,290	3,065,454	4,469,920	6,149,826
Fund Flow Statement													
Loan	558,818	9,665,291	3,389,707	0									
Revenue	0	0	0	2,361,472	2,690,733	3,056,729	3,378,068	3,733,187	4,125,639	4,559,346	5,038,648	5,568,335	6,153,707
Total Inflow	558,818	9,665,291	3,389,707	2,361,472	2,690,733	3,056,729	3,378,068	3,733,187	4,125,639	4,559,346	5,038,648	5,568,335	6,153,707
Investment	558,818	9,665,291	3,389,707	0									
O&M+GeneAdmi	0	0	0	1,556,869	1,738,969	1,934,473	2,112,807	2,308,574	2,523,538	2,759,645	3,019,040	3,304,092	3,617,413
Interest	11,176	204,482	272,276	272,276	272,276	272,276	272,276	272,276	272,276	272,276	271,717	262,052	258,662
Loan Repayment											27,941	511,205	680,691
Total Outflow	569,995	9,869,773	3,661,983	1,829,146	2,011,245	2,206,749	2,385,083	2,580,850	2,795,814	3,031,921	3,318,699	4,077,350	4,556,766
Net Inflow	(11,176)	(204,482)	(272,276)	532,326	679,488	849,980	992,985	1,152,337	1,329,824	1,527,425	1,719,949	1,490,986	1,596,940
Net Inflow (cum)	(11,176)	(215,659)	(487,935)	44,391	723,879	1,573,859	2,566,844	3,719,181	5,049,005	6,576,430	8,296,379	9,787,365	11,384,305
Balance Sheet													
Cash	(11,176)	(215,659)	(487,935)	44,391	723,879	1,573,859	2,566,844	3,719,181	5,049,005	6,576,430	8,296,379	9,787,365	11,384,305
Fixed Assets ex. Land	558,668	10,223,959	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666	13,613,666
Cum Depreciation	0	24,537	477,063	1,074,788	1,672,514	2,270,239	2,867,964	3,465,690	4,063,415	4,661,140	5,258,866	5,856,591	6,454,316
Fixed Assets ex. Land (net)	558,668	10,199,422	13,136,603	12,538,877	11,941,152	11,343,427	10,745,701	10,147,976	9,550,250	8,952,525	8,354,800	7,757,074	7,159,349
Land	150	150	150	150	150	150	150	150	150	150	150	150	150
Total Assets	547,492	9,983,764	12,648,668	12,583,269	12,665,031	12,917,285	13,312,545	13,867,156	14,599,255	15,528,955	16,651,179	17,544,439	18,543,654
Loan (net)	558,818	10,224,109	13,613,816	13,613,816	13,613,816	13,613,816	13,613,816	13,613,816	13,613,816	13,613,816	13,585,875	13,102,610	12,933,125
Capital	(11,326)	(240,345)	(965,148)	(1,030,547)	(948,785)	(696,530)	(301,271)	253,341	985,440	1,915,140	3,065,304	4,441,829	5,610,529
Total Liabilities and Owner's Equity	547,492	9,983,764	12,648,668	12,583,269	12,665,031	12,917,285	13,312,545	13,867,156	14,599,255	15,528,955	16,651,179	17,544,439	18,543,654

ANNEX F

RESULT OF WATER QUALITY SURVEY AND QUALITY STANDARDS

1. General

Water quality surveys in the cities/towns of Balti, Soroca, Falesti, and Riscani, and rivers of Nistru and Prut were carried out by the JICA Study Team in July 2001.

Objective of this water quality survey is to define the baseline condition of raw water (surface water and groundwater) and tap water of the water supply systems in the above cities/towns. Outline of the water quality survey and its results are described below.

2. Water Quality Sampling and Analysis

(1) Sampling

Total 50 water samples were taken as shown below. Details of location are shown in Table F.1 and Figures F.1 (1) through F.1 (5).

Number of Samples

Sampling Area	Surface Water (near water intake)		Groundwater (existing well)		Tap Water (at pipe end)
	River		Deep well	Shallow well	
Riscani	Prut	2	3	2	3
Falesti		3	3	3	1
Balti	---	---	9	3	6
Soroca	Nistru	2	4	2	4
Subtotal	7		29		14
Total	50				

(2) Selection of Sampling Points

Surface Water

Sampling of surface water were made in the vicinity of the existing water intake point of Nistru River and possible intake points of Prut River.

Groundwater

Groundwater samples were taken from deep and shallow wells. The representative production wells for water supply systems were selected for deep well samples, and barrel wells in the urban area of each city were selected for shallow well samples. Consequently, the depths of the former wells are more than 100 m, and that of the latter are 10 m to 30 m.

Tap water

Public taps at the roadside and taps in low story house/building, both connected to water supply distribution system, were selected in consideration of the following:.

- suggestion of personnel in Apa Canals and the Ministry of Health (regular sampling point)
- to include users such as medical and public facilities in addition to general residents

(3) Analysis Items

The items of water quality analysis are shown in Table F.2. The number of analysis items is 39 for surface water, 31 for deep well water, 34 for shallow well water, and 20 for tap water.

(4) Schedule

The water sampling was conducted in the following schedule.

Balti:	10 July 2001
Soroca:	18 July 2001
Riscani:	25 July 2001
Falesti:	31 July 2001

3. Results

The results of water quality survey are shown in Tables F.3 through F.6 and Figures F.1 (1) through F.2 (4).

Turbidity data for raw water and treated water in the existing ACSB water treatment plant are shown in Tables F.7 and F.8.

4. Quality Standards

Water quality standards in Moldova are shown in Tables F.9 through F.12.

Air quality standards and noise standards in Moldova are shown in Table F.13 and F.14, respectively.

Table F.1 List of Sampling Point for Water Quality Survey

Sample No.	City	Type of Source	Address	Latitude/Longitude
B-1	Balti	Shallow well	28 Cearupin St.	47 46 682 N, 27 53 417 E
B-2		Deep well	Copaceanca, well No. 15	47 47 574 N, 27 52 997 E
B-3		Deep well	Copaceanca, well No. 12	47 47 764 N, 27 52 896 E
B-4		Deep well	Copaceanca, well No. 13	47 47 764 N, 27 52 888 E
B-5		Deep well	Copaceanca, well No. 10	47 48 036 N, 27 52 551 E
B-6		Deep well	Copaceanca, well No. 4	47 48 011 N, 27 51 362 E
B-7		Deep well	Copaceanca, well No. 3	47 47 957 N, 27 51 701 E
B-8		Deep well	Gorodskaya, well No. 7	47 47 063 N, 27 54 501 E
B-9		Deep well	N. Pogranichnaya, well No. 6	47 46 603 N, 27 54 749 E
B-10		Shallow well	35 Artema St.	47 46 017 N, 27 53 999 E
B-11		Shallow well	8 Komarova St.	47 44 901 N, 27 54 100 E
B-12		Deep well	New Balti, well No. 29	47 44 612 N, 27 54 053 E
B-13		Tap water	New Balti, Aivazovski St.	47 44 556 N, 27 54 072 E
B-14		Tap water	9 Trandafirilor St.	47 43 849 N, 27 51 381 E
B-15		Tap water	106 Mira St.	
B-16		Tap water	106 31August St.	
B-17		Tap water	70 Chisinau St.	
B-18		Tap water	43 Soroca St.	
Nistru-1	Soroca	Surface water	Nistru river, Otaci village	48 26 350 N, 27 4768 E
Nistru-2		Surface water	Nistru river water intake	48 12 41 N, 28 13 57 E
S-3		Deep well	Egoreni village, deep well No. 4	48 12 848 N, 28 21 976 E
S-4		Deep well	Egoreni village, deep well No. 5	48 12 927 N, 28 22 028 E
S-5		Deep well	Egoreni village, deep well No. 6	48 13 041 N, 28 22 002 E
S-6		Deep well	Egoreni village, deep well No. 7	48 13 150 N, 289 21 979 E
S-7		Tap water	27 Limba Romana St.	48 10 573 N, 28 18 961 E
S-8		Shallow well	Limba Romana St., C. Stere Lyceum	48 10 514 N, 28 19 214 E
S-9		Shallow well	Kindergarten No. 13	48 10 058 N, 28 18 373 E
S-10		Tap water	82 Stefan cel Mare St.	48 100 14 N, 28 18 215 E
S-11		Tap water	18 V. Alecsandri St.	48 09 0942 N, 28 17 987 E
S-12		Tap water	42 A. Cel Bun St.	
Prut-1	Riscani	Surface water	Prut river, Domeni village	47 56040 N, 27 10 399 E
Prut-2		Surface water	Prut river, Costesti village	47 52 824 N, 27 14 899 E
R-3		Tap water	2 Sevcenko St.	
R-4		Deep well	S.A. "Lactis"	47 56 941 N, 27 32 823 E
R-5		Shallow well	48 Independentei St.	47 57 319 N, 27 338 E
R-6		Tap water	57 Independentei St.	47 57 319 N, 27 33 338 E
R-7		Shallow well	4 C. Stere St. (Dr. Botnaru)	47 56 865 N, 27 33 987 E
R-8		Tap water	13 Independentei St.	47 56 894 N, 27 33 978 E
R-9		Deep well	Apa-Canal	47 57 313 N, 27 33 739 E
R-10		Deep well	186 Independentei St.	47 57 139 N, 27 31 466 E
F-1	Falesti	Deep well	Apa-Canal pumping station	47 35 369 N, 27 4186 E
F-2		Deep well	Apa-Canal pumping station	
F-3		Deep well	Apa-Canal pumping station	47 35 376 N, 27 41808 E
F-4		Tap water	Apa-Canal tap-water reservoir	47 35 369 N, 27 4186 E
F-5		Shallow well	sector Victoria	47 34854 N, 27 42 424 E
F-6		Shallow well	M. Eminescu St.	47 34 437 N, 27 42 461 E
F-7		Shallow well	Bus station, near road	47 34 192 N, 27 43 266 E
Prut-3		Surface water	Prut river, water intake, Cobani village	47 23 293 N, 27 34 578 E
Prut-4		Surface water	Taxobeni village, water intake	
Prut-5		Surface water	Ungheni village	

Table F.2 Water Quality Analysis and Measurement Items

	Item of analysis	Category of water source: Surface water	Deep well	Shallow well	Tap water	Note
Simplified Analysis Parameters	pH	○	○	○	○	
	Water temperature	○	○	○	○	
	Turbidity	○	○	○	○	
	Total hardness	○	○	○	○	
	Electric Conductivity	○	○	○	○	
	Total number of microbes	○	○	○	○	
	Coliform bacteria	○	○	○	○	
	Iron (soluble)	-	○	○	-	
	Fluoride	-	○	○	-	
	Sulfide	-	○	○	-	
	Residual Chlorine	-	-	-	-	There is no chlorination
	Ammonia	○	○	○	-	
	Silica	-	○	○	-	
	Manganese	-	○	○	-	
Analysis in the laboratory	pH	○	○	○	○	
	Odor	○	○	○	○	
	Color	○	○	○	○	
	Turbidity	○	○	○	○	
	Total hardness	○	○	○	○	
	Total solids (TS)	○	○	○	○	
	Simazine	○	-	○	-	
	2,4-DB	○	-	○	-	
	Dichlorvos	○	-	○	-	
	Ammonia	○	○	○	○	
	Nitrate	○	○	○	○	
	Nitrite	○	○	○	○	
	Sulfide (H_2S)		○	-	-	
	Chloride (Cl)	○	○	○	○	
	Phosphate ion (PO_4)	○	○	○	○	
	Sulfate ion (SO_4)	○	○	○	○	
	Aluminum (Al)	○	○	○	-	
	Fluorine (F)	○	○	○	○	
	Manganese (Mn)	○	○	○	-	
	Total iron (Fe)	○	○	○	○	
	Copper (Cu)	○	○	○	-	
	Zinc (Zn)	○	○	○	-	
	Selenium (Se)	○	○	○	-	
	Arsenic (As)	○	○	○	-	
	Strontium (Sr)	○	○	○	-	
	Chromium (Total)	○	-	-	-	
	Molybdenum (Mo)	○	○	○	-	
	Lead (Pb)	○	○	○	-	
	Beryllium (Be)	○	○	○	-	
	Calcium (Ca)	○	○	○	○	
	Bicarbonate (HCO_3)		○	○	○	
	Sodium + Potassium (Na + K)		○	○	○	
	Magnesium (Mg)	○	○	○	○	
	Total number of microbes at 37°C	○	○	○	○	
	Total number of microbes at 22°C	○	-	-	-	
	Total coliforms	○	○	○	○	
	Enterococcs	○	-	-	-	
	Colifages	○	-	-	-	
	E. Coli	○	-	○	○	
	Helmints (Parasites)	○	-	-	-	
	BOD_5	○	-	-	-	
	COD (permanganate)	○	-	-	-	
	SS	○	-	-	-	
	DO	○	-	-	-	
	Mineral Oil	○	-	-	-	
	Fenols	○	-	-	-	

Table F.3 (1) Results of Water Quality Analysis (Baliti-1)

Items	unit	Deep well									
		B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-12	Average
pH	-	8.3	8.2	8.2	7.3	8.0	8.1	7.2	8.2	7.7	7.9
Odor	unit	0	0	0	0	0	0	0	0	0	0
Color	grade	26.9	26.3	36.3	18.1	21.3	24.4	16.3	26.9	13.1	23.3
Turbidity	mg/l	0.18	0.12	0.12	0.35	0.41	0.35	0.64	0.23	0.17	0.29
Total Hardness	me/l	0.6	0.6	0.6	4.2	0.9	0.6	8.8	0.6	6.6	2.6
Total solids	mg/l	1,193	1,221	1,199	1,397	1,293	1,276	1,241	1,235	920	1,219
Simazine	micro-g/l	-	-	-	-	-	-	-	-	-	-
2,4-DB	micro-g/l	-	-	-	-	-	-	-	-	-	-
Dichlorvos	micro-g/l	-	-	-	-	-	-	-	-	-	-
Ammonia	mg/l	2.6	3.1	2.5	2.6	2.9	2.8	1.4	2.6	2.1	2.5
Nitrates	mg/l	ND	ND	ND	0.8	ND	ND	ND	ND	0.7	0.8
Nitrites	mg/l	ND	0.001	0.001	0.070	ND	ND	ND	0.001	0.570	0.129
Sulfide	mg/l	0.22	-	0.17	1.12	0.21	-	1.29	0.19	0.20	0.49
Chloride ion (Cl)	mg/l	48.5	60.0	51.5	54.0	105	65.0	45.0	54.5	25.0	56.5
Phosphate ion (PO4)	mg/l	0.14	0.13	0.03	0.11	0.12	0.12	0.04	0.08	0.05	0.09
Sulfate ion	mg/l	275	298	278	442	307	317	418	291	287	324
Aluminum	mg/l	0.10	ND	0.13	0.08	0.07	0.13	0.03	0.01	0.11	0.08
Fluoride	mg/l	2.18	1.93	1.85	1.25	3.02	2.48	0.22	2.25	0.13	1.70
Manganese	mg/l	0.002	0.002	0.002	0.003	0.001	0.001	0.014	0.002	0.003	0.003
Total iron	mg/l	0.07	0.14	0.05	0.08	0.03	0.04	0.13	0.03	0.03	0.07
Copper	mg/l	0.003	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003
Zinc	mg/l	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01
Selenium	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
Arsenic	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
Strontium	mg/l	0.20	0.20	0.20	0.90	0.90	0.40	3.20	0.20	3.20	1.04
Molybdenum	mg/l	-	-	ND	-	-	-	ND	-	ND	-
Lead	mg/l	0.001	0.001	0.001	0.002	ND	0.001	0.002	0.002	0.002	0.001
Beryllium	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
Calcium (Ca)	mg/l	4.0	4.0	3.0	72.1	8.0	3.0	63.1	4.0	37.1	22.0
Bicarbonate (HCO_3)	mg/l	769	738	763	732	744	757	665	793	598	729
Sodium + Potassium	mg/l	479	486	480	463	516	506	302	501	247	442
Magnesium (Mg)	mg/l	4.3	4.3	4.9	7.3	6.1	5.5	68.7	4.3	57.8	18.1
Total number of microbes	n/ml	2	12	4	14	1	0	>300	2	1	5
Total Coliform bacteria	n/litter	<3	40	<3	11	<3	<3	8	<3	<3	-
E.coli	n/litter	-	-	-	-	-	-	-	-	-	-

Table F.3 (2) Results of Water Quality Analysis (Baliti-2)

Items	unit	Shallow well				Tap water						
		B-1	B-10	B-11	Average	B-13	B-14	B-15	B-16	B-17	B-18	Average
pH	-	7.2	7.0	7.2	7.1	7.5	7.0	7.1	7.1	7.1	7.2	7.2
Odor	unit	0	0	0	0	0	0	0	0	0	0	0.0
Color	grade	10.0	10.6	13.8	11.5	14.4	15.6	19.4	21.3	36.3	12.5	19.9
Turbidity	mg/l	0.58	0.40	0.35	0.44	0.46	0.52	0.46	0.52	0.17	0.12	0.38
Total Hardness	me/l	12.8	20.0	13.8	15.5	2.8	4.8	6.5	5.7	5.7	7.7	5.5
Total solids	mg/l	1,810	2,099	1,668	1,859	1,081	988	1,509	1,469	1,575	1,581	1,367
Simazine	micro-g/l	ND	ND	ND	-	-	-	-	-	-	-	-
2,4-DB	micro-g/l	ND	ND	ND	-	-	-	-	-	-	-	-
Dichlorvos	micro-g/l	ND	ND	ND	-	-	-	-	-	-	-	-
Ammonia	mg/l	0.02	0.11	0.10	0.08	1.30	0.80	0.03	0.05	1.80	1.10	0.85
Nitrates	mg/l	69.1	457	149	225	1.3	2.2	10.7	9.0	3.3	1.7	4.7
Nitrites	mg/l	0.001	0.007	0.007	0.005	1.40	1.60	0.001	0.001	0.040	0.050	0.515
Sulfide	mg/l	-	-	-	-	0.17	-	-	-	-	-	-
Chloride ion (Cl)	mg/l	135	140	88.0	121	28.0	28.5	62.0	58.0	80.0	80.5	56.2
Phosphate ion (PO4)	mg/l	0.06	0.13	0.03	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Sulfate ion	mg/l	461	328	506	431	291	286	541	528	548	603	466
Aluminum	mg/l	0.07	0.11	0.04	0.07	-	-	-	-	-	-	-
Fluoride	mg/l	0.88	1.27	0.33	0.83	0.46	0.43	1.57	1.54	2.78	0.44	1.20
Manganese	mg/l	0.005	0.006	0.005	0.005	-	-	-	-	-	-	-
Total iron	mg/l	0.07	0.04	0.04	0.05	0.09	0.09	0.11	0.08	0.11	0.08	0.09
Copper	mg/l	0.005	0.005	0.006	0.005	-	-	-	-	-	-	-
Zinc	mg/l	0.02	0.02	0.02	0.02	-	-	-	-	-	-	-
Selenium	mg/l	ND	ND	ND	-	-	-	-	-	-	-	-
Arsenic	mg/l	ND	ND	ND	-	-	-	-	-	-	-	-
Strontium	mg/l	1.50	1.65	1.20	1.45	-	-	-	-	-	-	-
Molybdenum	mg/l	ND	-	-	-	-	-	-	-	-	-	-
Lead	mg/l	0.002	0.002	0.002	0.002	-	-	-	-	-	-	-
Beryllium	mg/l	ND	ND	ND	-	-	-	-	-	-	-	-
Calcium (Ca)	mg/l	46.1	52.1	92.2	63.5	30.1	23.0	59.1	60.1	33.1	45.1	41.8
Bicarbonate (HCO_3)	mg/l	1,013	1,025	824	954	653	641	732	732	720	720	700
Sodium + Potassium	mg/l	458	373	378	403	369	311	463	473	549	473	440
Magnesium (Mg)	mg/l	128	212	112	150	15.8	44.4	43.2	32.8	22.5	66.3	37.5
Total number of microbes	n/ml	48	114	60	74	5	>300	5	16	47	120	39
Total Coliform bacteria	n/litter	160	510	240	303	414	131	91	97	282	97	185
E.coli	n/litter	<3	<3	<3	-	<3	<3	<3	<3	<3	<3	-

Table F.3 (3) Results of Water Quality Analysis (Soroca-1)

Items	unit	Deep well					Shallow well		
		S-3	S-4	S-5	S-6	Average	S-8	S-9	Average
pH	-	7.7	7.6	7.3	7.4	7.5	7.0	7.0	7.0
Odor	unit	0	0	0	0	0	0	0	0
Color	grade	1.9	1.2	1.2	ND	1.4	ND	ND	-
Turbidity	mg/l	0.12	0.06	0.01	0.12	0.08	0.12	0.12	0.12
Total Hardness	me/l	6.5	4.9	5.1	3.9	5.1	11.2	17.2	14.2
Total solids	mg/l	725	531	473	590	580	983	1,400	1,192
Simazine	micro g/l	-	-	-	-	-	ND	ND	-
2,4-DB	micro g/l	-	-	-	-	-	ND	ND	-
Dichlorvos	micro g/l	-	-	-	-	-	ND	ND	-
Ammonia	mg/l	ND	ND	ND	0.43	-	ND	ND	-
Nitrates	mg/l	47.9	7.30	8.30	4.40	17.0	128	447	287
Nitrites	mg/l	ND	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Sulfide	mg/l	ND	ND	ND	ND	-	-	-	-
Chloride ion (Cl)	mg/l	54.5	40.0	38.5	52.0	46.3	88.0	110	99
Phosphate ion (PO4)	mg/l	0.01	ND	0.01	ND	0.01	0.07	0.08	0.08
Sulfate ion	mg/l	99.9	105	109	134	112	136	132	134
Aluminum	mg/l	0.04	0.04	ND	ND	0.04	ND	ND	-
Fluoride	mg/l	0.63	0.27	0.36	0.43	0.42	0.41	0.66	0.54
Manganese	mg/l	0.001	0.020	0.006	0.060	0.022	0.003	0.004	0.004
Total iron	mg/l	0.01	0.01	0.01	0.05	0.02	ND	ND	-
Copper	mg/l	0.002	0.002	0.002	0.002	0.002	0.030	0.020	0.025
Zinc	mg/l	0.01	0.01	0.01	0.02	0.01	0.03	0.04	0.04
Selenium	mg/l	0.0008	0.0004	ND	0.0010	0.0007	ND	0.0008	-
Arsenic	mg/l	0.0006	0.0003	ND	ND	0.0005	ND	ND	-
Strontium	mg/l	0.5	0.5	0.5	0.5	0.5	1.7	1.5	1.6
Molybdenum	mg/l	ND	ND	ND	ND	-	ND	ND	-
Lead	mg/l	ND	ND	ND	0.001	-	ND	ND	-
Beryllium	mg/l	ND	ND	ND	ND	-	ND	ND	-
Calcium (Ca)	mg/l	72.1	64.1	58.1	58.1	63.1	100	156	128
Bicarbonate (HCO_3)	mg/l	470	348	323	354	374	592	561	577
Sodium + Potassium	mg/l	140	103	88.5	154	121	147	126	137
Magnesium (Mg)	mg/l	35.3	20.7	26.8	12.2	23.8	75.4	114	95
Total number of microbes	n/ml	0	2	0	2	1	26	0	13
Total Coliform bacteria	n/litter	146	1860	1000	14	755	3600	309	1,955
E.coli	n/litter	-	-	-	-	-	<9	<9	-

Table F.3 (4) Results of Water Quality Analysis (Soroca-2)

Items	unit	Tap water				
		S-7	S-10	S-11	S-12	Average
pH	-	7.8	7.3	7.4	7.4	7.5
Odor	unit	0	0	0	0	0
Color	grade	5.6	0.6	0.6	0.6	1.9
Turbidity	mg/l	1.80	0.17	0.23	0.12	0.58
Total Hardness	me/l	3.8	4.9	4.9	4.9	4.6
Total solids	mg/l	540	579	580	565	566
Simazine	micro g/l	-	-	-	-	-
2,4-DB	micro g/l	-	-	-	-	-
Dichlorvos	micro g/l	-	-	-	-	-
Ammonia	mg/l	ND	ND	ND	ND	-
Nitrates	mg/l	7.9	10.5	11.2	11.7	10.3
Nitrites	mg/l	0.10	0.30	0.02	0.20	0.16
Sulfide	mg/l	-	-	-	-	-
Chloride ion (Cl)	mg/l	53.5	52.0	52.0	52.0	52.4
Phosphate ion (PO4)	mg/l	ND	0.01	ND	0.003	0.007
Sulfate ion	mg/l	109	111	114	115	112
Aluminum	mg/l	-	-	-	-	-
Fluoride	mg/l	-	-	-	-	-
Manganese	mg/l	-	-	-	-	-
Total iron	mg/l	0.09	0.01	ND	0.02	0.04
Copper	mg/l	-	-	-	-	-
Zinc	mg/l	-	-	-	-	-
Selenium	mg/l	-	-	-	-	-
Arsenic	mg/l	-	-	-	-	-
Strontium	mg/l	-	-	-	-	-
Molybdenum	mg/l	-	-	-	-	-
Lead	mg/l	-	-	-	-	-
Beryllium	mg/l	-	-	-	-	-
Calcium (Ca)	mg/l	48.1	60.1	60.1	58.1	56.6
Bicarbonate (HCO_3)	mg/l	323	366	366	366	355
Sodium + Potassium	mg/l	132	122	123	124	125
Magnesium (Mg)	mg/l	18.2	23.1	23.1	24.3	22.2
Total number of microbes	n/ml	8	25	15	9	14
Total Coliform bacteria	n/litter	129	226	23	74	113
E.coli	n/litter	<3	<3	<3	<3	-

Table F.3 (5) Results of Water Quality Analysis (Riscani)

Items	unit	Deep well				Shallow well			Tap water			
		R-4	R-9	R-10	Average	R-5	R-7	Average	R-3	R-6	R-8	Average
pH	-	8.3	8.4	8.4	8.4	7.6	8	7.8	8.4	8.2	8.3	8.3
Odour	unit	0	0	0	0	0	0	0	0	0	0	0
Color	grade	17.5	15.0	14.7	15.7	5.6	ND	5.6	12.5	10.6	19.4	14.2
Turbidity	mg/l	0.6	0.3	0.6	0.5	1.4	0.5	1.0	0.3	0.4	0.4	0.4
Total Hardness	me/l	0.3	0.4	0.4	0.4	17.4	14.2	15.8	0.4	0.4	0.3	0.4
Total solids	mg/l	1,290	1,450	1,230	1,320	1,870	1,820	1,850	1,420	1,140	1,500	1,350
Simazine	micro g/l	-	-	-	-	ND	ND	-	-	-	-	-
2,4-DB	micro g/l	-	-	-	-	ND	ND	-	-	-	-	-
Dichlorvos	micro g/l	-	-	-	-	ND	ND	-	-	-	-	-
Ammonia	mg/l	1.9	2.5	1.9	2.1	ND	ND	-	1.70	0.02	2.64	1.45
Nitrates	mg/l	0.5	0.1	ND	0.3	496	50.2	273	0.6	12.5	ND	6.6
Nitrites	mg/l	0.80	0.10	0.03	0.31	0.01	0.003	0.007	0.8	0.3	0.7	0.6
Sulfide	mg/l	0.05	0.10	0.05	0.07	-	-	-	-	-	-	-
Chloride ion (Cl)	mg/l	46	38	55	46	115	101	108	34	27	43	34
Phosphate ion	mg/l	ND	ND	ND	-	ND	ND	-	ND	ND	ND	-
Sulfate ion	mg/l	263	341	256	286	215	316	265	328	257	420	335
Aluminum	mg/l	ND	0.005	0.14	0.07	ND	0.005	-	-	-	-	-
Fluoride	mg/l	3.33	1.51	2.82	2.55	0.62	1.09	0.86	1.83	2.18	1.98	2.00
Manganese	mg/l	0.004	0.004	0.003	0.004	0.005	0.005	0.005	-	-	-	-
Total iron	mg/l	0.07	0.06	0.12	0.08	0.03	0.03	0.03	0.08	0.07	0.13	0.09
Copper	mg/l	0.004	0.002	0.007	0.004	0.003	0.006	0.005	-	-	-	-
Zinc	mg/l	0.01	0.02	0.01	0.01	0.02	0.04	0.03	-	-	-	-
Selenium	mg/l	0.0006	0.0004	ND	0.0005	ND	ND	-	-	-	-	-
Arsenic	mg/l	ND	ND	0.001	-	ND	ND	-	-	-	-	-
Strontium	mg/l	0.20	0.30	0.35	0.28	1.1	1.2	1.2	-	-	-	-
Molybdenum	mg/l	ND	ND	ND	-	ND	ND	-	-	-	-	-
Lead	mg/l	ND	ND	ND	-	0.008	0.007	0.008	-	-	-	-
Beryllium	mg/l	ND	ND	ND	-	ND	ND	-	-	-	-	-
Calcium (Ca)	mg/l	2	2	2	2	86.2	52.1	69.2	2	2	2	2
Bicarbonate (HCO_3)	mg/l	806	909	824	846	806	1,370	1,090	879	806	976	887
Sodium + Potassium	mg/l	492	567	499	519	288	461	375	545	473	642	553
Magnesium (Mg)	mg/l	2.4	3.6	2.4	2.8	159	141	150	3.6	3.6	2.4	3.2
T.N. of microbes	n/ml	0	0	6	2	86	2	44	0	4	6	3
T.Coliform bacteria	n/litter	130	82	114	109	490	400	445	14	325	114	151
E.coli	n/litter	-	-	-	-	<9	<9	-	-	<3	<3	-

Table F.3 (6) Results of Water Quality Analysis (Falesti)

Items	unit	Deep well				Shallow well				Tap water
		F-1	F-2	F-3	Average	F-5	F-6	F-7	Average	F-4
pH	-	8.4	8.4	8.5	8.4	7.8	8.0	7.4	7.7	8.4
Odor	unit	0	0	0	0	0	0	0	0	0
Color	grade	34.7	35.0	34.1	34.6	60.6	15.0	14.1	29.9	35.6
Turbidity	mg/l	0.06	0.12	0.70	0.29	160	0.52	0.12	53	0.12
Total Hardness	me/l	0.5	0.6	0.5	0.5	7.8	25.8	21.6	18.4	0.7
Total solids	mg/l	1,261	1,264	1,199	1,241	1,540	2,646	2,705	2,297	1,356
Simazine	micro g/l	-	-	-	-	ND	ND	ND	-	-
2,4-DB	micro g/l	-	-	-	-	ND	ND	ND	-	-
Dichlorvos	micro g/l	-	-	-	-	ND	ND	ND	-	-
Ammonia	mg/l	1.99	0.23	1.86	1.36	0.35	0.13	0.03	0.17	24.0
Nitrates	mg/l	ND	ND	0.20	-	98.9	534	4.80	213	0.40
Nitrites	mg/l	0.24	0.14	0.73	0.37	0.15	0.01	ND	0.08	0.14
Sulfide	mg/l	0.13	0.13	0.15	0.14	-	-	-	-	0.21
Chloride ion (Cl)	mg/l	33	35	32	33	59	140	148	116	33
Phosphate ion (PO4)	mg/l	ND	ND	ND	-	ND	ND	ND	-	ND
Sulfate ion	mg/l	284	276	266	275	333	494	1,040	622	277
Aluminum	mg/l	0.07	0.08	ND	0.08	0.16	0.01	0.11	0.09	0.06
Fluoride	mg/l	3.96	4.20	3.38	3.85	0.40	1.27	0.15	0.61	4.10
Manganese	mg/l	0.005	0.004	0.005	0.005	0.024	0.009	0.006	0.013	0.030
Total iron	mg/l	0.07	0.07	0.06	0.07	0.08	ND	ND	-	0.06
Copper	mg/l	0.004	0.005	0.004	0.004	0.009	0.009	0.006	0.008	0.004
Zinc	mg/l	0.010	0.001	0.002	0.004	0.040	0.040	0.020	0.033	0.008
Selenium	mg/l	ND	ND	ND	-	ND	0.001	0.001	0.001	ND
Arsenic	mg/l	0.001	ND	ND	-	ND	ND	ND	-	0.001
Strontium	mg/l	0.3	0.3	0.3	0.3	0.7	1.5	2.5	1.6	0.3
Molybdenum	mg/l	ND	ND	ND	-	ND	ND	ND	-	ND
Lead	mg/l	ND	ND	ND	-	ND	ND	ND	-	ND
Beryllium	mg/l	ND	ND	ND	-	ND	ND	ND	-	-
Calcium (Ca)	mg/l	6.0	4.0	4.0	4.7	32.1	60.1	116	69	4.0
Bicarbonate (HCO_3)	mg/l	915	928	879	907	1,050	1,380	1,140	1,190	915
Sodium + Potassium	mg/l	534	534	509	525	490	492	572	518	525
Magnesium (Mg)	mg/l	2.4	4.9	3.6	3.6	75.4	277	192	182	6.1
T. number of microbes	n/ml	34	10	6	17	32	11	145	63	32
Total Coliform bacteria	n/litter	<3	9	<3	-	800	20	510	443	3
E.coli	n/litter	-	-	-	-	127	<3	150	139	-

Table F.3 (7) Results of Water Quality Analysis (Surface Water)

Items	unit	Nistru River			Prut River					
		N-1	N-2	Av.	P-1	P-2	P-3	P-4	P-5	Av.
pH	-	7.3	7.4	7.4	7.7	7.9	7.5	7.6	7.7	7.7
Odor	point	1	1	1	1	1	1	1	1	1
Color	grade	35.6	23.8	29.7	16.3	15.0	30.0	60.6	34.4	31.3
Turbidity	mg/l	1.1	10.1	5.6	2.0	2.6	1.5	0.6	0.6	1.5
Total Hardness	me/l	3.7	3.8	3.8	3.6	3.4	3.3	3.3	3.3	3.4
Total solids	mg/l	306	310	308	289	290	221	273	259	266
Simazine	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-DB	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorvos	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ammonia	mg/l	0.11	0.10	0.11	0.06	0.05	0.09	0.10	0.10	0.08
Nitrates	mg/l	9.0	9.0	9.0	4.0	2.5	4.6	5.0	4.8	4.2
Nitrites	mg/l	0.01	0.01	0.01	0.04	0.05	0.02	0.01	0.01	0.03
Chloride ion (Cl)	mg/l	31	31	31	22	23	20	22	21	22
Phosphate ion (PO_4)	mg/l	0.04	0.05	0.05	0.03	0.03	0.04	0.01	0.04	0.03
Sulfate ion	mg/l	66.2	81.5	73.9	63.0	63.8	54.3	67.2	56.0	60.9
Aluminum	mg/l	0.005	0.005	0.005	ND	ND	0.001	0.001	0.002	0.001
Fluoride	mg/l	0.06	0.10	0.08	0.06	0.11	0.08	0.06	0.08	0.08
Manganese	mg/l	0.02	0.03	0.03	0.02	0.01	0.01	0.02	0.02	0.01
Total iron	mg/l	0.07	0.08	0.08	0.06	0.05	0.03	0.07	0.07	0.06
Copper	mg/l	0.003	0.003	0.003	0.004	0.002	0.004	0.004	0.006	0.004
Zinc	mg/l	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01
Selenium	mg/l	0.002	0.002	0.002	ND	ND	0.0002	0.0002	0.0003	0.0002
Arsenic	mg/l	ND	ND	ND	ND	ND	0.0008	0.0009	0.0010	0.0009
Strontium	mg/l	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Chromium (Total)	mg/l	ND	ND	ND	0.001	0.001	0.004	0.001	0.001	0.002
Molybdenum	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND
Beryllium	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND
BOD5	mg/l	1	1	1	1	1	1	1	1	1
COD (permanganate)	mg/l	2.4	2.4	2.4	1.2	1.6	1.6	1.6	1.6	1.5
SS	mg/l	14.5	17.1	15.8	17.1	14.5	4.0	13.3	12.1	12.2
DO	mg/l	6.6	6.6	6.6	7.2	7.9	5.9	7.7	7.7	7.3
Mineral oil	mg/l	0.62	0.68	0.65	1.58	0.48	0.71	0.90	0.75	0.88
Phenols	mg/l	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.002
Lead	mg/l	<0.001	<0.001	-	0.003	0.003	0.004	0.010	0.020	0.008
Calcium (Ca)	mg/l	56.1	54.1	55.1	52.1	38.1	50.1	48.1	44.1	46.5
Magnesium (Mg)	mg/l	10.9	13.4	12.2	12.2	18.2	9.7	10.9	13.4	12.9
Total microbes at 37°C	n/litter	1,200	770	985	3,000	1,200	230	650	280	1,072
Total microbes at 22°C	n/litter	62,000	2,800	32,400	4,200	1,300	180	440	460	1,316
Total coliforms	n/litter	60,000	68,000	64,000	1,100	34,000	2,900	6,600	4,300	9,780
Enterococcs	n/litter	15,000	800	7,900	450	270	1,700	200	500	624
Colifages	n/litter	200	<100	-	100	<100	<100	100	100	100
E.coli	n/litter	<100	<100	-	100	1,750	<100	600	900	838
Helmints (parasite)	n/litter	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table F.4 (1) Results of Water Quality Analysis (Simplified Analysis : Balti)

Items		Deep wall									
Sampling No.		B2	B3	B4	B5	B6	B7	B8	B9	B12	Average
Appearance	-	Clear	Clear	Clear	Clear	Small bubbles	Clear, smell-small	Clear	Clear	Clear	-
Air Temperature	(oC)	26	28	28.5	30	30.5	33	33	32.5	29	30
Water Temperature	(oC)	13	13.5	16	13	17	16	12	15	14	15
pH	-	8.4	8.0	8.4	7.5	8.2	8.3	7.0	8.3	7.1	7.9
EC	(mS/cm)	1.86	1.93	1.96	2.00	2.00	1.90	1.75	1.86	1.42	1.85
Turbidity	(NTU)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	4.0	N.D.	0.5	2.3
Total Hardness	mg/l	29	22	30	218	41	45	434	32	377	136
NH_4-N	mg/l	3.50	1.70	3.30	2.90	3.20	3.30	1.50	4.10	0.90	2.71
Sulfide	mg/l	0.003	0.015	0.001	N.D.	0.009	0.002	0.004	0.001	0.006	0.005
Fluoride	mg/l	2.06	2.08	4.20	1.78	4.10	3.35	0.85	3.05	0.85	2.48
Fe (soluble)	mg/l	0.01	0.10	0.09	0.09	0.01	0.03	0.20	0.01	0.08	0.07
Residual Cl_2	mg/l	-	-	-	-	-	-	-	-	-	-
Silicate (SiO_3)	mg/l	-	-	-	-	-	-	-	-	-	-
Manganese (Mn)	mg/l	-	-	-	-	-	-	-	-	-	-
Ordinary Bacteria	(CFU/ml)	4.6E+02	4.3E+02	3.1E+02	2.0E+01	8.9E+01	6.0E+00	5.0E+00	0.0E+00	1.2E+03	2.8E+02
Coliform Bacteria	(CFU/ml)	1.3E+02	1.1E+02	1.7E+02	1.5E+01	1.0E+01	1.0E+01	7.0E+00	1.2E+01	3.8E+02	9.4E+01

Items		Shallow well				Tap water						
Source		B1	B10	B11	Average	B13	B14	B15	B16	B17	B18	Average
Appearance	-	Clear	Clear	Clear	-	Clear	Clear	Clear	Clear	Clear	Clear	-
Air Temperature	(oC)	27.5	29	28	29	30	30	32	31.5	32	31.5	31
Water Temperature	(oC)	12	12	13	12	13.5	13.5	16	16.5	17	15	16
pH	-	7.2	7.5	7.3	7.3	7.5	7.4	7.2	7.2	7.6	7.1	7.3
EC	(mS/cm)	2.30	2.80	2.30	2.47	1.50	1.53	2.20	2.20	2.40	2.20	2.01
Turbidity	(NTU)	0.5	0.3	N.D.	0.4	0.3	N.D.	N.D.	0.2	0.2	N.D.	0.2
Total Hardness	mg/l	674	1007	701	794	237	234	358	350	190	482	309
NH_4-N	mg/l	0.11	0.05	N.D.	0.08	0.60	0.09	N.D.	0.40	0.40	0.60	0.42
Sulfide	mg/l	N.D.	0.002	0.003	0.003	-	-	-	-	-	-	-
Fluoride	mg/l	1.55	2.25	1.55	1.78	1.15	1.35	2.75	2.85	4.05	1.75	2.32
Fe (soluble)	mg/l	0.05	0.01	0.01	0.02	-	-	-	-	-	-	-
Residual Cl_2	mg/l	-	-	-	-	-	-	-	-	-	-	-
Silicate (SiO_3)	mg/l	-	-	-	-	-	-	-	-	-	-	-
Manganese (Mn)	mg/l	-	-	-	-	-	-	-	-	-	-	-
Ordinary Bacteria	(CFU/ml)	5.0E+02	2.2E+02	3.8E+02	3.7E+02	1.4E+03	1.5E+03	6.5E+02	+++	3.4E+02	4.8E+02	8.8E+02
Coliform Bacteria	(CFU/ml)	3.4E+02	6.6E+01	3.4E+02	2.5E+02	4.2E+02	1.2E+03	1.7E+03	1.7E+03	1.9E+03	3.4E+02	1.2E+03

Table F.4 (2) Results of Water Quality Analysis (Simplified Analysis : Soroca)

Items		Surface water			Deep wall				
Sampling No.		Nistru-1	Nistru-2	Average	S-3	S-4	S-5	S-6	Average
Appearance	-	Clear	Clear	-	Clear	Clear	Clear	Clear	-
Air Temperature	(oC)	20	22	21	23	24.5	24.5	25	24
Water Temperature	(oC)	16.5	19	17.8	12	11.5	12	11.5	12
pH	-	7.8	8.0	7.9	6.6	7.0	6.9	6.8	6.8
EC	(mS/cm)	0.24	0.44	0.34	0.99	0.68	0.69	0.80	0.8
Turbidity	(NTU)	2.7	2.4	2.6	N.D.	0.2	N.D.	1.8	1.0
Total Hardness	mg/l	330	220	275	356	284	394	250	321.0
NH_4-N	mg/l	0.05	0.05	0.05	-	0.16	0.11	0.85	0.4
Sulfide	mg/l	-	-	-	N.D.	0.001	0.006	N.D.	0.0
Fluoride	mg/l	-	-	-	0.99	0.70	0.60	0.86	0.8
Fe (soluble)	mg/l	-	-	-	0.01	0.05	0.05	0.19	0.1
Residual Cl_2	mg/l	-	-	-	-	-	-	-	-
Silicate (SiO_3)	mg/l	-	-	-	1.60	-	-	-	-
Manganese (Mn)	mg/l	-	-	-	0.003	-	-	-	-
Ordinary Bacteria	(CFU/ml)	1.2E+03	2.1E+03	1.6E+03	6.6E+01	8.0E+01	1.0E+02	5.5E+01	7.5E+01
Coliform Bacteria	(CFU/ml)	7.1E+02	6.7E+02	6.9E+02	1.5E+02	1.3E+02	2.1E+02	4.2E+01	1.3E+02
Note		Nistru-1	Nistru-2	-	-	-	-	-	-

Items		Shallow well			Tap water				
Source		S-8	S-9	Average	S-7	S-10	S-11	S-12	Average
Appearance	-	Clear	Clear	-	Clear	Clear	Clear	Clear	-
Air Temperature	(oC)	25	28	27	25	27	28	27	27
Water Temperature	(oC)	13	13	13	19	13	15	20.5	16
pH	-	7.0	6.7	6.9	7.1	6.9	6.7	6.9	6.9
EC	(mS/cm)	1.26	1.69	1.48	0.68	0.80	0.80	0.82	0.78
Turbidity	(NTU)	0.1	N.D.	0.1	1.7	0.4	0.1	0.4	0.7
Total Hardness	mg/l	576	942	759	204	268	290	294	264
NH_4-N	mg/l	0.05	0.01	0.03	-	-	-	-	-
Sulfide	mg/l	0.001	0.001	0.001	-	-	-	-	-
Fluoride	mg/l	0.58	0.83	0.71	-	-	-	-	-
Fe (soluble)	mg/l	0.02	0.01	0.02	-	-	-	-	-
Residual Cl_2	mg/l	-	-	-	ND	ND	ND	ND	ND
Silicate (SiO_3)	mg/l	-	-	-	-	-	-	-	-
Manganese (Mn)	mg/l	-	-	-	-	-	-	-	-
Ordinary Bacteria	(CFU/ml)	5.9E+02	7.0E+01	3.3E+02	5.0E+01	6.0E+01	3.8E+01	8.0E+01	5.7E+01
Coliform Bacteria	(CFU/ml)	3.4E+02	7.0E+01	2.0E+02	5.6E+01	3.6E+01	3.7E+01	8.6E+01	5.4E+01

Table F.4 (3) Results of Water Quality Analysis (Simplified Analysis : Riscani)

Items		Surface water			Deep wall			
Sampling No.		Prut-1	Prut-2	Average	R-4	R-9	R-10	Average
Appearance	-	Clear	Clear	-	Clear	Clear	Clear	-
Air Temperature	(oC)	29	28	29	28	29	26	28
Water Temperature	(oC)	24	25	25	16	17	21	18
pH	-	8.2	8.6	8.4	8.6	8.5	8.6	8.6
EC	(mS/cm)	0.39	0.39	0.39	1.60	1.84	1.66	1.70
Turbidity	(NTU)	12.7	6.6	9.7	1.0	0.0	0.9	0.6
Total Hardness	mg/l	174	186	180	14	18	20	17
NH_4-N	mg/l	0.07	0.07	0.07	8.40	3.20	3.00	4.87
Sulfide	mg/l	-	-	-	0.01	0.00	0.00	0.01
Fluoride	mg/l	0.17	0.29	0.23	3.00	1.45	2.06	2.17
Fe (soluble)	mg/l	-	-	-	0.06	0.02	0.24	0.11
Residual Cl_2	mg/l	-	-	-	-	-	-	-
Silicate (SiO_3)	mg/l	-	-	-	0.96	20.2	14.8	12.0
Manganese (Mn)	mg/l	-	-	-	ND	ND	0.002	0.002
Ordinary Bacteria	(CFU/ml)	3.4E+02	1.5E+03	9.4E+02	1.1E+03	6.2E+02	2.4E+01	5.7E+02
Coliform Bacteria	(CFU/ml)	5.0E+02	+++	5.0E+02	8.4E+02	2.9E+02	3.0E+00	3.8E+02
Note		Prut-1	Prut-2	-	-	-	-	-

Items		Shallow well			Tap water			
Source		R-5	R-7	Average	S-7	S-10	S-11	Average
Appearance	-	Clear	Clear	-	Clear	Clear	Clear	-
Air Temperature	(oC)	29	36	33	27	23	25	25
Water Temperature	(oC)	14	13	14	18	19	16	18
pH	-	7.6	7.5	7.6	8.2	8.0	8.3	8.2
EC	(mS/cm)	2.00	2.40	2.20	1.76	1.58	2.10	1.81
Turbidity	(NTU)	12.5	0.4	6.5	0.0	0.9	0.4	0.4
Total Hardness	mg/l	466	670	568	18	8	18	15
NH_4-N	mg/l	0.01	0.03	0.02	-	-	-	-
Sulfide	mg/l	0.01	0.00	0.005	-	-	-	-
Fluoride	mg/l	0.36	0.96	0.66	-	-	-	-
Fe (soluble)	mg/l	0.06	0.02	0.04	-	-	-	-
Residual Cl_2	mg/l	-	-	-	-	-	-	-
Silicate (SiO_3)	mg/l	7.80	3.55	-	-	-	-	-
Manganese (Mn)	mg/l	0.040	0.004	-	-	-	-	-
Ordinary Bacteria	(CFU/ml)	8.3E+01	1.1E+03	5.7E+02	5.4E+01	1.1E+03	6.7E+02	6.2E+02
Coliform Bacteria	(CFU/ml)	5.0E+01	8.9E+02	4.7E+02	9.2E+02	3.4E+02	5.1E+02	5.9E+02

Table F.4 (4) Results of Water Quality Analysis (Simplified Analysis : Falesti)

Items		Surface water			Deep wall			
Sampling No.		Prut-3	Prut-4	Average	F-1	F-2	F-3	Average
Appearance	-	Clear	Clear	-	Clear, H_2S smell	Clear, H_2S smell	Clear, H_2S smell	-
Air Temperature	(oC)	22	29	25	24	24	24	24
Water Temperature	(oC)	23	23.5	23	19	19	19.5	19
pH	-	7.9	7.4	7.7	8.6	8.7	8.6	8.6
EC	(mS/cm)	0.42	0.41	0.42	1.78	1.74	1.77	1.76
Turbidity	(NTU)	6.4	24	15.1	0.5	0.3	0.2	0.3
Total Hardness	mg/l	162	190	176	59	44	65	56
NH_4-N	mg/l	0.06	0.01	0.04	2.40	2.80	2.20	2.47
Sulfide	mg/l	-	-	-	0.01	0.01	0.01	0.01
Fluoride	mg/l	0.02	-	0.02	7.05	8.80	6.75	7.53
Fe (soluble)	mg/l	-	-	-	0.02	0.02	0.01	0.02
Residual Cl_2	mg/l	-	-	-	-	-	-	-
Silicate (SiO_3)	mg/l	-	-	-	22.6	31.4	31.4	28.5
Manganese (Mn)	mg/l	-	-	-	ND	ND	0.001	0.001
Ordinary Bacteria	(CFU/ml)	8.4E+01	4.2E+02	2.5E+02	5.7E+02	5.4E+01	4.0E+01	2.2E+02
Coliform Bacteria	(CFU/ml)	2.2E+02	3.4E+02	2.8E+02	7.6E+02	5.0E+01	1.3E+01	2.7E+02
Note		Prut-3	Prut-4	-	-	-	-	-

Items		Shallow well				Tap water	
Source		F-5	F-6	F-7	Average	S-11	Average
Appearance	-	High turbidity	Clear	Clear	-	Clear, H_2S smell	-
Air Temperature	(oC)	26	27	28	27	24	24
Water Temperature	(oC)	13	15	15	14	20	20
pH	-	7.7	7.5	7.4	7.5	8.6	8.6
EC	(mS/cm)	2.00	3.30	3.40	2.90	1.81	1.81
Turbidity	(NTU)	>440*	2.4	0.8	1.6	0.1	0.1
Total Hardness	mg/l	396	1,404	1,020	940	176	176
NH_4-N	mg/l	0.02	N.D.	0.03	0.03	3.60	3.60
Sulfide	mg/l	0.02	0.01	0.01	0.01	-	-
Fluoride	mg/l	1.22	1.98	1.39	1.53	-	-
Fe (soluble)	mg/l	0.20	0.02	0.01	0.08	-	-
Residual Cl_2	mg/l	-	-	-	-	-	-
Silicate (SiO_3)	mg/l	15.4	14.4	5.80	11.9	-	-
Manganese (Mn)	mg/l	0.042	0.010	0.035	0.029	-	-
Ordinary Bacteria	(CFU/ml)	7.1E+02	9.2E+02	7.0E+01	5.7E+02	7.5E+01	7.5E+01
Coliform Bacteria	(CFU/ml)	6.5E+02	6.9E+02	8.5E+01	4.8E+02	4.5E+01	4.5E+01

Table F.5 (1) Categorization of Water Quality Problems (Deep well)

Items	Evaluation				WQS	Water Quality (Average value)			
	Balti	Soroca	Riscan	Falesti		Balti	Soroca	Riscan	Falesti
pH	-	-	-	-	6 - 9	7.9	7.5	8.4	8.4
Odor	-	-	-	-	2 unit	ND	ND	ND	ND
Color	6/9	-	-	3/3	20 grade	23	1	16	35
Turbidity	-	-	-	-	1.5 mg/l	0.3	0.1	0.5	0.3
Total hardness	1/9	-	-	-	7 me/l	2.6	5.1	0.4	0.5
Total solids	8/9	-	3/3	3/3	1,000 mg/l	1,219	580	1,320	1,241
Simazine					-	-	-	-	-
2,4-DB					-	-	-	-	-
Dichlorvos					-	-	-	-	-
Ammonia	8/9*	-*	3/3*	2/3*	1.5 mg/l*	2.5	0.1	2.1	1.4
Nitrate nitrogen	-	1/4	-	-	45 mg/l	0.8	17.0	0.3	0.1
Chloride	-	-	-	-	350 mg/l	57	46	46	33
Phosphate ion	-	-	-	-	3.5 mg/l	0.09	0.01	ND	ND
Sulfate ion	-	-	-	-	500 mg/l	324	112	286	275
Aluminum	-	-	-	-	0.5 mg/l	0.1	0.0	0.1	0.1
Fluorine	7/9	-	3/3	3/3	1.2 mg/l	1.7	0.4	2.6	3.8
Manganese	-	-	-	-	0.1 mg/l	0.003	0.022	0.004	0.005
Total iron	-	-	-	-	0.3 mg/l	0.07	0.02	0.08	0.07
Copper	-	-	-	-	1 mg/l	0.003	0.002	0.004	0.004
Zinc	-	-	-	-	5 mg/l	0.01	0.01	0.01	0.00
Selenium	-	-	-	-	0.01 mg/l	ND	0.0007	0.0005	ND
Arsenic	-	-	-	-	0.05 mg/l	ND	0.0005	ND	ND
Strontium	-	-	-	-	7 mg/l	1.04	0.50	0.28	0.30
Molybdenum	-	-	-	-	0.25 mg/l	ND	ND	ND	ND
Lead	-	-	-	-	0.03 mg/l	0.001	ND	ND	ND
Beryllium	-	-	-	-	0.0002 mg/l	ND	ND	ND	ND
Total No. of microbes	1/9	-	-	-	100 /ml	5	1	2	17
Total coliforms	-	-	-	-	-	9	755	109	5
E. Coli					3 /litter	-	-	-	-

WQS : The Water Quality Standard for centralized water supply

-	The all data of objective wells satisfy the requirement of the Water Quality Standard for centralized water supply in the Moldova (W.Q.S.).
n/tn	Some objective wells do not meet the requirement of the W.Q.S.
n/tn	Average of water quality do not meet the requirement of the W.Q.S.

n : Number of data, which is unsatisfied water quality

tn : Total number of data

* : using the guideline of WHO

Table F.5 (2) Categorization of Water Quality Problems (Shallow well)

Items	Evaluation				WQS	Water Quality (Average value)			
	Balti	Soroca	Riscan	Falesti		Balti	Soroca	Riscan	Falesti
pH	-	-	-	-	-	7.1	7.0	7.8	7.7
Odor	-	-	-	-	2-3 unit	ND	ND	ND	ND
Color	-	-	-	1/3	30 grade	11.5	ND	5.6	29.9
Turbidity	-	-	-	1/3	2 mg/l	0.44	0.12	1.0	53
Total hardness	3/3	2/2	2/2	2/3	10 me/l	15.5	14.2	15.8	18.4
Total solids	3/3	-	2/2	3/3	1,500 mg/l	1,859	1,192	1,850	2,297
Simazine	-	-	-	-	0.002 mg/l*	ND	ND	ND	ND
2,4-DB	-	-	-	-	0.09 mg/l*	ND	ND	ND	ND
Dichlorvos	-	-	-	-	0.008 mg/l**	ND	ND	ND	ND
Ammonia	-	-	-	-	1.5 mg/l*	0.08	ND	ND	0.17
Nitrate nitrogen	3/3	2/2	2/2	2/3	50 mg/l	225	287	273	213
Chloride	-	-	-	-	350 mg/l	121	99	108	116
Phosphate ion	-	-	-	-	-	0.07	0.08	ND	ND
Sulfate ion	1/3	-	-	1/3	500 mg/l	431	134	265	622
Aluminum	-	-	-	-	-	0.07	ND	ND	0.09
Fluorine	1/3	-	-	1/3	1.2 mg/l***	0.83	0.54	0.86	0.61
Manganese	-	-	-	-	-	0.005	0.004	0.005	0.013
Total iron	-	-	-	-	-	0.05	ND	0.03	0.04
Copper	-	-	-	-	-	0.005	0.025	0.005	0.008
Zinc	-	-	-	-	-	0.02	0.04	0.03	0.033
Selenium	-	-	-	-	-	ND	ND	ND	0.001
Arsenic	-	-	-	-	-	ND	ND	ND	ND
Strontium	-	-	-	-	-	1.45	1.6	1.2	1.6
Molybdenum	-	-	-	-	-	ND	ND	ND	ND
Lead	-	-	-	-	-	0.002	ND	0.008	ND
Beryllium	-	-	-	-	-	ND	ND	ND	ND
Total No. of microbes	-	-	-	-	-	74	13	44	63
Total coliforms	-	-	-	-	-	303	1,955	445	443
E. Coli	-			2/3	10 /litter	<3	<9	<9	139

WQS : The Water Quality Standard for non-centralized water supply

-	The all data of objective wells satisfy the requirement of the Water Quality Standard for non-centralized water supply in the Moldova (W.Q.S.).
n/tn	Some objective wells do not meet the requirement of the W.Q.S.
n/tn	Average of water quality do not meet the requirement of the W.Q.S.

n : Number of data, which is unsatisfied water quality
tn : Total number of data
* : using the guideline of WHO
** : using the Water Quality Standard for drinking water in Japan (monitoring items)
*** : using the Water Quality Standard for non-centralized water supply

Table F.6 Categorization of Water Quality Problems (Tap Water)

Items	Evaluation				WQS	Water Quality (Average value)			
	Balti	Soroca	Riscan	Falesti		Balti	Soroca	Riscan	Falesti
pH	-	-	-	-	6 - 9	7.2	7.5	8.3	8.4
Odor	-	-	-	-	2 unit	ND	ND	ND	ND
Color	2/6	-	-	1/1	20 grade	19.9	1.9	14.2	35.6
Turbidity	-	1/4	-	-	1.5 mg/l	0.38	0.58	0.4	0.12
Total hardness		-	-	-	7 me/l	5.5	4.6	0.4	0.7
Total solids	5/6	-	3/3	1/1	1,000 mg/l	1,367	566	1,350	1,356
Ammonia		-	2/3*	1/1*	1.5 mg/l*	0.85	ND	1.45	24.0
Nitrate nitrogen	-	-	-	-	45 mg/l	4.7	10.3	6.6	0.40
Chloride	-	-	-	-	350 mg/l	56.2	52.4	34	33
Phosphate ion	-	-	-	-	3.5 mg/l	0.01	0.007	ND	ND
Sulfate ion	4/6	-	-	-	500 mg/l	466	112	335	277
Fluorine	3/6	-	3/3	1/1	1.2 mg/l	1.20	-	2.00	4.10
Total iron	-	-	-	-	0.3 mg/l	0.09	0.04	0.09	0.06
Total No. of microbes	2/6	-	-	-	100 /ml	39	14	3	32
Total coliforms	-	-	-	-	-	185	113	151	3
E. Coli	-	-	-	-	3 /litter	<3	<3	<3	-

WQS : The Water Quality Standard for centralized water supply

-	The all data of objective wells satisfy the requirement of the Water Quality Standard for centralized water supply in the Moldova (W.Q.S.).
n/tn	Some objective wells do not meet the requirement of the W.Q.S.
n/tn	Average of water quality do not meet the requirement of the W.Q.S.

n : Number of data, which is unsatisfied water quality

tn : Total number of data

* : using the guideline of WHO

Table F.7 Turbidity Data for the Raw Water (1996 - 2002)

Unit: mg/l

Year	Jan		Feb		Mar		Apr		May		Jun	
	(Monthly Average)		(Monthly Average)		(Monthly Average)		(Monthly Average)		(Monthly Average)		(Monthly Average)	
	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)
1996	--		--		--		--		--		3.4 (3 days)	
	--	--	--	--	--	--	--	--	--	--	2.30	5.60
1997	1.90		3.11		0.69		1.52		1.80		6.45	
	1.20	4.10	1.30	12.70	0.51	1.20	0.76	5.10	1.20	3.30	1.10	57.00
1998	6.60		3.63		1.63		1.77		4.54		25.65	
	1.60	22.60	1.30	11.20	0.76	3.50	0.66	3.10	1.00	8.12	1.70	118.00
1999	1.44		1.72		10.14		2.73		2.25		3.52	
	0.56	2.50	0.80	5.10	2.90	40.10	1.70	5.10	1.00	4.00	1.00	24.60
2000	0.83		--		--		--		--		1.63	
	0.51	1.10	--	--	--	--	--	--	--	--	1.20	2.50
2001	--		--		--		--		--		--	
	--	--	--	--	--	--	--	--	--	--	--	--
2002	2.10		1.85		1.29		0.89		1.23			
	0.60	9.60	0.60	7.30	0.60	3.40	--	1.50	0.91	2.10		

Year	Jul		Aug		Sep		Oct		Nov		Dec	
	(Monthly Average)		(Monthly Average)		(Monthly Average)		(Monthly Average)		(Monthly Average)		(Monthly Average)	
	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)
1996	5.34		2.70		7.11		4.09		4.97		9.51	
	1.80	21.40	1.70	6.60	1.50	18.90	2.00	7.10	1.50	31.00	1.50	132.00
1997	28.57		6.15		6.79		4.23		1.95		12.85	
	1.10	191.00	3.00	21.00	2.50	13.60	1.80	16.10	1.10	8.25	1.00	66.90
1998	12.58		3.77		2.21		4.05		2.62		2.04	
	5.10	24.00	1.50	9.70	1.20	4.00	2.20	7.80	1.00	8.60	1.20	14.80
1999	1.97		0.78		0.78		0.96		0.89		1.10	
	0.86	2.80	0.51	1.30	0.51	1.80	0.51	1.90	0.56	2.30	0.51	2.20
2000	3.06		1.24		0.86		--		--		--	
	1.00	11.70	0.60	2.80	0.51	1.25	--	--	--	--	--	--
2001	7.75 (2 days)		3.90		2.45		1.88		1.82		3.80	
	5.30	10.20	1.50	12.40	1.50	3.90	0.82	4.40	0.50	4.50	0.85	39.50
2002												

Table F.8 Turbidity Data for Raw and Treated Waters (Monthly Average Turbidity, 1996 – 2002)

Unit: mg/l

Year	Jan		Feb		Mar		Apr		May		Jun	
	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water
1996	--	--	--	--	--	--	--	--	--	--	3.40	0.76
1997	1.90	0.82	3.11	0.93	0.69	0.32	1.52	0.90	1.80	0.68	6.45	0.62
1998	6.60	0.87	3.63	0.85	1.63	0.75	1.77	0.70	4.54	0.65	25.65	0.63
1999	1.44	0.72	1.72	0.94	10.14	1.59	2.73	0.91	2.25	0.65	3.52	0.82
2000	0.83	0.44	--	--	--	--	--	--	--	--	1.63	0.98
2001	--	--	--	--	--	--	--	--	--	--	--	--
2002	2.10	0.58	1.85	0.73	1.29	0.66	0.89	0.4	1.23	0.55	--	--

Year	Jul		Aug		Sep		Oct		Nov		Dec	
	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water
1996	5.34	0.88	2.70	0.92	7.11	1.19	4.09	0.89	4.97	0.95	9.51	1.05
1997	28.57	0.53	6.15	0.70	6.79	0.91	4.23	0.59	1.95	0.73	12.85	0.84
1998	12.58	0.64	3.77	0.94	2.21	0.93	4.05	1.00	2.62	0.96	2.04	0.78
1999	1.97	0.86	0.78	0.29	0.78	0.30	0.96	0.42	0.89	0.42	1.10	0.61
2000	3.06	0.64	1.24	0.46	0.86	0.31	--	--	--	--	--	--
2001	7.75	1.16	3.90	1.24	2.45	1.08	1.88	0.61	1.82	0.74	3.80	0.79
2002												

Table F.9 Drinking Water Quality Standard (GOST 2874-82)

(Applied for centralized water supply)

Parameter	unit	MAV (Maximum Admissible Value)	Comments
pH		6 - 9	
Fe	mg/litter	0.3	Up to 1 mg/litter is admissible on the base of agreement with Sanitary-Epidemiological Service
Total Hardness	mg* equivalent /litter	7	Up to 10 mg*equivalent/l is admissible on the base of agreement with Sanitary-Epidemiological Service
Mn	mg/litter	0.1	Up to 0.5 mg/1 is admissible on the base of a agreement with Sanitary-Epidemiological Service
Cu^{2+}	mg/litter	1	
$P0_4^{3-}$ (polyphosphates residual)	mg/litter	3.5	
$S0_4^{2-}$	mg/litter	500	
Dry residues	mg/litter	1000	Up to I 500 mg/1 is admissible on the base of agreement with Sanitary-Epidemiological Service
Cl^-	mg/litter	350	
Zn^{2+}	mg/litter	5	
Odor (20 oC and 40 oC)	point	2	
Taste (20 oC)	point	2	
Color	grade	20	Up to 35 grades is admissible on the base of agreement with Sanitary-Epidemiological Service
Turbidity	mg/litter	1.5	Up to 2 mg/litter (in case of flood situation) is admissible on the base of agreement with Sanitary-Epidemiological Service
Al residual	mg/litter	0.5	
Be	mg/litter	0.0002	
Mo	mg/litter	0.25	
As	mg/litter	0.05	
$N0_3$	mg/litter	45	
Poly-acrylamide residual	mg/litter	2	
Pb	mg/litter	0.03	
Se	mg/litter	0.01	
Sr	mg/litter	7	
F (depending on the climatic zones)	mg/litter	0.7 - 1.5	1 .2 mg/1 is applied in the climatic conditions of Moldova
Total number of microbes	microbes per cm^3	100	
Coli-index	E. Coli per litter	3	

Water should not contain visible aquatic organisms and should not have any floating materials.
If other substances (not listed in the DWQS) are detected in the water the concentration of pollutants should not exceed Maximum Admissible Concentrations (MAC) for water bodies designated for drinking/domestic and recreational water use.
Water should have no radiological contamination risk.

If several pollutants (not listed in the DWQS) are detected in the water the following formula should applied: $C_1/MAC_1 + C_2/MAC_2 + ... C_n/MAC_n <$ or = 1, where $C_{1,2,n}$ - detected concentrations and $MAC_{1,2,n}$ - relevant maximum admissible concentrations.

The content of Cl (residuals) after water accumulation reservoir should be within the limits 0.3-0.5 mg/l (for active chlorine) or 0.8-1.2 mg/l (for connected chlorine). In some cases the concentration of Cl (residuals) can be higher if approved by the Sanitary-Epidemiological Service.

Table F.10 Drinking Water Quality Standard

(Applied for non-centralized water supply)

Parameter	unit	MAV (Maximum Admissible Value)	Comments
Odor	point	2 - 3	
Taste	point	2 - 3	
Color	grade	30	
Turbidity	mg/litter	2	
Dry residues	mg/litter	1 500	
Cl^-	mg/litter	350	
SO_4^{2-}	mg/litter	500	
Total Hardness	mg*equivalent/litter	10	
NO_3	mg/litter	50	
E-coli bacteria	E. Coli per litter	10	

Source: Hygienic regulation Nr. 06.6.3.18-96.

Table F.11 Raw Water Quality Standard (GOST 2781-84)

Source	Parameter	unit	MAV (Maximum Admissible Value)		
			Class 1	Class 2	Class 3
Groundwater	Turbidity	mg/litter	1.5	1.5	10
	Color	grade	20	20	50
	pH		6 - 9	6 - 9	6 - 9
	Fe	mg/litter	0.3	10	20
	Mn	mg/litter	0.1	1	2
	H_2S	mg/litter	absence	3	10
	F (depending on the climatic zone)	mg/litter	0.7 - 1.5	0.7 - 1.5	5
	COD (permanganate)	mg-0_2/litter	2	5	15
	E-Coli	number of E-Coli per litter	3	100	1,000
Surface water	Turbidity	mg/litter	20	1,500	10,000
	Color	grade	35	120	200
	Odor (20 °C and 40 °C)	point	2	3	4
	pH		6.5-8.5	6.5-8.5	6.5-8.5
	Fe	mg/litter	1	3	5
	Mn	mg/litter	0	1	2
	Phytoplancton	mg/litter	1	5	50
		cells/cm3	1,000	100,000	100,000
	COD (permanganate)	mg-0_2/litter	7	15	20
	BOD full	mg-0_2/litter	3	5	7
	Lactozo-positive bacteria	number of microbes per litter	1,000	10,000	50,000

Source	Class	Treatment requirement
Groundwater	1	Water quality is corresponded to the DWQS (GOST 2874-82), no treatment required.
	2	Water quality is deviated from the requirements of DWQS (GOST 2874-82) by several parameters, applicable water treatment technologies - aeration, filtration, disinfecting. For water sources with unstable water quality (seasonal variation of Dry Residuals within the requirements of DWQS (GOST 2874-82)), applicable water treatment technologies - preventing disinfecting.
	3	Applicable water treatment technologies as indicated for the class 2 plus additional filtration after preliminary sedimentation or using of reagents
Surface water	1	Applicable water treatment technologies - disinfecting, filtration or filtration + coagulation
	2	Applicable water treatment technologies - disinfecting, filtration, coagulation, sedimentation and micro-filtration (in case of algae)
	3	Applicable water treatment technologies as indicated for the class 2 plus additional sedimentation step, oxidation or sorption methods and more effective

Table F.12 Water Quality Standards for Protection of Water Bodies against Pollution (Nr 06.6.3.23 03 July 1997)

Parameter	unit	MAV (Maximum Admissible Value)			
		Water bodies for drinking and food industry water supply			Water bodies for recreation, bathing, irrigation, tourism, etc.
		Class 1	Class 2	Class 3	
Turbidity	mg/litter	20	1,500	10,000	-
Floating material	-	Floating materials should not present at the surface of water			
Color	grade	35	120	200	-
Odor (20 °C and 40 °C)	point	2	3	4	2
Mineralisation	mg/litter	should not exceed 1000, including for 350 mg/l-Cl and 500 mg/l-SO_4			
pH	-	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
Dissolved Oxygen	mg/litter	should not be less than 4 mg/l			
Fe	mg/litter	1	3	5	1
Mn	mg/litter	0	1	2	0.1
	mg/litter	1	5	50	-
Phytoplancton	cells/cm3	1,000	100,000	100,000	-
COD (permanganate)	mg-0_2/litter	7	15	20	-
BOD full	mg-0_2/litter	3	5	7	6
		should not be registered			
Lactozo-positive bacteria	number of microbes per litter	1,000	10,000	50,000	50,000
Coliphages	number of microbes per litter	1,000	10,000	50,000	
Ovus of helmintes	number of microbes per litter	1,000	10,000	50,000	
Other chemical substances	-	should not be found in concentrations exceeding Maximum admissible Concentration			

Table F.13 Air Quality Standards (GOST 12.1.005-88)

Pollutant	Occupational standard mg/m^3				Standard for human settlement, mg/m^3			
	DC	MAC[1]	MAC[2]	PDSL	DC	MAC[3]	MAC[4]	PDSL
Dust (from wood)	-	-	-	0.1	-	-	-	-
Dust inorganic (SiO_2 > 70%)	3	0.15	0.05	-	3	0.15	0.05	-
Dust inorganic (SiO_2 = 20-70%)	3	0.3	0.1	-	3	0.3	0.1	-
Dust inorganic (SiO_2 < 20%)	3	0.5	0.15	-	3	0.5	0.15	-
Dust after cement production (CaO > 60%, SiO_2 > 20%)	3	-	0.02	-	-	-	-	-
Dust from gypsum + cement	-	-	-	-	-	-	-	0.5
Soot	3	0.15	0.05	-	3	0.15	0.05	-
Coal ashes after thermoelectric stations (CaO = 35-40%, fractions = less 3 microns, particles < 97%)	2	0.05	0.02	-	2	0.05	0.02	-
Ozone	1	0.16	0.03	-	1	0.16	0.03	-
Chlorine	2	0.1	0.03	-	2	0.1	0.03	-
CCl_4	2	4	0.7	-	2	4	0.7	-
CO	4	5	3	-	4	5	3	-
HCl	2	0.2	0.2	-	2	0.2	0.2	-
H_2S	2	0.008	-	-	2	0.008	-	-
NO	3	0.4	0.06	-	3	0.6	0.06	-
NO_2	2	0.085	0.04	-	2	0.085	0.04	-
NH_4	4	0.2	0.04	-	4	0.2	0.04	-
SO_2	3	0.5	0.05	-	3	0.5	0.05	-
Petrol	4	5	1.5	-	4	5	1.5	-
Phenol	2	0.01	0.003	-	2	0.01	0.003	-
Hydrocarbons (C_{12}-C_{19})	4	1	-	-	-	-	-	-
Benz(a)pyrene	1	-	1[5]	-	1	-	0.1	$1x10^{-6}$

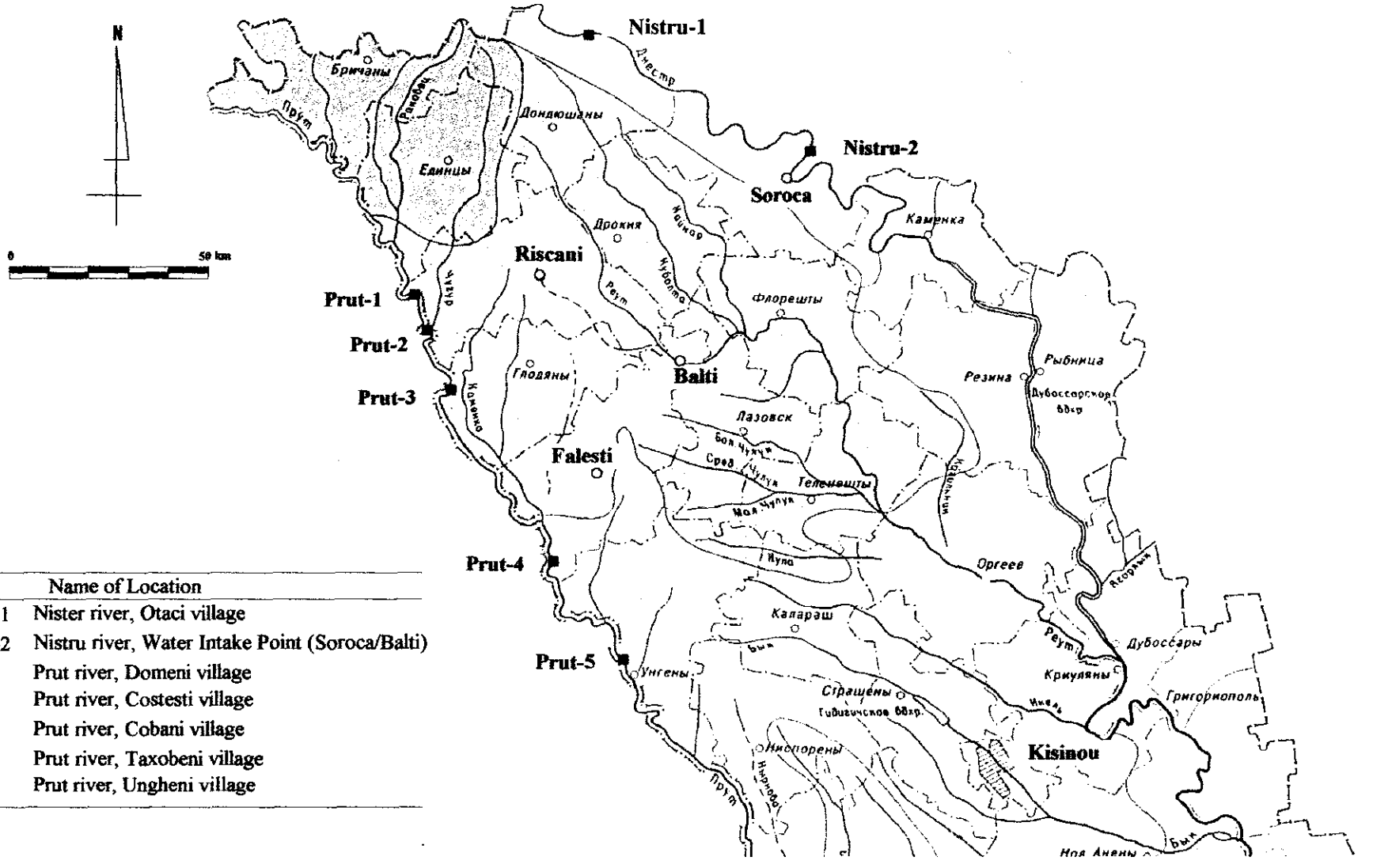
Note:

(1) Maximum admissible at one moment
(2) Maximum admissible daily average
(3) Maximum admissible at one moment
(4) Maximum admissible daily average
(5) Nanogram/m^3

The values of Maximum Admissible Concentrations (MACs) and Preliminary Determined Safety Levels (PDSLs) for principal air pollutants are presented in the table. The Dangerous Class (DC) of pollutants is indicated as 1 - 4 in the order of danger. MACs are specified for instantaneous concentration and daily averaged concentration.

Table F.14 Occupational Safety Standards System
Noise - General Safety Requirements
(GOST 12.1.003-83)

Occupation	Noise Level (dB)
1) Creative work, administration, research, etc.	50
2) Laboratory, industrial administration	60
3) Operators	65
4) Operators (with noise equipment)	75
5) Other works	80
6) Drivers (train, metro)	80
7) Drivers (electric train)	75
8) Other train (passengers)	60
9) Post wagons, restaurant wagons	70
10) Drivers (tractors, heavy lorry)	70 - 80
11) Drivers (automobiles, cars)	60
12) Air craft pilots	80



No.	Name of Location
Nistru-1	Nister river, Otaci village
Nistru-2	Nistru river, Water Intake Point (Soroca/Balti)
Prut-1	Prut river, Domeni village
Prut-2	Prut river, Costesti village
Prut-3	Prut river, Cobani village
Prut-4	Prut river, Taxobeni village
Prut-5	Prut river, Ungheni village

Figure F.1 (1) Location of Sampling Point for Water Quality Survey (Surface Water)

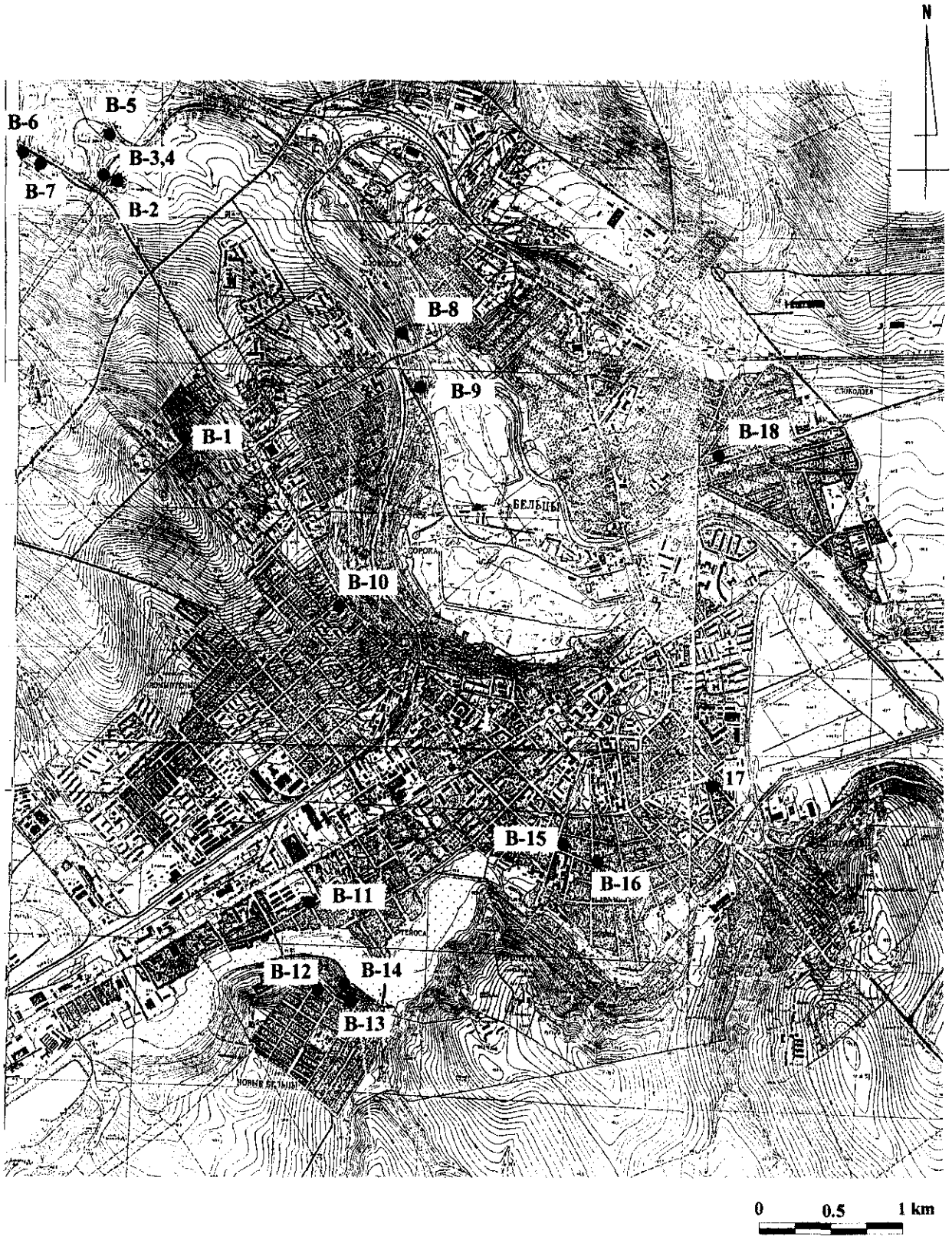


Figure F.1 (2) **Location of Sampling Point for Water Quality Survey (Balti)**

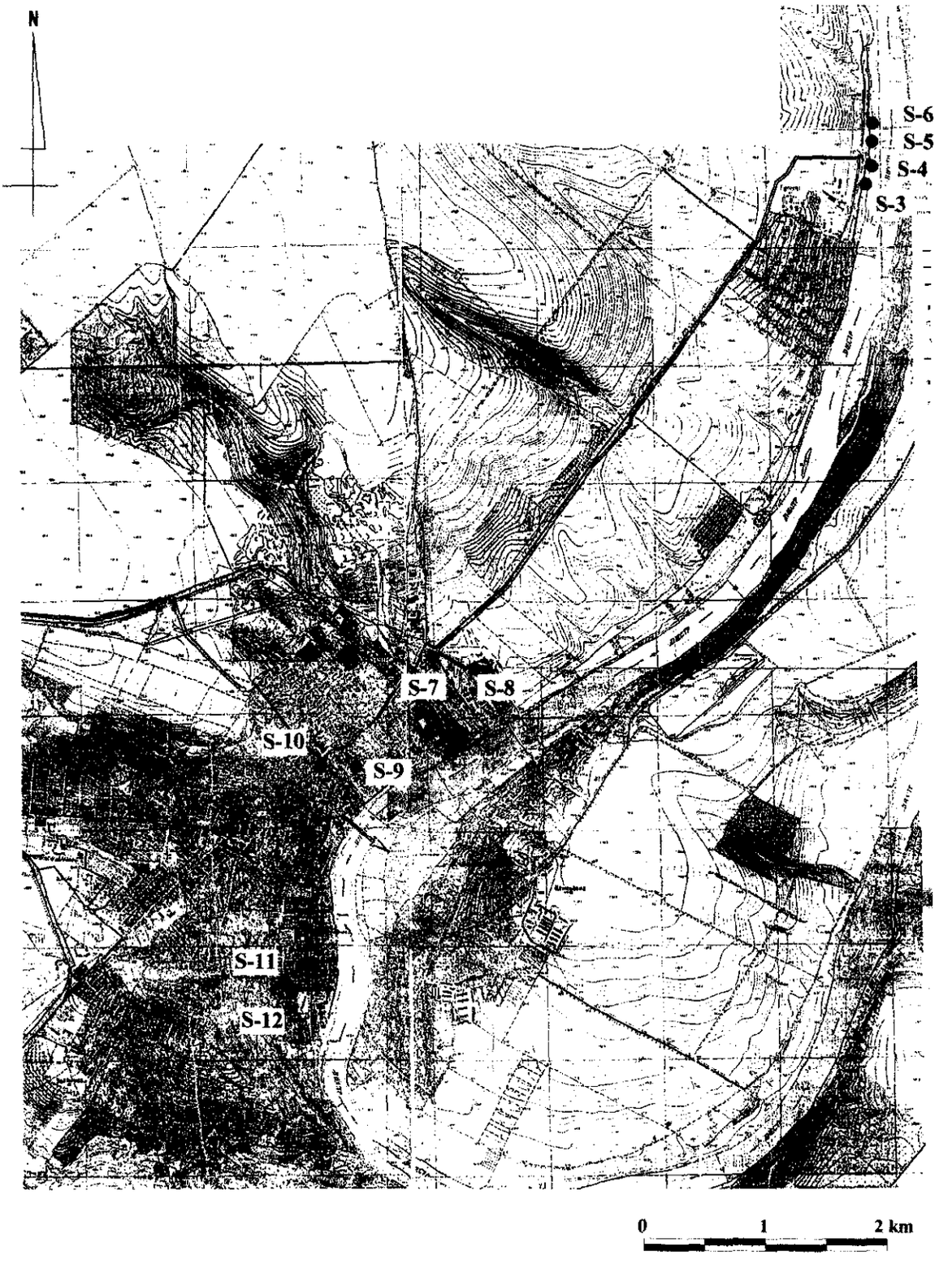


Figure F.1 (3) **Location of Sampling Point for Water Quality Survey (Soroca)**

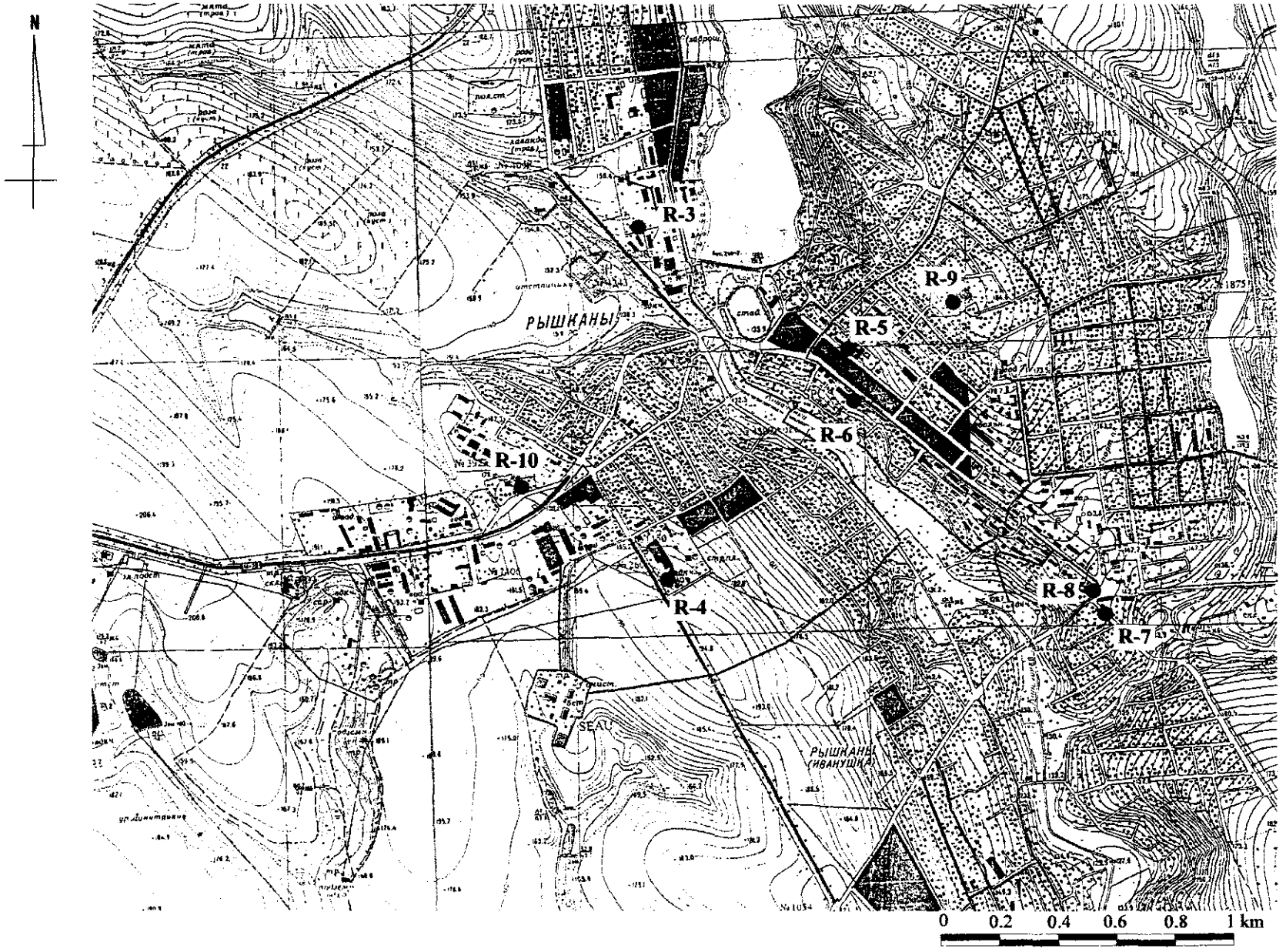
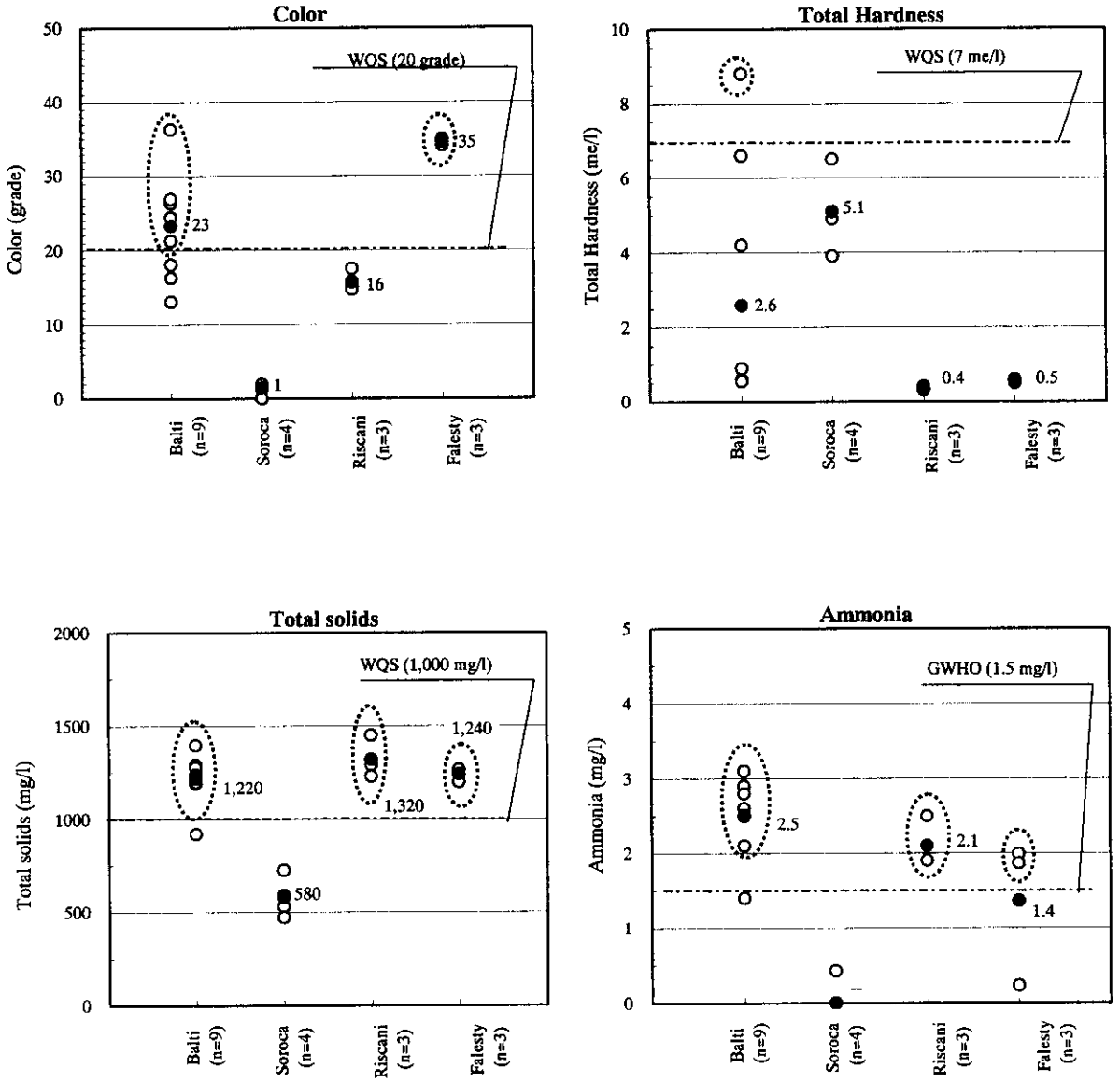


Figure F.1 (4) **Location of Sampling Point for Water Quality Survey (Riscani)**

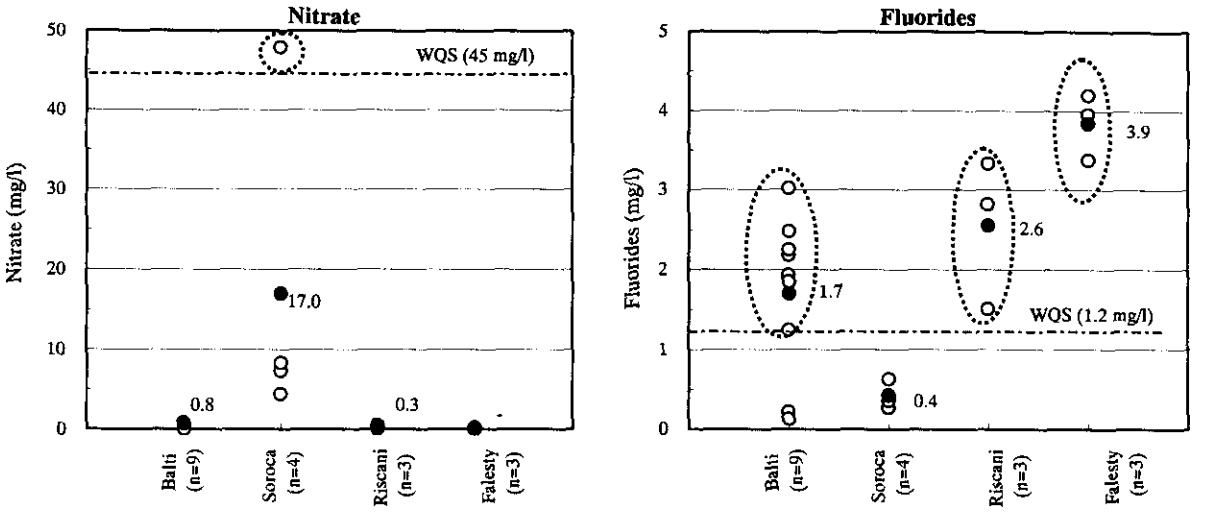
Figure F.1 (5) Location of Sampling Point for Water Quality Survey (Falesti)

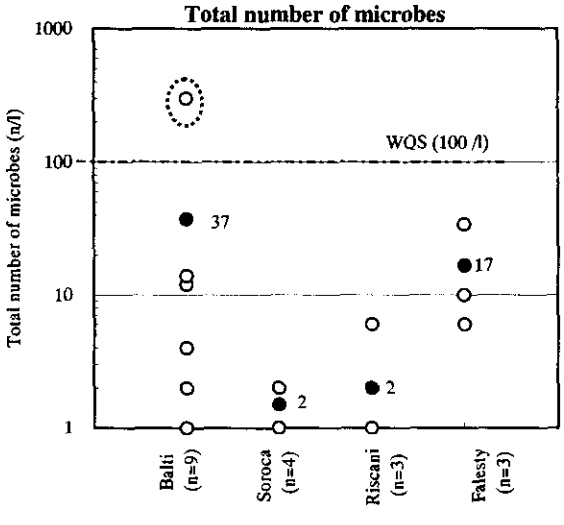


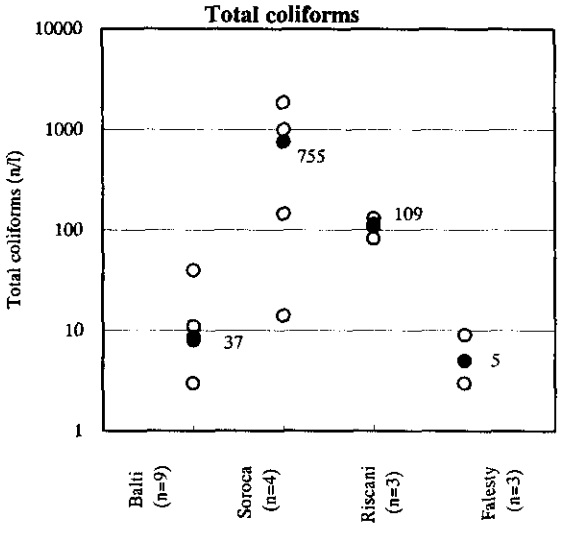
LEGEND

- ○ Results of analysis
- ● 0.5 Average and its value
- WQS : Water quality standard for drinking water (Applied for centralized water supply)
- GWHO : Guideline for drinking-water (WHO)
- Balti (n=9) Name of city (number of data)
- This mark means that data is more than the WQS/GWHO value.

Figure F.2 (1) Results of Water Quality Analysis (Groundwater: Deep well)







LEGEND

○ Results of analysis

● 0.5 Average and its value

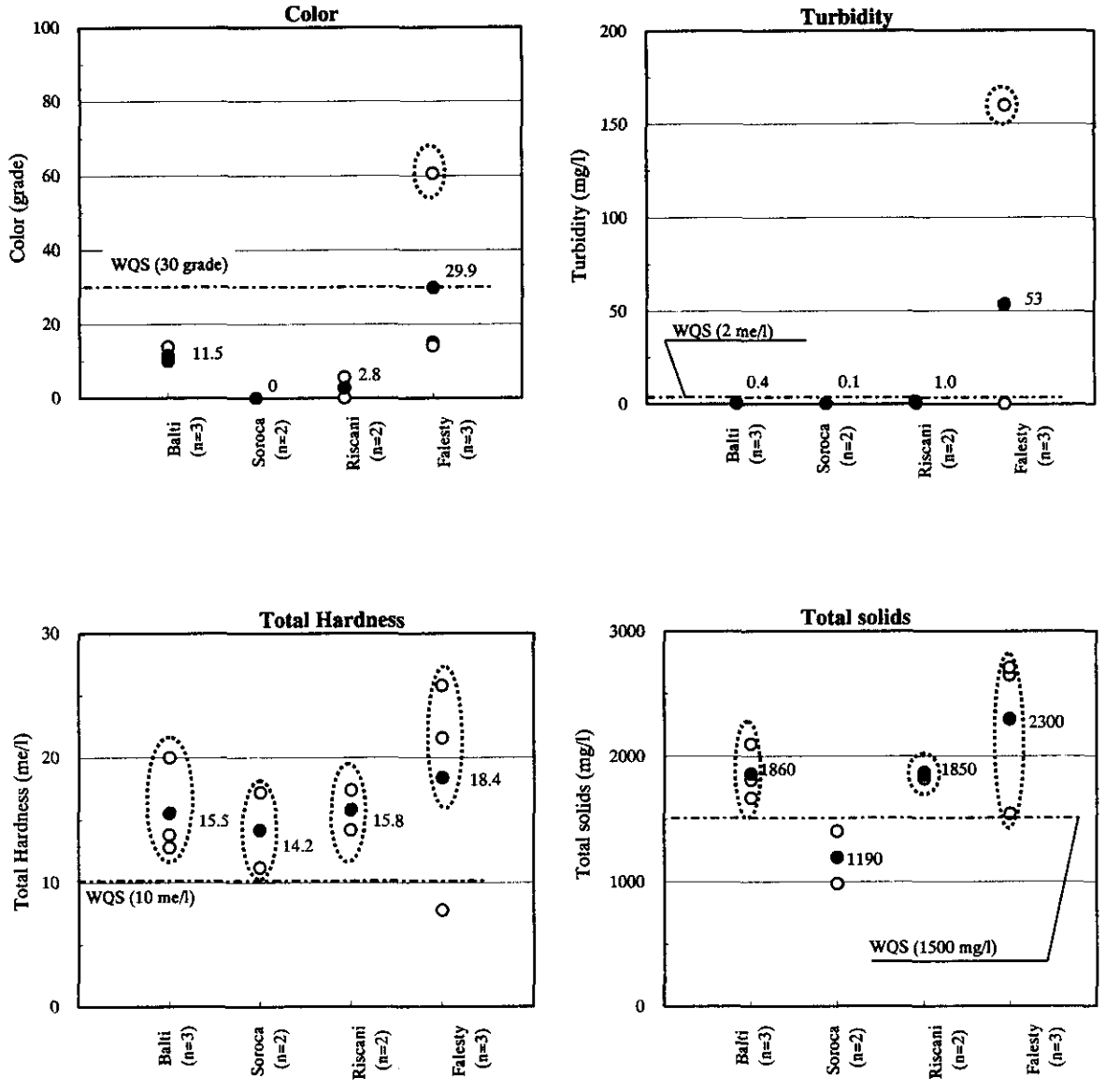
WQS : Water quality standard for drinking water (Applied for centralized water supply)

GWHO : Guideline for drinking-water (WHO)

Balti (n=9) Name of city (number of data)

This mark means that data is more than the WQS/GWHO value.

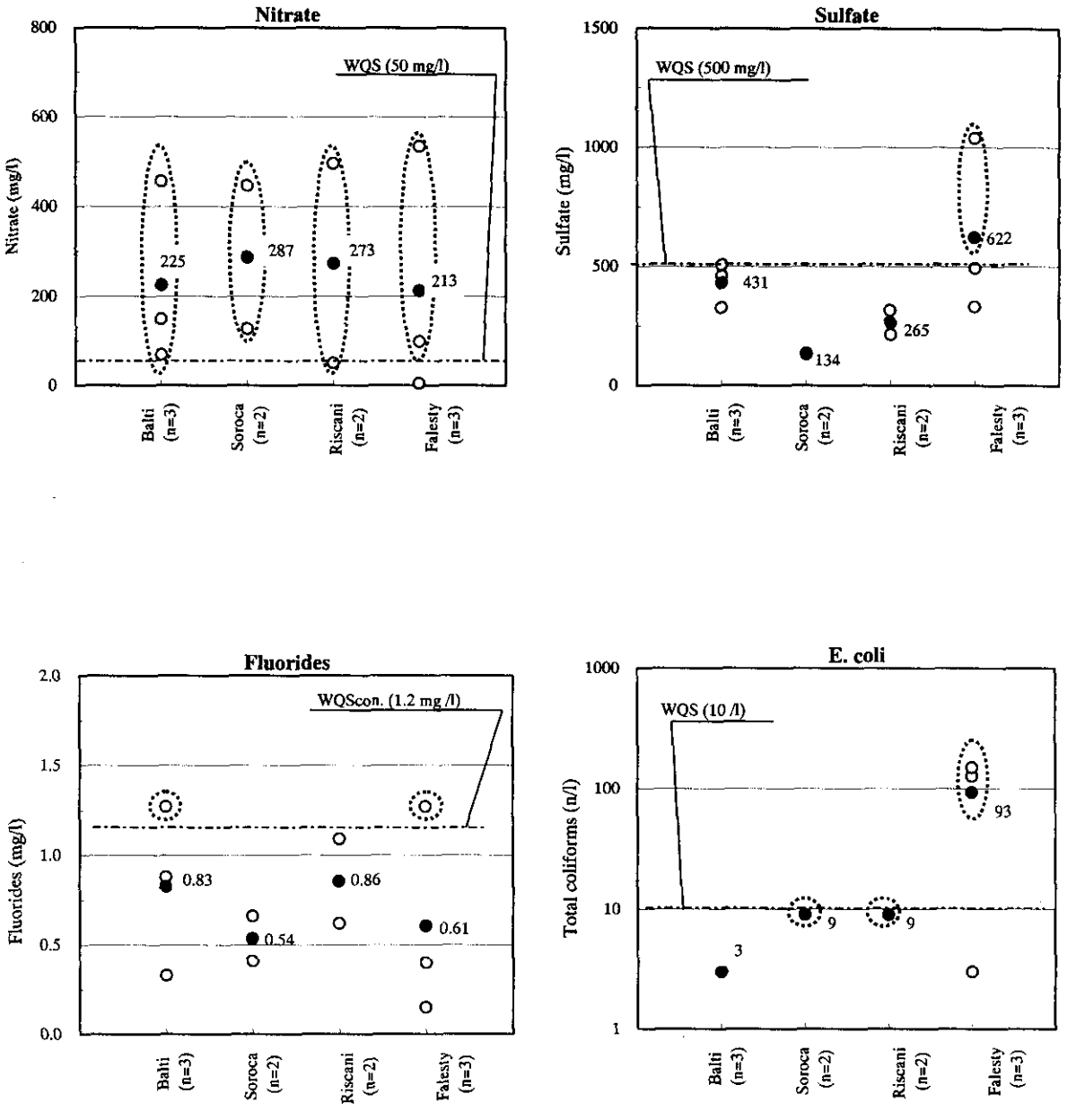
Figure F.2 (2) Results of Water Quality Survey (Groundwater: Deep well)



LEGEND

- ○ Results of analysis
- ● 0.5 *Average and its value*
- WQS : Water quality standard for drinking water (Applied for non-centralized water supply)
- WQScen. : Water quality standard for drinking water (Applied for centralized water supply)
- Name of city (number of data)
- This mark means that data is more than the WQS/WQScen. value.

Figure F.2 (3) Results of Water Quality Analysis (Groundwater: Shallow well)



LEGEND

○ Results of analysis

● 0.5 Average and its value

WQS : Water quality standard for drinking water (Applied for non-centralized water supply)

WQScen. : Water quality standard for drinking water (Applied for centralized water supply)

Name of city (number of data)

This mark means that data is more than the WQS/WQScen. value.

Figure F.2 (4) Results of Water Quality Survey (Groundwater: Shallow well)

ANNEX G

RESULT OF WATER LEAKAGE SURVEY

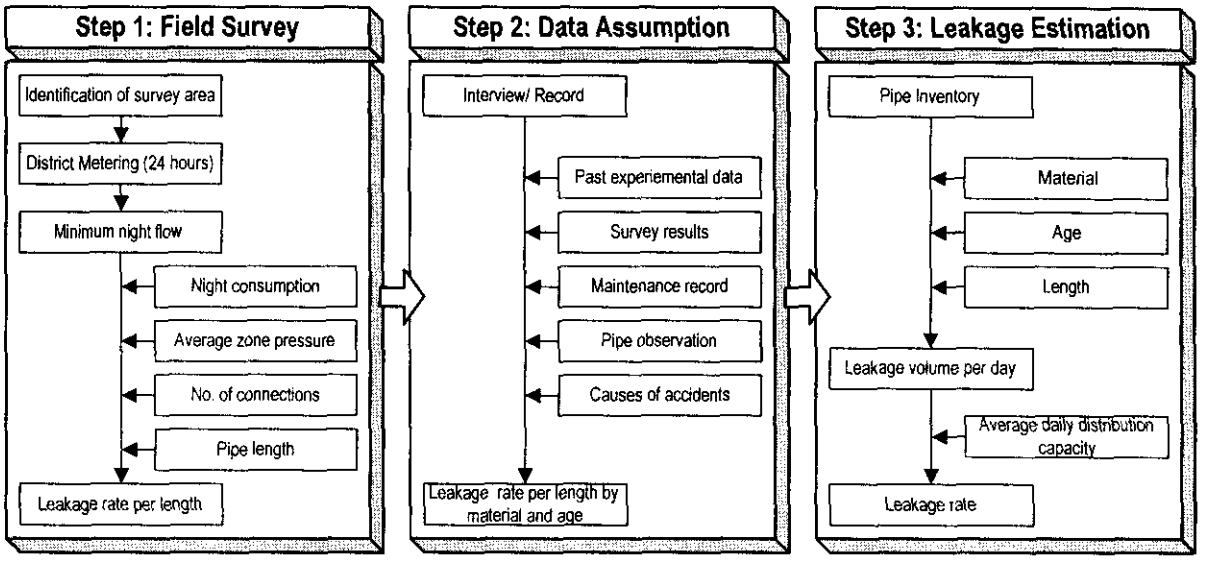
1. Objectives

Objectives of the survey are;

- To identify the existing leakage rate through the distribution network
- To provide a basic data for pipe replacement program.

2. Methodology

Leakage survey was conducted by the three steps, namely (i) field survey, (ii) data assumption, and (iii) estimation of leakage rate. The workflow is outlined below:



Workflow of Leakage Survey

3. Field Survey (Step 1)

Four sites were selected in Soroca and Balti. Each site has a distribution pipelines with single inlet and no outlet from the system. The locations of sites and survey dates are shown below:

Locations of sites and dates of survey

Survey ID	City	Location	Pipe material	Diameter	Date
S01	Soroca	St. Luceafarului	Steel	100 mm	13 June 2001
S02	Soroca	St. Viilor	Steel	100 mm	14 June 2001
S03	Soroca	St. Limbii	Steel	200 mm	15 June 2001
B01	Balti	New Balti	Steel	100 mm	20 June 2001

The district metering was conducted by installing a portable ultrasonic flowmeter at an inlet pipe of each district. Flow rate was measured for 24 hours at an interval of five minutes. Through the measured minimum night flow, its components were analyzed by BABE method #).

#) *BABE method: The Burst And Background Estimate procedures developed by the UK water industry* during the early 1990s, that is gaining international acceptance as the standard approach to evaluating leakage levels in distribution systems. The concept of the BABE method is to analyze the various water loss components by using night flow measurement, zone pressure and etc.

Survey results are summarized as shown below. The values range widely and clear tendency was not obtained due to small number of field surveys. Details of the result and field observation data are shown in Appendices A and C.

Summary of Survey Results

		S01	S02	S03	B01
[1]	Length of mains	120 m	210 m	300 m	3008 m
[2]	Average daily flow	3.53 m^3/h	1.88 m^3/h	4.19 m^3/h	12.28 m^3/h
[3]	Minimum night flow	1.05 m^3/h	0.65 m^3/h	1.40 m^3/h	8.65 m^3/h
[4]	Estimated physical loss	0.53 m^3/h	0.08 m^3/h	0.68 m^3/h	5.09 m^3/h
[5]	Estimated leakage per length of mains	4.42 $m^3/km/h$	0.38 $m^3/km/h$	2.27 $m^3/km/h$	1.69 $m^3/km/h$

4. Data Assumption (Step 2)

Although leakage rates for the four sites were estimated from the field survey data, their values are quite high in some areas and do not necessarily represent the whole distribution system. Therefore, leakage rates per length by material and age are reasonably assumed as the Step 2, by referring to the past experimental data (see Appendix B-2), the survey results, maintenance records, pipe observation results, causes of accidents, etc. The estimated leakage per length is shown below.

Estimated Leakage per Length by Material and Year of Construction

Material	1950s	1960s	1970s	1980s	1990s
Steel	1.5 $m^3/km/h$	1.3 $m^3/km/h$	1.1 $m^3/km/h$	0.9 $m^3/km/h$	0.7 $m^3/km/h$
Cast Iron	1.4 $m^3/km/h$	1.2 $m^3/km/h$	1.0 $m^3/km/h$	0.8 $m^3/km/h$	0.6 $m^3/km/h$
Asbestos Cement	2.0 $m^3/km/h$	1.8 $m^3/km/h$	1.6 $m^3/km/h$	1.4 $m^3/km/h$	1.2 $m^3/km/h$
Reinforced Concrete	1.6 $m^3/km/h$	1.4 $m^3/km/h$	1.2 $m^3/km/h$	1.0 $m^3/km/h$	0.8 $m^3/km/h$
Polyethylene	-	-	-	1.1 $m^3/km/h$	0.9 $m^3/km/h$

5. Estimation of Leakage Rate (Step 3)

(1) Leakage Volume

Leakage rate of each city was estimated by using existing pipe inventory data on the assumption that the key effective factors are material and age. Leakage volume per day was calculated as follows:

$$V = \sum_{i,j} X_{(i,j)} \times L_{(i,j)} \times T$$

V : Leakage volume (m^3/day)

$X_{(i,j)}$: Leakage per length by material and age(m^3/km/hour)

$L_{(i,j)}$: Pipe length by material and age (km) #1)

T : Period of water supply per day (hour) #2)

(Notes)

#1) Data on pipe length were provided by Apa Canals.

#2) Periods of water supply were estimated based on information from Apa Canals.

The calculation results are described in Appendix B-4.

(2) Leakage Rate

The leakage rate was calculated by dividing the above obtained leakage volume by the average daily distribution volume which were provided by Apa Canals.

		Balti	Soroca	Riscani	Faresti
[1]	Estimated leakage volume per day	6,892 m^3/d	722 m^3/d	168 m^3/d	139 m^3/d
[2]	Average daily distribution	25,245 m^3/d	2,479 m^3/d	448 m^3/d	423 m^3/d
[3]	Leakage rate ([1] / [2])	27.3 %	29.1 %	37.5 %	32.9 %

6. Appendices

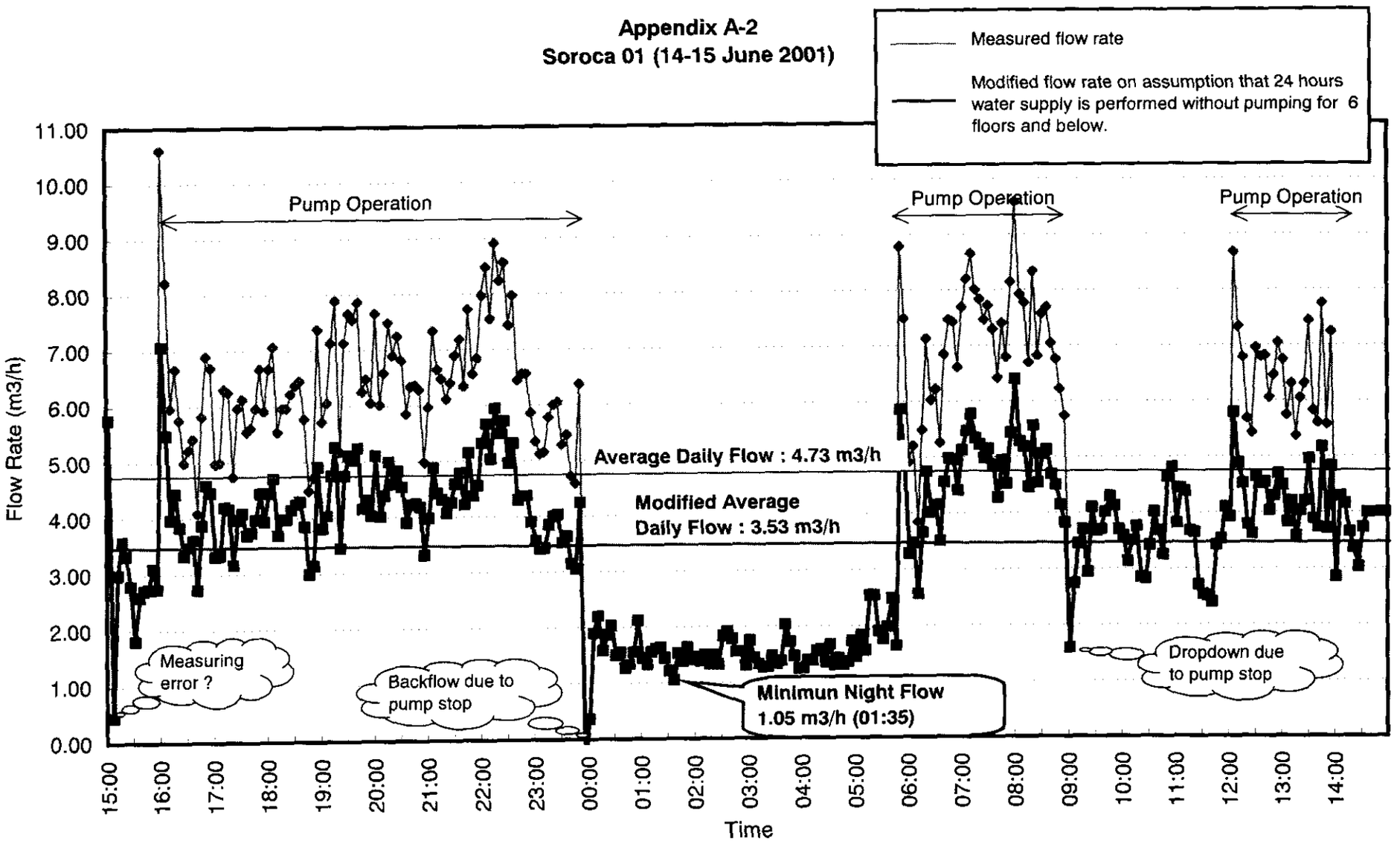
Appendices are attached in the following pages.

Appendix A-1 Survey Result

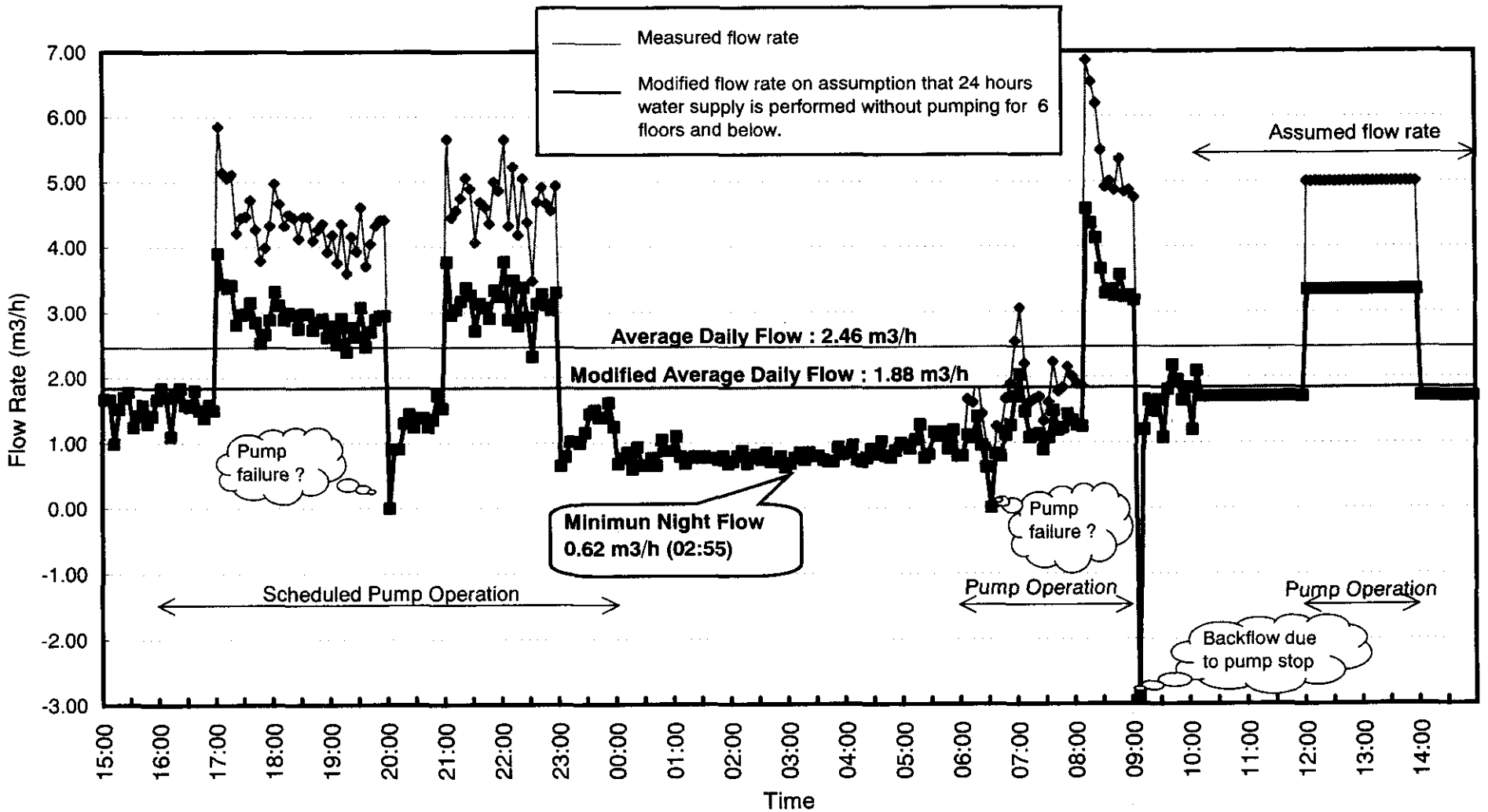
[1]	Measurement ID	Soroca 01	Soroca 02	Soroca 03	Balti 01
[2]	Date of measurement	13 - 14 June 2001	14 - 15 June 2001	15 - 16 June 2001	16 - 14 June 2001
[3]	Location	St. Luceafarului, Soroca	St. Villor, St. Stefan cel Mare, Soroca	St. Limbli, Soroca	New Balti, Balti
[4]	Average zone night pressure	29 m	30 m	35 m	30 m
[5]	Length of mains	120 m	210 m	300 m	3008 m
[6]	Pipe material of the main	Steel pipe	Steel	Steel, Cast Iron	Cast Iron(83%), Steel(17%)
[7]	Year of construction	1984	around 1980	1974	1969
[8]	Number of connections	5 connections	4 connections	5 connections	643 connections
[9]	Number of properties (number of customers)	95 nos estimated (out of 210 apartments)	98 nos estimated (out of 216 apartments)	130 nos estimated (out of 290 apartments)	643 nos
[10]	Estimated population	280 people	293 people	391 people	1985 people
[11]	Background losses from mains	60 L/km/h	60 L/km/h	60 L/km/h	60 L/km/h
[12]	Background losses from connections	5 L/connection/h	5 L/connection/h	5 L/connection/h	5 L/connection/h
[13]	Background losses from properties	1.0 L/property/h	1.0 L/property/h	1.0 L/property/h	1.0 L/property/h
[14]	Rate of population active during night flow measurement	5%	5%	5%	5%
[15]	Quantity of water used in toilet cistern	10 Liters	10 Liters	10 Liters	10 Liters
[16]	Number of small non-domestic users	NIL	NIL	NA	NA
[17]	Average use for small non-domestic users	NIL	NIL	NA	NA
[18]	Use by large non-domestic users	NIL	NIL	NA	NA
[19]	Average waste per property	4.0 L/property/h	4.0 L/property/h	4.0 L/property/h	4.0 L/property/h
[20]	Measured average daily flow	3.53 m3/h	1.88 m3/h	4.19 m3/h	12.28 m3/h
[21]	Measured minimum night flow	1.05 m3/h	0.62 m3/h	1.40 m3/h	8.65 m3/h
[22]	Estimated normal night use	0.14 m3/h	0.15 m3/h	0.20 m3/h	0.99 m3/h
[23]	*Estimated night waste*	*0.38 m3/h*	*0.39 m3/h*	*0.52 m3/h*	*2.57 m3/h*
[24]	Estimated background loss	0.06 m3/h	0.06 m3/h	0.10 m3/h	1.88 m3/h
[25]	Estimated burst	0.47 m3/h	0.02 m3/h	0.58 m3/h	3.21 m3/h
[26]	Leakage per length of mains	4.42 m3/km/h	0.38 m3/km/h	2.27 m3/km/h	1.69 m3/km/h

(Note)
[9] Number of properties is estimated from the population and family size of 3.0 person/family
[10] Estimated population is based on water ledger of Apa Canal
[11] Background losses from mains: 60 L/km/h is employed from the experimental data.
[12] Background losses from connections: 5 L/connection/h is employed from the experimetal data.
[13] Background losses from properties: 1.0 L/property/h is employed from the experimental data.
[14] Rate of population active during night flow measurement: 5% is employed based on the site reconnaissnace.
[15] Quantity of water used in toilet cistern: 10 Liters is employed as an normal capacity.
[19] Average waste per property: 4.0 L/property/h is employed based on a field survey on waste.
[22] Estimated normal night use: [10]x[14]x[15]
[23] Estimated waste: [9]x[19]
[24] Estimated background loss: ([5]x[11] + [8]x[12] + [9]x[13]) x Cbg
Cbg: Pressure correlation factor for background loss: ([4] / 50)^1.5
[25] Estimated burst: [21] - ([22]+[23]+[24])
[26] Leakage per length of mains: ([24]+[25]) / [5]

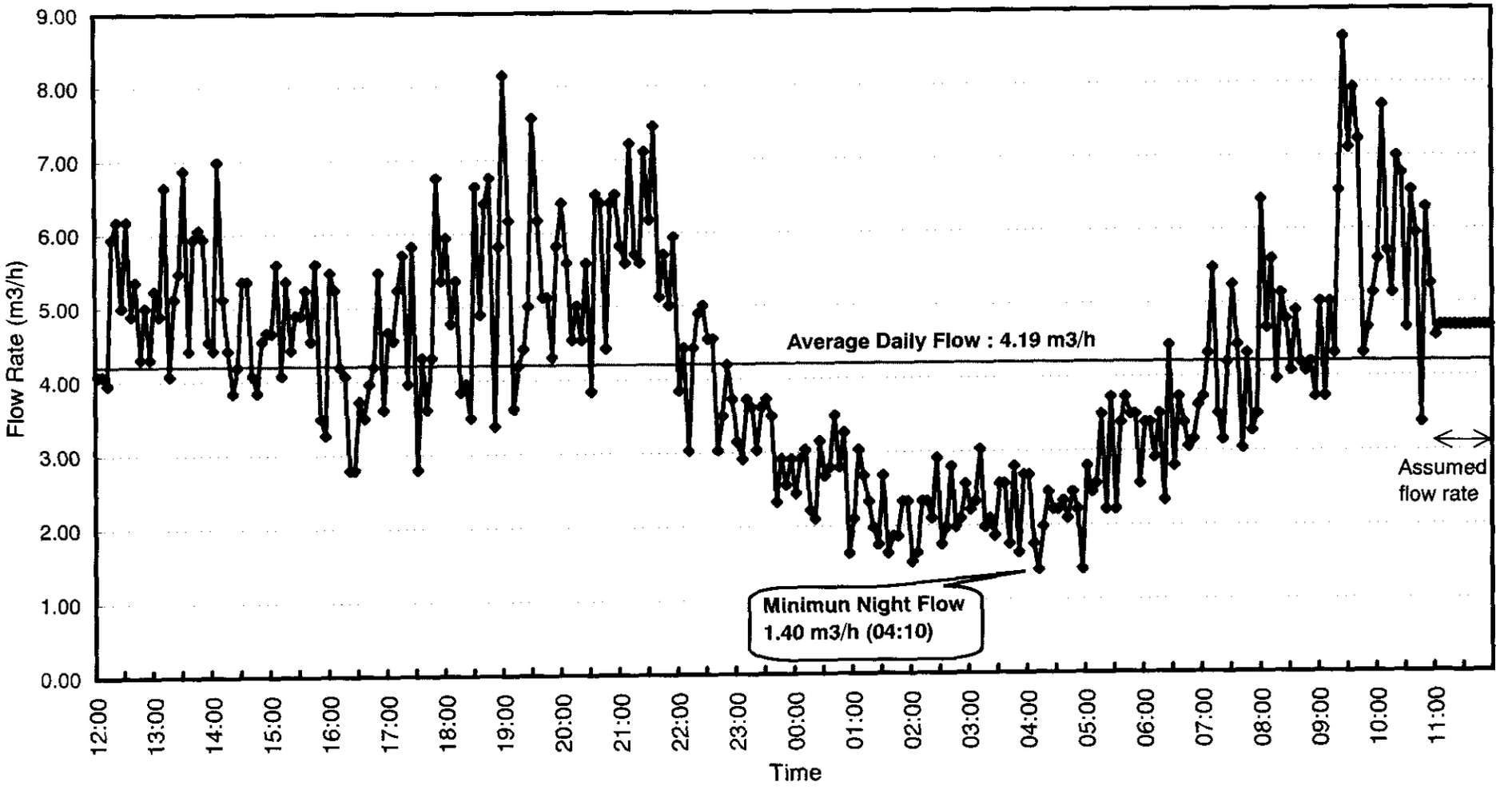
Appendix A-2
Soroca 01 (14-15 June 2001)



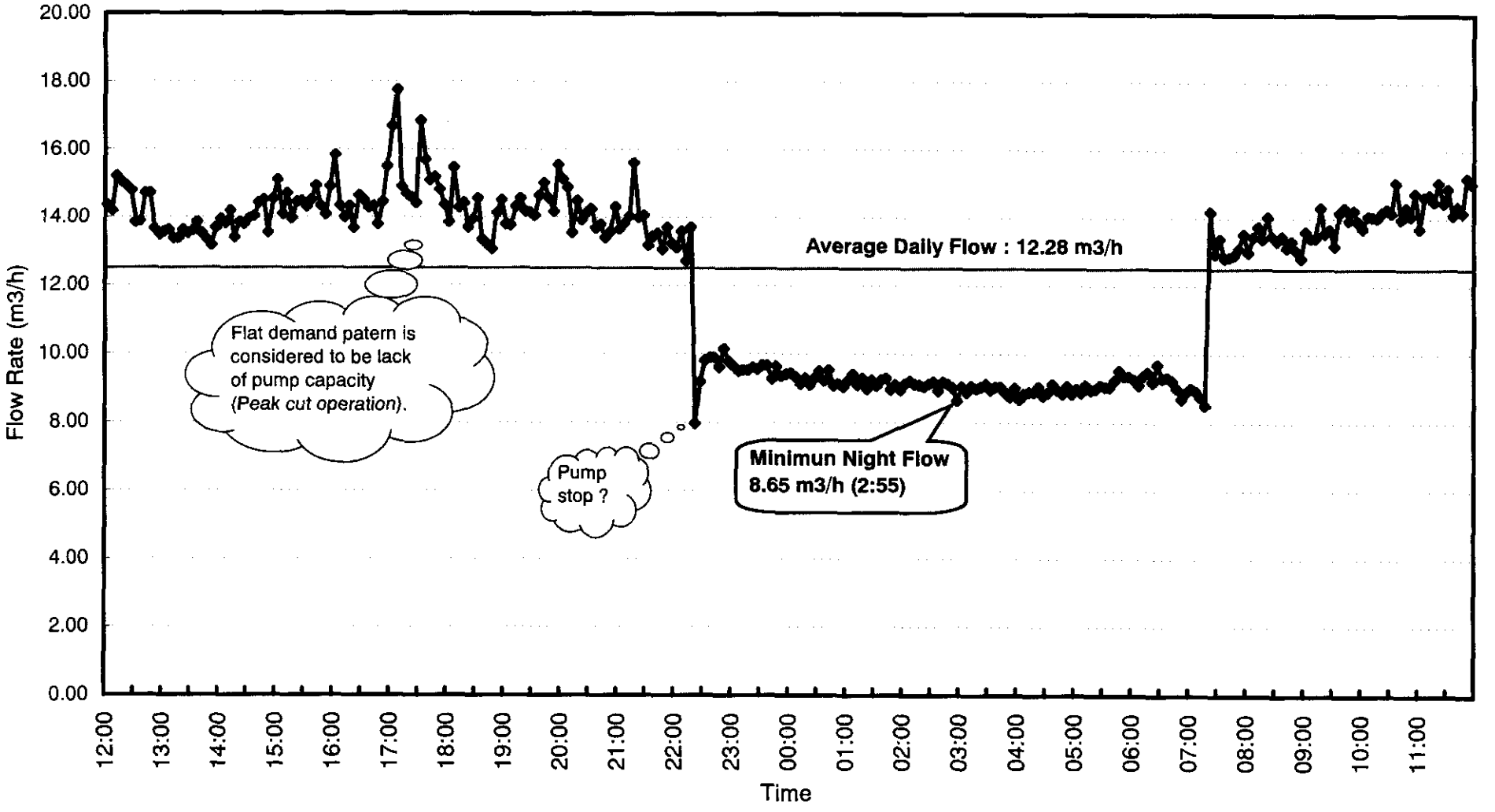
Appendix A-3
Soroca 02 (14 - 15 / Jun / 2001)



Appendix A-4
Soroca 03 (15 - 16 / Jun / 2001)



Appendix A-5
Balti 01 (20 - 21 / Jun / 2001)



Appendix A-6 Survey of Average Waste per Property

Waste volumes of water at six houses in an apartment in Chisinau were measured by means of direct measu and drop testing, while water tap closed. The result is tabulated as below.

	Pressure MPa	Kitchen L/h	Toilet L/h	Shower room L/h	Total Waste L/h
House 1	0.21	0.60	2.43	5.70	8.73
House 2	0.16	2.88	2.22	0.00	5.10
House 3	0.15	1.10	1.95	0.38	3.43
House 4	0.17	0.00	2.80	2.10	4.90
House 5	0.20	0.30	2.54	0.25	3.09
House 6	0.14	0.00	2.40	0.35	2.75
Average	0.17	0.81	2.39	1.46	4.67

Assumed to be not measurable by water meters

Total waste volumes of five apartments out of six were less than 7L/h, that are considered to be not measurat by water meters.

Estimated average waste per property: 4.0 L/property/h

Appendix B-1 Length of Mains by Material and Year of Construction

BALTI

Material	1950s	1960s	1970s	1980s	1990s	Total
Steel	2,190 m	39,570 m	19,940 m	43,670 m	17,150 m	122,520 m
Cast Iron	12,620 m	57,910 m	37,410 m	22,250 m	1,500 m	131,690 m
Asbestos Cement	330 m	4,680 m	160 m			5,170 m
Reinforced Concrete				4,600 m		4,600 m
Polyethylene				620 m	1,450 m	2,070 m
Total	15,140 m	102,160 m	57,510 m	71,140 m	20,100 m	266,050 m

SOROCA

Material	1950s	1960s	1970s	1980s	1990s	Total
Steel			49,211 m			49,211 m
Cast Iron			17,445 m			17,445 m
Asbestos Cement				2,600 m		2,600 m
Total			66,656 m	2,600 m		69,256 m

RISCANI

Material		Total
Steel	9,300 m	9,300 m
Cast Iron	15,200 m	15,200 m
Asbestos Cement	2,500 m	2,500 m
Total	27,000 m	27,000 m

FALESTI

Material	1950s	1960s	1970s	1980s	1990s	Total
Steel				25,100 m		25,100 m
Cast Iron				1,600 m		1,600 m
Asbestos Cement				4,700 m		4,700 m
Polyethylene						
Total				31,400 m		31,400 m

(Source)
Data is provided by Apa Canals as of July 2001. Data for years of construction in Riscani was not available.

Appendix B-2 Leakage Per Length of Mains by Material and Year of Construction

(m3/km/h)

Material	1950s	1960s	1970s	1980s	1990s
Steel	1.5	1.3	1.1	0.9	0.7
Cast Iron	1.4	1.2	1.0	0.8	0.6
Asbestos Cement	2.0	1.8	1.6	1.4	1.2
Reinforced Concrete	1.6	1.4	1.2	1.0	0.8
Polyethylene	-	-	-	1.1	0.9

(Note)
Leakage per length is assumed by taking into account of the survey result and field reconnaissance within the range of the past experimental data reported in "Leakage Control Policy and Practice, Water Authorities Association, UK, 1985." The reported values varies from 0.5 to 2.0 m3/km/h depending on material and age of pipes.

Appendix B-3 Leakage Volume Per Hour

BALTI

Material	1950s	1960s	1970s	1980s	1990s	Total
Steel	3.29 m3/h	51.44 m3/h	21.93 m3/h	39.30 m3/h	12.01 m3/h	127.97 m3/h
Cast Iron	17.67 m3/h	69.49 m3/h	37.41 m3/h	17.80 m3/h	0.90 m3/h	143.27 m3/h
Asbestos Cement	0.66 m3/h	8.42 m3/h	0.26 m3/h			9.34 m3/h
Reinforced Concrete				4.60 m3/h		4.60 m3/h
Polyethylene				0.68 m3/h	1.31 m3/h	1.99 m3/h
Total	21.61 m3/h	129.36 m3/h	59.60 m3/h	62.39 m3/h	14.21 m3/h	287.17 m3/h

SOROCA

Material	1950s	1960s	1970s	1980s	1990s	Total
Steel			54.13 m3/h			54.13 m3/h
Cast Iron			17.45 m3/h			17.45 m3/h
Asbestos Cement				3.64 m3/h		3.64 m3/h
Total			71.58 m3/h	3.64 m3/h		75.22 m3/h

RISCANI

Material		Total
Steel	8.37 m3/h	8.37 m3/h
Cast Iron	12.16 m3/h	12.16 m3/h
Asbestos Cement	3.50 m3/h	3.50 m3/h
Total	24.03 m3/h	24.03 m3/h

FALESTI

Material	1950s	1960s	1970s	1980s	1990s	Total
Steel				22.59 m3/h		22.59 m3/h
Cast Iron				1.28 m3/h		1.28 m3/h
Asbestos Cement				6.58 m3/h		6.58 m3/h
Polyethylene						
Total				30.45 m3/h		30.45 m3/h

(Note)
Leakage volume is calculated by multiplying length and leakage per length.
Leakage per length for Riscani employs the rate for 1980s, since its data on year of construction is unavailable.

Appendix B-4 Leakage Volume Per Day

BALTI
[Leakage rate per hour] x 24 hours x 100%
= 287.17 m3/h x 24 h
= 6,892 m3/day

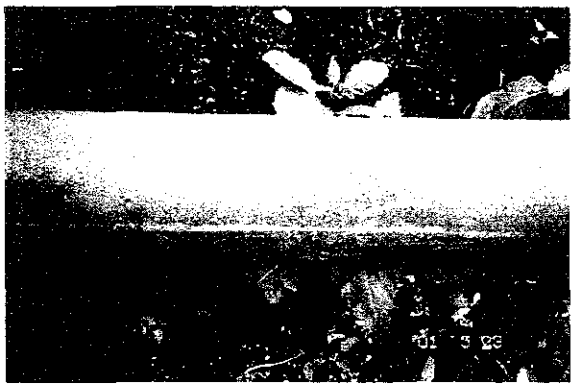
SOROCA
[Leakage rate per hour] x (24 hours x 10% + 13 hours x 40% + 4 hours x 50%)
= 75.22 m3/h x 9.6 h
= 722 m3/day

RISCANI
[Leakage rate per hour] x 7 hours x 100%
= 24.03 m3/h x 7 h
= 168 m3/day

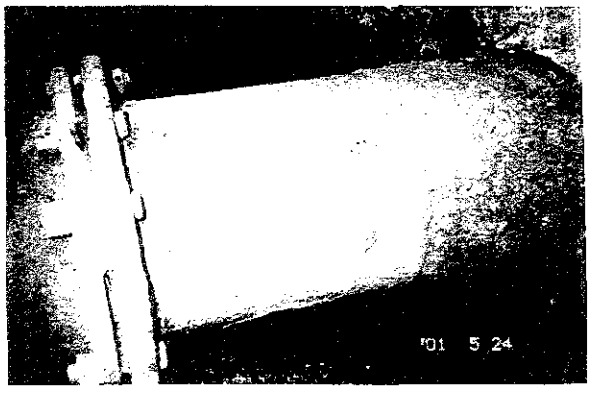
FALESTI
[Leakage rate per hour] x (4 hours x 2/7 x 85% + 24 hours x 15%)
= 30.45 m3/h x 4.57 h
= 104 m3/day

(Note)
Information on period of water supply per day and its coverage ratio was taken into account for calculation purpose.

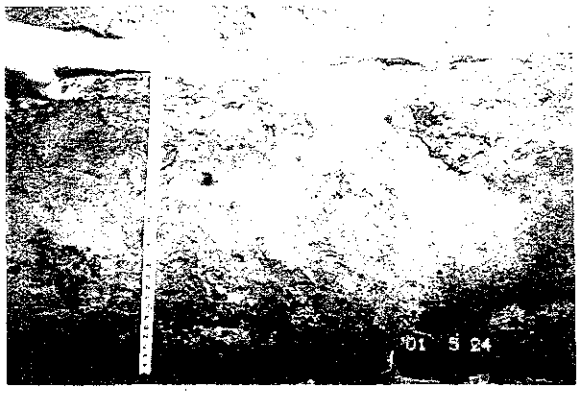
Appendix C Pipe Observation Report (1/2)



Observation Date :	23 May, 2001
Place	Balti
Location :	Exposed pipe along a street
Material :	Steel
Diameter :	200 mm
Age :	NA
Appearance :	Somewhat rusted
Inner Surface :	NA
Remarks	



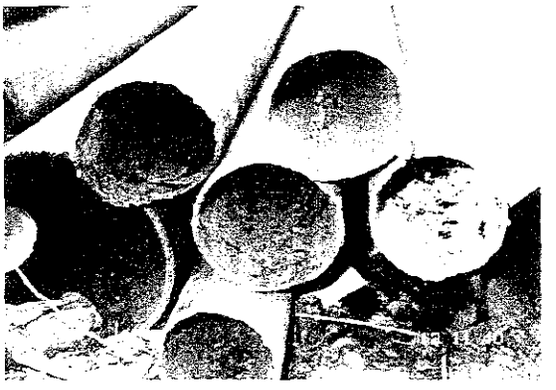
Observation Date :	23 May, 2001
Place	Balti
Location :	West Pumping Station Inlet Pipe
Material :	Steel
Diameter :	200 mm
Age :	NA
Appearance :	Heavily rusted
Inner Surface :	NA
Remarks	Uitrasonic flowmeter doesn't work, due to thick rusty layer.



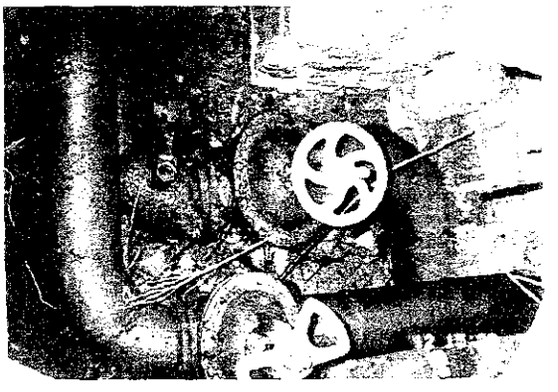
Observation Date :	23 May, 2001
Place	Balti
Location :	West pumping station
Material :	Steel
Diameter :	300 mm
Age :	1971
Appearance :	Heavily corroded and pinhole of dia. 5mm was observed
Inner Surface :	Tubercles are deposited
Remarks	Pipe is stored in the yard.

Observation Date :	12 June, 2001
Place	Soroca
Location :	St. Limbii
Material :	Steel
Diameter :	300 mm
Age :	1971
Appearance :	Heavily deteriorated
Inner Surface :	NA
Remarks	Ultrasonic flowmeter doesn't work, due to thick rusty layer.

Appendix C Pipe Observation Report (2/2)



Observation Date :	13 June, 2001
Place	Soroca
Location :	Stock yard of Apa Canal
Material :	Steel
Diameter :	200mm - 300 mm
Age :	NA
Appearance :	Somewhat rusted
Inner Surface :	Tubercles are deposited
Remarks	



Observation Date :	12 June, 2001
Place	Soroca
Location :	St. Limbii
Material :	Steel
Diameter :	300 mm
Age :	1974
Appearance :	Considerably deteriorated
Inner Surface :	NA
Remarks	Leakge from valve

Observation Date :	14 June, 2001
Place	Soroca
Location :	St. Stefan cel Mare
Material :	Steel
Diameter :	NA
Age :	NA
Appearance :	Somewhat deteriorated
Inner Surface :	NA
Remarks	Pipe burst caused widely water supply suspension