

**No.43 Meliqgyugh**

# Information on Existing Water Sources (Aragatsotn)

Study for Improvement of  
Rural Water Supply and  
Sewage Systems in RA

No.43 Community Meliqgyugh  
District Aragats  
Marz Aragatsotn

No.43 Community Meliqgyugh  
District Aragats  
Marz Aragatsotn  
Sampling date 23/Aug/2007

No	Water source	Latitude			Longitude			Atitude	Yeild(L/sec)		
		deg	min	sec	deg	min	sec	(m)	Min	Max	At site
1	Spring	40	38	55.0	44	22	18.1	2,510	2.0	7.0	5.0
2	Aghi-2 spring	40	38	55.7	44	22	24.5	2,518			
3	Khshah spring	40	40	19.6	44	22	54.1	2,350	1.3	2.5	2.0
4	Aslani ground spring	40	39	40.7	44	23	22.8	2,306	1.5	2.5	3.0
5											
6											
7											
8											
9											
10											

<i>Notes:</i>	
<i>Latitude, Longitude, Atitude:</i>	<i>Measured at site</i>
<i>Yield (Min, Max):</i>	<i>Interviewed to the Community</i>
<i>Yield (at site):</i>	<i>Measured / estimated at site in summer of 2007</i>

Users Acceptnce for water quality	Acceptable
Notes	Springs of "Aslan" monastery are in open condition, there is not sanitary zone.
Alternative sources if any	No alternative water sources are available

	Parameters analysed	Units	No.1	No.2	Guidelines	
					WHO	Armenia
<i>a</i>	pH		8.4	8.2	6.5-8	6.0 - 9.0
<i>b</i>	Temperature	Deg.C	9.3	6.4		
<i>c</i>	TDS	Mg/L	42	107	1000	1000
1	Al:Aluminum	Mg/L	n.d	n.d	0.10	0.50
2	B: Boron	Mg/L	n.d	n.d	0.70	0.50
3	Cl: Chloride	Mg/L	4	4	250	350
4	Cr: Chrome	Mg/L	<0.01	<0.01	0.05	0.05
5	Cu: Copper	Mg/L	n.d	n.d	2	1
6	F: Fluoride	Mg/L	0.09	0.02	1.50	
7	Hardness	Mg/L	100	240	500	700
8	Fe: Iron	Mg/L	n.d	n.d	0.30	0.30
9	Mn: Manganese	Mg/L	n.d	n.d	0.40	0.10
10	Mo: Molibdenum	Mg/L	n.d	n.d	0.070	0.250
11	Ni: Nickel	Mg/L	n.d	n.d	0.020	0.100
12	Nitrate(NO3+)	Mg/L	0.9	0.9	50.0	45.0
13	SO4: Sulfate	Mg/L	4.8	52.0	250.0	500.0
14	Zn: Zink	Mg/L	<0.1	n.d	3.0	5.0
15	As: Arsenic	Mg/L	n.d	n.d	0.0	0.1
16	Ba: Barium	Mg/L	<0.01	<0.01	0.70	0.10
17	Be: Berillium	Mg/L	<0.00005	0.00005	NA	0.00020
18	Cd: Cadmium	Mg/L	n.d	n.d	0.0030	0.0010
19	Pb: Lead	Mg/L	<0.001	<0.001	0.010	0.030
20	Hg: Mercury	Mg/L	n.d	n.d	0.00100	0.00050
21	Se: Selenium	Mg/L	n.d	n.d	0.010	0.010
22	Sr: Strontium	Mg/L	n.d	<0.7	NA	7.0
23	CN: Cyanide	Mg/L	n.d	n.d	0.070	0.035
24	Coli form bacteria	bacteria per 100 ml			-	0
25	Thermo-tolerant coli form bacteria	bacteria per 100 ml			0	0
26	Total bacteria	bacteria per 1 ml			-	50



No. 43 Marz Aragatsotn Community Meliqgyugh

**1. ACCESSIBILITY TO THE SITE**

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Difficult	Unknown	
2	Intake	Difficult	Unknown	
3	Intake	Difficult	Unknown	
4	Transmission pipeline	Difficult	Unknown	Pipeline is mostly far from the road
5	Reservoir	Fair	Possible	

**2. IN Water main**

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	Spring	40°38'55.0"	44°22'18.1"	2,510	1960	Concrete	5.0	Yes
2	Spring	40°38'55.7"	44°22'24.5"	2,518	1960	Concrete		Yes
3	Spring	40°40'19.6"	44°22'54.1"	2,350	1983	Concrete	2.0	Yes
4	Spring	40°39'40.7"	44°23'22.8"	2,306	1976	Concrete	3.0	Yes

**3. TRANSMISSION PIPELINE**

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	1,100	100	Steel	3.0	1960	Medium	Yes
	900	150	AsbestosCement		1960	Medium	Yes
	300	100	cast iron		1960	Medium	Yes
2	2,800	100	Steel	1.2	1976	Medium	Yes
3	3,100	100	Steel	1.4	1983	Medium	Yes

**4. RESERVOIR**

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	40°40'14.2"	44°21'34.8"	2,194	reinforced concrete	Rectangular	10x6x5	250	Yes

**5. CHLORINATION EQUIPMENT**

No.	Existence (Y/N)	Location	Chlorine type	Chlorine duration
1	No			

**6. DISTRIBUTION PIPELINE**

No.	Pipeline length (m)	Pipe diameter	Material	Year	Leakage	Rehabilitation Necessity (Y/N)
1	600	100	AsbestosCement	1960	Medium	Yes
2	1,000	150	AsbestosCement	1960	Medium	Yes
3	400	100	Steel	1960	Medium	Yes

**7. PUMP STATION**

Existence (Y/N)	Power source	Type	Capacity (l/s)	Pump head (m)	Tank cap. (m3)	House size (m)	Rehabilitation Necessity (Y/N)
No							

**8. PUBLIC TAPS**

No. of taps	Old one (year)	New one (year)	Valves (Y/N)	Valve rate (%)	Rehabilitation Necessity (Y/N)
3	1985		No	0	Yes

**9. DRAINAGE SYSTEM**

Existence (Y/N)	Rehabilitation Necessity (Y/N)	Remarks
No	Yes	

## Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

<b>Marz</b>	<b>Aragatsotn</b>
<b>Number and Name of Community</b>	<b>No.43 Meliqgyugh</b>
<b>District</b>	<b>Aragats</b>

No.	Question	Answer
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### A: Baseline Data

A1	Actual population in 2001	2,200
A2	Actual population in 2007	1,300
A3	Number of households	300
A4.1	Elderly people	72
A4.2	Population in labor force (age from 16 to 62)	933
A4.3	Children	295
A5.1	Pensioners	103
A5.2	Unemployed	24
A5.3	Receiving benefits	72
A6	Average monthly income of household (AMD)	30,000
A7	Number of medical ambulance staion/first and health post	absent
A8	Number of beds in each medical ambulance staion	0
A9	Number of school	1
A10	Number of pupils	125

### B: Budget

B1	Annual Budget of the community 2004, in thousand AMD	1,500
	Annual Budget of the community 2005, in thousand AMD	1,500
	Annual Budget of the community 2006, in thousand AMD	2,100
	Annual Budget of the community 2007, in thousand AMD	1,300
	Annual Budget of the community 2008, in thousand AMD	is not planned.
B2	Amount spent in drinking water sector 2004, in thousand AMD	0
	Amount spent in drinking water sector 2005, in thousand AMD	0
	Amount spent in drinking water sector 2006, in thousand AMD	400
	Amount spent in drinking water sector 2007, in thousand AMD	800
	Amount spent in drinking water sector 2008, in thousand AMD	is not planned.

### C: Socio-Economic Survey

C1	Major industries of the community:	cereals, meat, dairy, vegetables
C2	Is there any community activities carrying out by women? 1-Yes, 2-No	no

### D: Water Usage and Water Demand Survey

D1	Does the community hold water use permit? 1-Yes, 2-No	yes
D2	Water use permit number	-
D3	Date of expiry of water use permit	-
D4	Planned date of obtaining water use permit	applied to NPM
D5	Present condition of the water supply volume of Domestic use	sufficient
D6	Present condition of the water supply volume of Irrigation water	sufficient
D7	Number of house connection to drinking water system	300
D8	How many house connection household set the water meter	0
D9	Number of public taps	5
D10.1	How is the regime of water supply in your community in the dry season?	24 hrs
D10.2	How is the regime of water supply in your community in the wet season?	24 hrs
D11	What time of day water is given?	-
D12	Are you pleased with duration of domestic water supply?	very pleased
D13	Are hours of water supply convenient?	-
D14.1	How long the taps are open to provide the domestic water (cooking, washing, foodstuffs, dishes, Landry, bathing, etc) of each household a day?	-

No.	Question	Answer
D14.2	Estimate quantity of domestic water use of each household (litter per day)	400
D15.1	How long the taps are open to provide the each household for filling	-
D15.2	Estimate quantity of water for filling containers of each household (litter per	400
D16	Drinking water monthly water fee per household	0
D17	How often do you usually pay water fees?	-
D18	Water fee structure 1-Flat rate, 2 Having water tariff	-
D19	Where do you acquire the irrigation water?	spring
D20	Are you satisfied with irrigation water supply volume?	sufficient

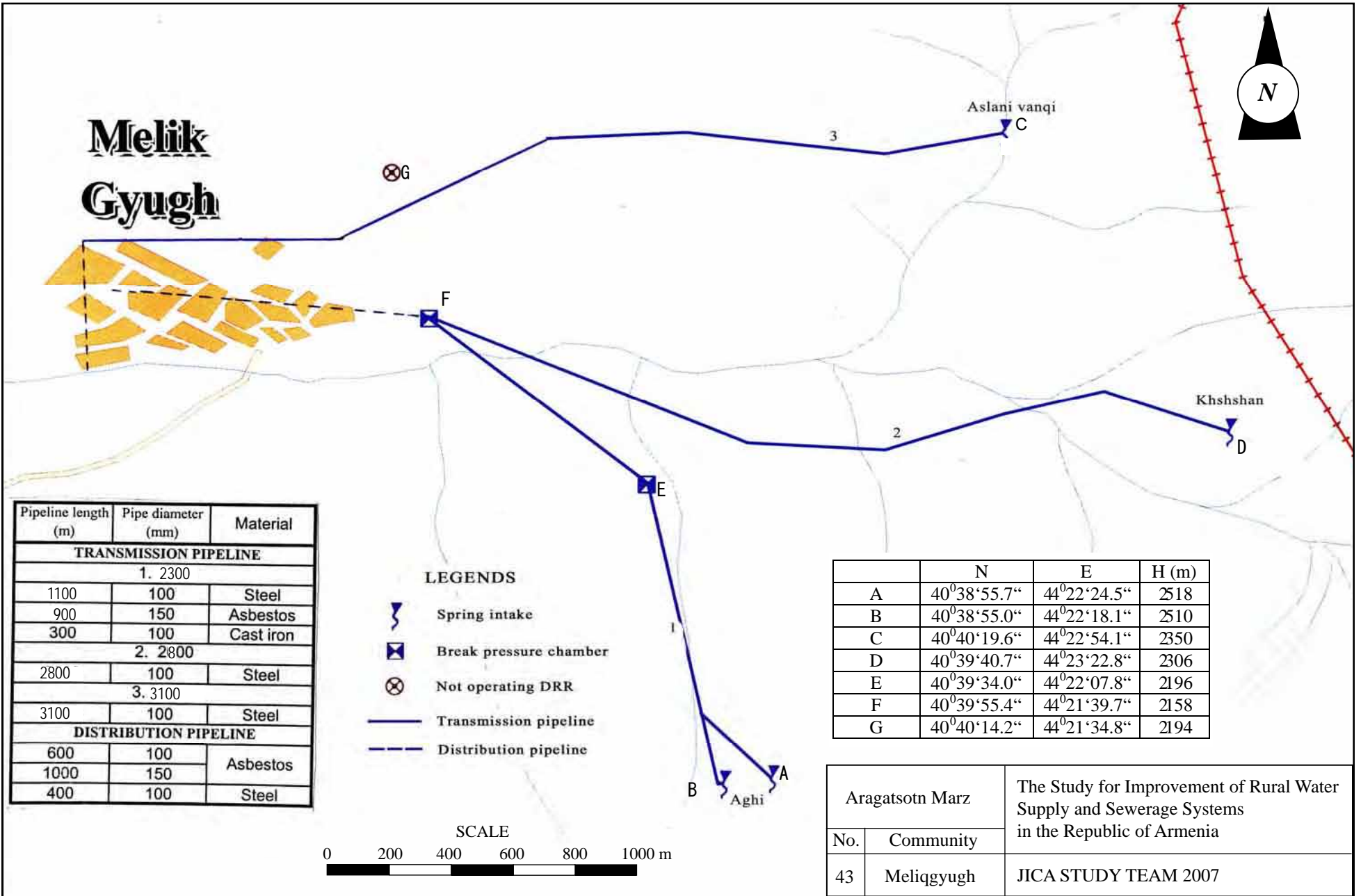
### E: Present Operation and Maintenance Works

E1	Name of responsible for water supply	Hovhannisyan Hakob
E2	Position	specialist
E3	Telephone	(093)925085
E4	Quantity and present condition of the water supply facilities: spring/ intake	4 rehabilitated-
E5	Quantity and present condition of the water supply facilities:	1 deteriorated 2 rehabilitated-
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	1 rehabilitated-
E7	Quantity and present condition of the water supply facilities: net/distribution pipes	deteriorated
E8	Quantity and present condition of the water supply facilities: public tap	partially repaired
E9	Quantity and present condition of the water supply facilities: pump	absent
E10	Who is the owner of the water supply facilities?	community
E11	Who is engaged in the water supply facilities repairing works?	residents
E12	How do you repair the water supply facilities?	inviting a specialist
E13	Who is in charge of the repair work in the community?	specialist from community
E14	How you prepare O&M costs?	community budget
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	0
	Labor cost (AMD)	40,000
	Repair cost(AMD)	800,000
	Others(AMD)	0
	Total (AMD)	840,000
E16	Do the residents participate in the O&M works?	welding
E17	What kind of OM method is preferable to you?	resident participation

### F: Initial Environmental Examination (IEE)






F1	Are any of the following areas located inside or around the project site?	
F1.1	National park, protected area designated by the government (coast line, water lands, reserved are for ethnic or indigenous people, cultural heritage), and areas being considered for national parks or proposed areas.	absent
F1.2	Virgin forests, tropical forests	absent
F1.3	Ecological improvement habits areas (coral reef, mangrove wetland, tidal	absent
F1.4	Habit of valuable species protected by domestic laws or international treaties	absent
F1.5	Likely salts cumulus or soil erosion areas on a massive scale	absent
F1.6	Remarkable desertification trend areas	absent
F1.7	Archaeological historical or cultural valuable areas	yes
F1.8	Living areas of ethic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent

# Melik Gyugh

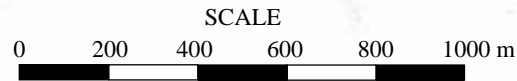


Pipeline length (m)	Pipe diameter (mm)	Material
<b>TRANSMISSION PIPELINE</b>		
1. 2300		
1100	100	Steel
900	150	Asbestos
300	100	Cast iron
2. 2800		
2800	100	Steel
3. 3100		
3100	100	Steel
<b>DISTRIBUTION PIPELINE</b>		
600	100	Asbestos
1000	150	
400	100	Steel

## LEGENDS

-  Spring intake
-  Break pressure chamber
-  Not operating DRR
-  Transmission pipeline
-  Distribution pipeline

	N	E	H (m)
A	40°38'55.7"	44°22'24.5"	2518
B	40°38'55.0"	44°22'18.1"	2510
C	40°40'19.6"	44°22'54.1"	2350
D	40°39'40.7"	44°23'22.8"	2306
E	40°39'34.0"	44°22'07.8"	2196
F	40°39'55.4"	44°21'39.7"	2158
G	40°40'14.2"	44°21'34.8"	2194



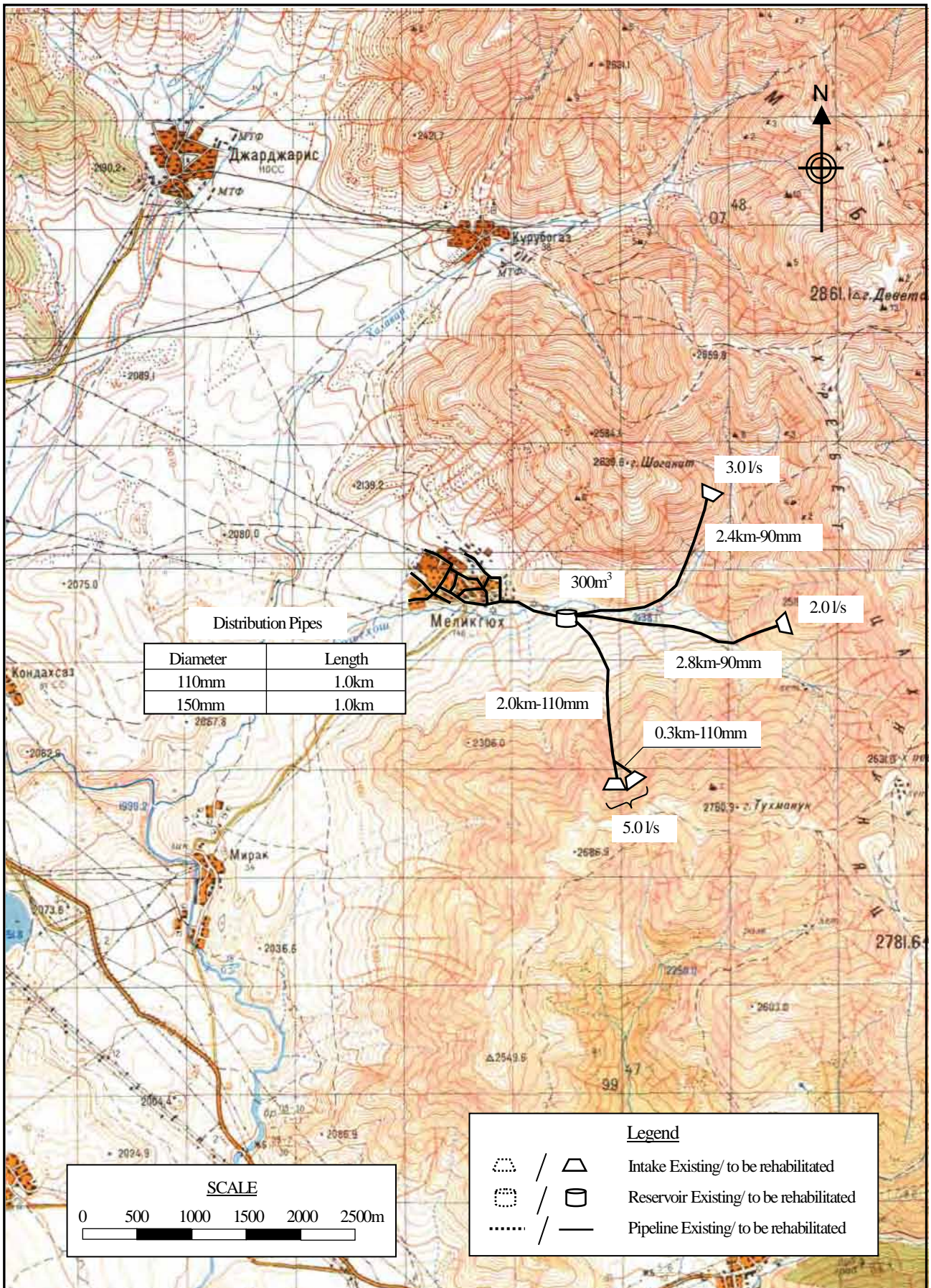
Aragatsotn Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
43	Meliqgyugh	JICA STUDY TEAM 2007

Marz : **Aragatsotn**  
Name : **Meliqgyugh**

No.43

No.	Item	Quantity	Unit	Water demand (m3/d)
<b>A. WATER DEMAND</b>				
	1 Population	1,300	persons	130.0
	2 Factory	-	nos	0.0
	3 School (pupils)	125	pupils	1.3
	4 Medical Ambulance Station	-	nos	-
	5 Polyclinic	-	nos	-
	6 Livestocks (87lit/household)	300	household	26.1
	Sub-total			157.4
	Unaccounted for water (20%)			31.5
1	Average Daily Water Demand			188.9 m3/day
2	Maximum Daily Water Demand			226.7 m3/day
3	Maximum Hourly Water Demand			24.6 m3/hr
<b>B. WATER SUPPLY PLAN</b>				
	1 Water source type	Nr.	Total vol.	
	a Spring	4	10.0	lit/sec
				864.0 m3/day
	Total			864.0 m3/day
	2 Required reservoir volume			295 m3

<b>C. WATER SUPPLY FACILITIES REHABILITATION PLAN</b>				
No	Item	Quantity	Unit	
1	Intake			
	1m3	4	nos	
	2m3		nos	
	3m3		nos	
	4m3		nos	
2	Transmission pipe			
	50mm diameter		m	
	75mm diameter		m	
	90mm diameter	5,200	m	
	110mm diameter	2,300	m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
3	Reservoir			
	300m3 capacity	1	nos	
4	Distribution pipe			
	50mm diameter		m	
	75mm diameter		m	
	90mm diameter		m	
	110mm diameter	1,000	m	
	150mm diameter	1,000	m	
	200mm diameter		m	
	250mm diameter		m	
5	House connection	-	nos	
6	Water meter installation	300	nos	
7	Public tap	3	nos	
8	Chlorination	1	nos	
9	Pumps	-	nos	



Water Supply Facilities Rehabilitation Plan		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
Marz	Aragatsotn	
No. 43	Melikguyh	JICA STUDY TEAM



STUDY FOR IMPROVEMENT OF  
RURAL WATER SUPPLY AND  
SEWAGE SYSTEMS IN RA

Marz : **Aragatsotn**  
No. : **43**  
Name : **Meliqgyugh**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake	1m3	4	nos	367,700	1,470,800
		2m3		nos	545,000	
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					1,470,800
2	Transmission Pipe	50mm		m	5,520	
		75mm		m	7,160	
		90mm	5,200	m	8,040	41,808,000
		110mm	2,300	m	9,680	22,264,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					64,072,000
3	Reservoir	50m3		nos	8,363,900	
		100m3		nos	12,968,300	
		150m3		nos	18,804,500	
		200m3		nos	22,524,600	
		250m3		nos	25,952,800	
		300m3	1	nos	29,630,400	29,630,400
		350m3		nos	33,528,700	
		400m3		nos	36,388,000	
		450m3		nos	39,392,500	
		500m3		nos	42,520,900	
	Sub-total					29,630,400
4	Distribution Pipe	50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	1,000	m	9,680	9,680,000
		150mm	1,000	m	13,140	13,140,000
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					22,820,000
5	House Connection			nos	74,000	
6	Water Meter Installation		300	nos	80,000	24,000,000
7	Public Tap		3	nos	90,000	270,000
8	Chlorilation Equipment		1	nos	500,000	500,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa	800	m	3,600	2,880,000
<b>Total</b>					<b>AMD</b>	<b>145,643,200</b>
					Equivalent to USD	476,706
					Equivalent to JPY	50,292,477
					<b>AMD</b>	<b>USD</b>
Investment Cost per household			300	HH	485,477	1,589
Investment Cost per person			1,300	persons	112,033	367





**No.44 Miraq**

# Information on Existing Water Sources (Aragatsotn)

Study for Improvement of  
Rural Water Supply and  
Sewage Systems in RA

No.44 Community Miraq  
District Aragats  
Marz Aragatsotn

No.44 Community Miraq  
District Aragats  
Marz Aragatsotn  
Sampling date 24/Aug/2007

No	Water source	Latitude			Longitude			Atitude (m)	Yeild(L/sec)		
		deg	min	sec	deg	min	sec		Min	Max	At site
1	2 ground springs	40	38	30.3	44	21	39.1	2,451	0.8	2.0	1.0
2											
3											
4											
5											
6											
7											
8											
9											
10											

*Notes:*

<i>Latitude, Longitude, Atitude:</i>	<i>Measured at site</i>
<i>Yield (Min, Max):</i>	<i>Interviewed to the Community</i>
<i>Yield (at site):</i>	<i>Measured / estimated at site in summer of 2007</i>

Users Acceptnce for water quality	Acceptable
Notes	From the spring to the water main water runs about 1 km with open bed. The community has not connections to the network, residents use 2 public taps.
Alternative sources if any	At 3km distance from the Community there is a prospective spring with 2l/sec discharge.

	Parameters analysed	Units	No.1	Guidelines	
				WHO	Armenia
a	pH		8.1	6.5-8	6.0 - 9.0
b	Temperature	Deg.C	22.4		
c	TDS	Mg/L	48	1000	1000
1	Al:Aluminum	Mg/L	0.01	0.10	0.50
2	B:Boron	Mg/L	n.d	0.70	0.50
3	Cl:Chloride	Mg/L	4	250	350
4	Cr:Chrome	Mg/L	0.01	0.05	0.05
5	Cu:Copper	Mg/L	n.d	2	1
6	F:Fluoride	Mg/L	0.13	1.50	
7	Hardness	Mg/L	100	500	700
8	Fe:Iron	Mg/L	n.d	0.30	0.30
9	Mn:Manganese	Mg/L	n.d	0.40	0.10
10	Mo:Molibdenum	Mg/L	<0.02	0.070	0.250
11	Ni:Nickel	Mg/L	n.d	0.020	0.100
12	Nitrate(NO3+)	Mg/L	1.3	50.0	45.0
13	SO4:Sulfate	Mg/L	3.0	250.0	500.0
14	Zn:Zink	Mg/L	n.d	3.0	5.0
15	As:Arsenic	Mg/L	n.d	0.0	0.1
16	Ba:Barium	Mg/L	0.01	0.70	0.10
17	Be:Berillium	Mg/L	0.00006	NA	0.00020
18	Cd:Cadmium	Mg/L	n.d	0.0030	0.0010
19	Pb:Lead	Mg/L	0.002	0.010	0.030
20	Hg:Mercury	Mg/L	n.d	0.00100	0.00050
21	Se:Selenium	Mg/L	n.d	0.010	0.010
22	Sr:Strontium	Mg/L	<0.7	NA	7.0
23	CN:Cyanide	Mg/L	n.d	0.070	0.035
24	Coli form bacteria	bacteria per 100 ml		-	0
25	Thermo-tolerant coli form bacteria	bacteria per 100 ml		0	0
26	Total bacteria	bacteria per 1 ml		-	50



No. 44 Marz Aragatsotn Community Mirag**1. ACCESSIBILITY TO THE SITE**

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Difficult	Difficult	
2	Transmission pipeline	Difficult	Difficult	Pipeline is mostly far from the road
3	Reservoir			No reservoir

**2. INTAKE STRUCTURE**

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	Spring	40°38'30.3"	44°21'39.1"	2,451	1986	Concrete	1.0	Yes

**3. TRANSMISSION PIPELINE**

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	4,200	100	Steel	0.7	1986	Medium	Yes

**4. RESERVOIR**

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m <sup>3</sup> )	Rehabilitation Necessity (Y/N)
1	No							

**5. CHLORINATION EQUIPMENT**

No.	Existence (Y/N)	Location	Chlorine type	Chlorine duration
1	No			

**6. DISTRIBUTION PIPELINE**

No.	Pipeline length (m)	Pipe diameter	Material	Year	Leakage	Rehabilitation Necessity (Y/N)
1	No					

**7. PUMP STATION**

Existence (Y/N)	Power source	Type	Capacity (l/s)	Pump head (m)	Tank cap. (m <sup>3</sup> )	House size (m)	Rehabilitation Necessity (Y/N)
No							

**8. PUBLIC TAPS**

No. of taps	Old one (year)	New one (year)	Valves (Y/N)	Valve rate (%)	Rehabilitation Necessity (Y/N)
2	1987		No	0	Yes

**9. DRAINAGE SYSTEM**

Existence (Y/N)	Rehabilitation Necessity (Y/N)	Remarks
No	Yes	

## Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

<b>Marz</b>	<b>Aragatsotn</b>
<b>Number and Name of Community</b>	<b>No.44 Miraq</b>
<b>District</b>	<b>Aragats</b>

No.	Question	Answer
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### A: Baseline Data

A1	Actual population in 2001	120
A2	Actual population in 2007	132
A3	Number of households	70
A4.1	Elderly people	25
A4.2	Population in labor force (age from 16 to 62)	67
A4.3	Children	40
A5.1	Pensioners	20
A5.2	Unemployed	2
A5.3	Receiving benefits	5
A6	Average monthly income of household (AMD)	45,000
A7	Number of medical ambulance staion/first and health post	absent
A8	Number of beds in each medical ambulance staion	0
A9	Number of school	1
A10	Number of pupils	30

### B: Budget

B1	Annual Budget of the community 2004, in thousand AMD	700
	Annual Budget of the community 2005, in thousand AMD	800
	Annual Budget of the community 2006, in thousand AMD	800
	Annual Budget of the community 2007, in thousand AMD	1,000
	Annual Budget of the community 2008, in thousand AMD	is not planned.
B2	Amount spent in drinking water sector 2004, in thousand AMD	0
	Amount spent in drinking water sector 2005, in thousand AMD	0
	Amount spent in drinking water sector 2006, in thousand AMD	0
	Amount spent in drinking water sector 2007, in thousand AMD	0
	Amount spent in drinking water sector 2008, in thousand AMD	is not planned.

### C: Socio-Economic Survey

C1	Major industries of the community:	dairy, meat, cereals
C2	Is there any community activities carrying out by women? 1-Yes, 2-No	no

### D: Water Usage and Water Demand Survey

D1	Does the community hold water use permit? 1-Yes, 2-No	yes
D2	Water use permit number	088844
D3	Date of expiry of water use permit	2002-2007
D4	Planned date of obtaining water use permit	-
D5	Present condition of the water supply volume of Domestic use	almost sufficient
D6	Present condition of the water supply volume of Irrigation water	absent
D7	Number of house connection to drinking water system	0
D8	How many house connection household set the water meter	0
D9	Number of public taps	2
D10.1	How is the regime of water supply in your community in the dry season?	24 hrs
D10.2	How is the regime of water supply in your community in the wet season?	24 hrs
D11	What time of day water is given?	-
D12	Are you pleased with duration of domestic water supply?	very pleased
D13	Are hours of water supply convenient?	-
D14.1	How long the taps are open to provide the domestic water (cooking, washing, foodstuffs, dishes, Landry, bathing, etc) of each household a day?	-

D14.2	Estimate quantity of domestic water use of each household (litter per day)	400
D15.1	How long the taps are open to provide the each household for filling	-
D15.2	Estimate quantity of water for filling containers of each household (litter per	400
D16	Drinking water monthly water fee per household	0
D17	How often do you usually pay water fees?	-
D18	Water fee structure 1-Flat rate, 2 Having water tariff	-
D19	Where do you acquire the irrigation water?	absent
D20	Are you satisfied with irrigation water supply volume?	is not sufficient

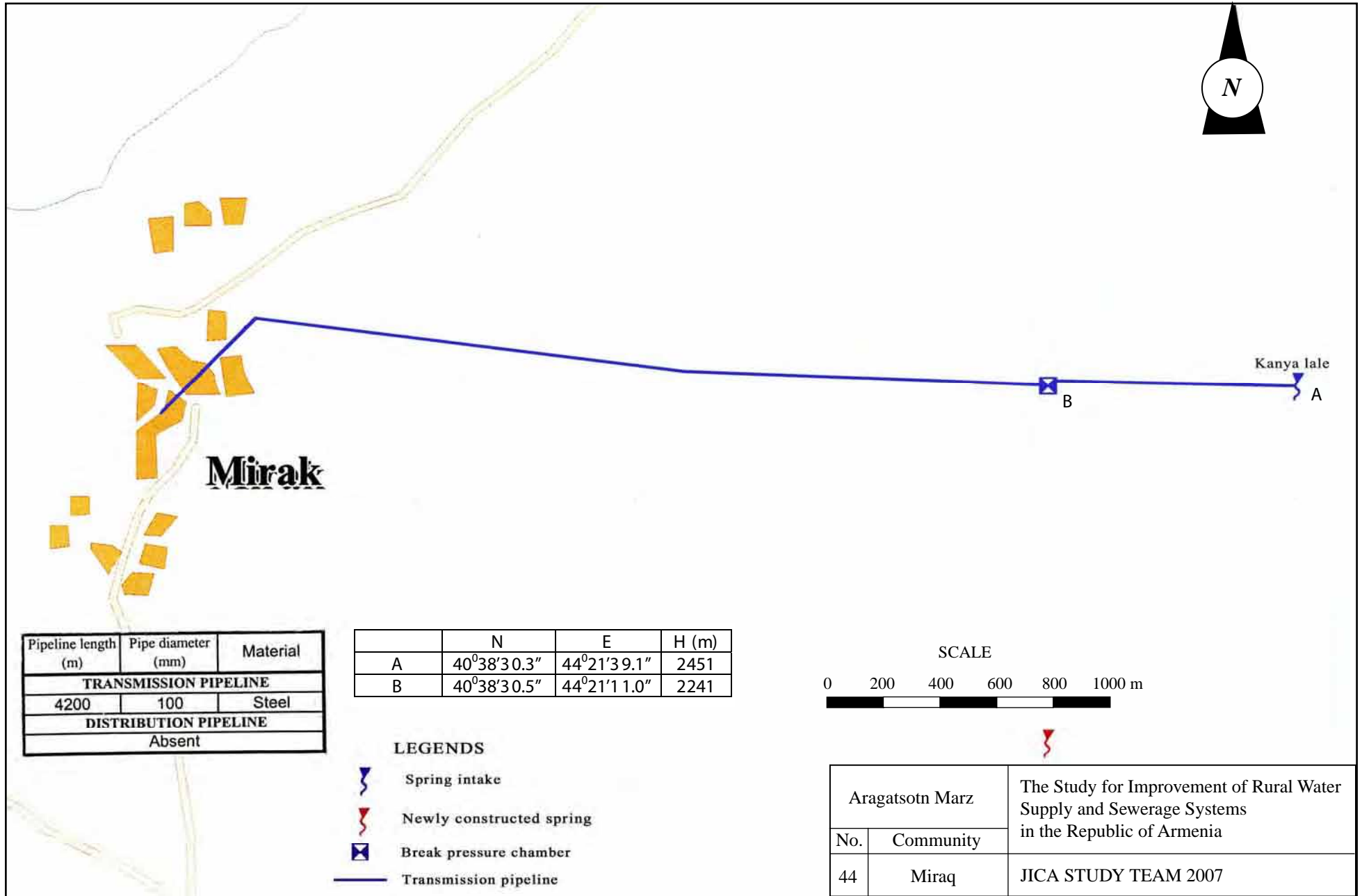
### E: Present Operation and Maintenance Works

E1	Name of responsible for water supply	nobody
E2	Position	-
E3	Telephone	-
E4	Quantity and present condition of the water supply facilities: spring/ intake	1 deteriorated
E5	Quantity and present condition of the water supply facilities:	1 - deteriorated
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	absent
E7	Quantity and present condition of the water supply facilities: net/distribution pipes	deteriorated
E8	Quantity and present condition of the water supply facilities: public tap	deteriorated
E9	Quantity and present condition of the water supply facilities: pump	absent
E10	Who is the owner of the water supply facilities?	community
E11	Who is engaged in the water supply facilities repairing works?	residents
E12	How do you repair the water supply facilities?	by ourselves
E13	Who is in charge of the repair work in the community?	administration head
E14	How you prepare O&M costs?	community budget
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	0
	Labor cost (AMD)	0
	Repair cost(AMD)	0
	Others(AMD)	0
	Total (AMD)	0
E16	Do the residents participate in the O&M works?	manpower
E17	What kind of OM method is preferable to you?	resident participation

### F: Initial Environmental Examination (IEE)

F1	Are any of the following areas located inside or around the project site?	
F1.1	National park, protected area designated by the government (coast line, water lands, reserved are for ethnic or indigenous people, cultural heritage), and areas being considered for national parks or proposed areas.	absent
F1.2	Virgin forests, tropical forests	absent
F1.3	Ecological improvement habits areas (coral reef, mangrove wetland, tidal	yes
F1.4	Habit of valuable species protected by domestic laws or international treaties	absent
F1.5	Likely salts cumulus or soil erosion areas on a massive scale	absent
F1.6	Remarkable desertification trend areas	absent
F1.7	Archaeological historical or cultural valuable areas	absent
F1.8	Living areas of ethic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent





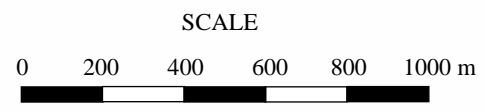
**Mirak**

Kanya lale  
A

B

Pipeline length (m)	Pipe diameter (mm)	Material
<b>TRANSMISSION PIPELINE</b>		
4200	100	Steel
<b>DISTRIBUTION PIPELINE</b>		
Absent		

	N	E	H (m)
A	40°38'30.3"	44°21'39.1"	2451
B	40°38'30.5"	44°21'11.0"	2241



- LEGENDS**
- Spring intake
  - Newly constructed spring
  - Break pressure chamber
  - Transmission pipeline

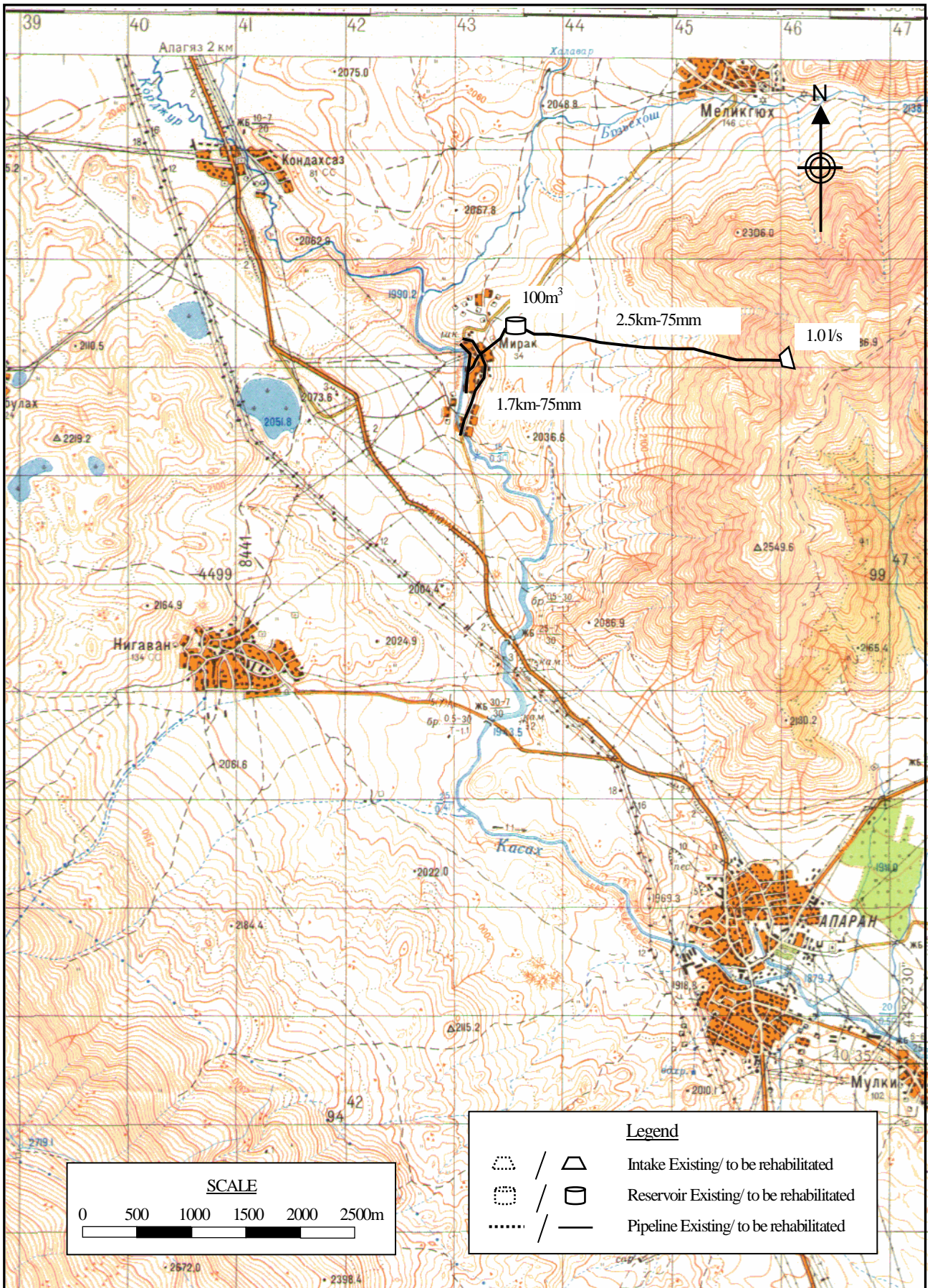
Aragatsotn Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
44	Mirak	JICA STUDY TEAM 2007

Marz : **Aragatsotn**  
Name : **Miraq**

No.44

No.	Item	Quantity	Unit	Water demand (m3/d)
<b>A. WATER DEMAND</b>				
1	Population	132	persons	13.2
2	Factory	-	nos	0.0
3	School (pupils)	30	pupils	0.3
4	Medical Ambulance Station	-	nos	-
5	Policlinic	-	nos	-
6	Livestocks (87lit/household)	70	household	6.1
	Sub-total			19.6
	Unaccounted for water (20%)			3.9
1	Average Daily Water Demand			23.5 m3/day
2	Maximum Daily Water Demand			28.2 m3/day
3	Maximum Hourly Water Demand			6.9 m3/hr
<b>B. WATER SUPPLY PLAN</b>				
	1 Water source type	Nr.	Total vol.	
	a Spring	1	1.0	lit/sec
				86.4 m3/day
	Total			86.4 m3/day
	2 Required reservoir volume			83 m3

<b>C. WATER SUPPLY FACILITIES REHABILITATION PLAN</b>				
No	Item	Quantity	Unit	
1	Intake			
	1m3	1	nos	
	2m3		nos	
	3m3		nos	
	4m3		nos	
2	Transmission pipe			
	50mm diameter		m	
	75mm diameter	2,500	m	
	90mm diameter		m	
	110mm diameter		m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
3	Reservoir			
	100m3 capacity	1	nos	
4	Distribution pipe			
	50mm diameter		m	
	75mm diameter	1,700	m	
	90mm diameter		m	
	110mm diameter		m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
5	House connection	70	nos	
6	Water meter installation	70	nos	
7	Public tap	1	nos	
8	Chlorination	1	nos	
9	Pumps	-	nos	



Water Supply Facilities Rehabilitation Plan		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia JICA STUDY TEAM
Marz	Aragatsotn	
No. 44	Miraq	

STUDY FOR IMPROVEMENT OF  
RURAL WATER SUPPLY AND  
SEWAGE SYSTEMS IN RA

Marz : **Aragatsotn**

No. : **44**

Name : **Miraq**

No	Item	Specification	Quantity	Unit	Unit Price	Total	
1	Intake	1m3	1	nos	367,700	367,700	
		2m3		nos	545,000		
		3m3		nos	669,100		
		4m3		nos	805,100		
	Sub-total					367,700	
2	Transmission Pipe	50mm		m	5,520		
		75mm	2,500	m	7,160	17,900,000	
		90mm		m	8,040		
		110mm		m	9,680		
		150mm		m	13,140		
		200mm		m	19,440		
		250mm		m	27,040		
	Sub-total					17,900,000	
3	Reservoir	50m3		nos	8,363,900		
		100m3	1	nos	12,968,300	12,968,300	
		150m3		nos	18,804,500		
		200m3		nos	22,524,600		
		250m3		nos	25,952,800		
		300m3		nos	29,630,400		
		350m3		nos	33,528,700		
		400m3		nos	36,388,000		
		450m3		nos	39,392,500		
		500m3		nos	42,520,900		
	Sub-total					12,968,300	
4	Distribution Pipe	50mm		m	5,520		
		75mm	1,700	m	7,160	12,172,000	
		90mm		m	8,040		
		110mm		m	9,680		
		150mm		m	13,140		
		200mm		m	19,440		
		250mm		m	27,040		
	Sub-total					12,172,000	
5	House Connection		70	nos	74,000	5,180,000	
6	Water Meter Installation		70	nos	80,000	5,600,000	
7	Public Tap		1	nos	90,000	90,000	
8	Chlorilation Equipment		1	nos	500,000	500,000	
9	Pump Replacement			nos	10,000,000		
10	Drainage and Sewerage concrete surfa		680	m	3,600	2,448,000	
Total					AMD	57,226,000	
					Equivalent to USD	187,307	
					Equivalent to JPY	19,760,877	
					AMD	USD	
Investment Cost per household				70	HH	817,514	2,676
Investment Cost per person				132	persons	433,530	1,419





**No.45 Mulqi**

# Information on Existing Water Sources (Aragatsotn)

Study for Improvement of  
Rural Water Supply and  
Sewage Systems in RA

No.45 Community Mulqi  
District Aparan  
Marz Aragatsotn

No.45 Community Mulqi  
District Aparan  
Marz Aragatsotn  
Sampling date 24/Jul/2007

No	Water source	Latitude			Longitude			Atitude (m)	Yield(L/sec)		
		deg	min	sec	deg	min	sec		Min	Max	At site
1	Vichki spring	40	35	4.9	44	22	27.3	1,892	1.2	2.0	2.0
2	Nokheyi spring	40	35	2.7	44	22	30.3	1,897	0.8	1.0	1.0
3	Seroyi spring	40	35	4.9	44	22	36.6	1,898	0.2	0.5	0.5
4	Zhani spring	40	34	51.9	44	22	36.7	1,897	0.7	1	1.0
5											
6											
7											
8											
9											
10											
<i>Notes:</i>											
<i>Latitude, Longitude, Atitude:</i>		<i>Measured at site</i>									
<i>Yield (Min, Max):</i>		<i>Interviewed to the Community</i>									
<i>Yield (at site):</i>		<i>Measured / estimated at site in summer of 2007</i>									

Users Acceptnce for water quality	Not acceptable
Notes	There is estimated 60% leakage in the internal network. There are 5 boreholes in the community, water of which is pumped to Yerevan. Community feels poor water quality.
Alternative sources if any	There is a great groundwater potential in the community.

	Parameters analysed	Units	No.1 Vichki panel	No.2 Jami aghbyur	No.3 Sevoyi aghbyur	Guidelines	
						WHO	Armenia
<i>a</i>	pH		7.6	6.8	7.6	6.5-8	6.0 - 9.0
<i>b</i>	Temperature	Deg.C	6.7	6.4	7.6		
<i>c</i>	TDS	Mg/L	165	81	196	1000	1000
1	Al:Aluminum	Mg/L	0.01	n.d	0.01	0.10	0.50
2	B:Boron	Mg/L	n.d	n.d	n.d	0.70	0.50
3	Cl:Chloride	Mg/L	14	9	18	250	350
4	Cr:Chrome	Mg/L	<0.01	<0.01	0.01	0.05	0.05
5	Cu:Copper	Mg/L	n.d	n.d	n.d	2	1
6	F:Fluoride	Mg/L	0.25	0.11	0.28	1.50	
7	Hardness	Mg/L	170	150	280	500	700
8	Fe:Iron	Mg/L	n.d	n.d	n.d	0.30	0.30
9	Mn:Manganese	Mg/L	n.d	n.d	n.d	0.40	0.10
10	Mo:Molibdenum	Mg/L	n.d	n.d	n.d	0.070	0.250
11	Ni:Nickel	Mg/L	n.d	n.d	n.d	0.020	0.100
12	Nitrate(NO3+)	Mg/L	12.0	1.8	16.0	50.0	45.0
13	SO4:Sulfate	Mg/L	18.5	10.0	18.0	250.0	500.0
14	Zn:Zink	Mg/L	n.d	n.d	n.d	3.0	5.0
15	As:Arsenic	Mg/L	n.d	n.d	n.d	0.0	0.1
16	Ba:Barium	Mg/L	<0.05	<0.01	<0.01	0.70	0.10
17	Be:Berillium	Mg/L	0.00005	n.d	<0.00005	NA	0.00020
18	Cd:Cadmium	Mg/L	n.d	n.d	n.d	0.0030	0.0010
19	Pb:Lead	Mg/L	<0.001	<0.001	<0.001	0.010	0.030
20	Hg:Mercury	Mg/L	<0.00005	<0.00005	<0.0002	0.00100	0.00050
21	Se:Selenium	Mg/L	<0.001	<0.001	<0.001	0.010	0.010
22	Sr:Strontium	Mg/L	<0.7	n.d	<0.7	NA	7.0
23	CN:Cyanide	Mg/L	n.d	n.d	n.d	0.070	0.035
24	Coli form bacteria	bacteria per 100 ml	>1100	n.d		-	0
25	Thermo-tolerant coli form bacteria	bacteria per 100 ml	n.d	n.d		0	0
26	Total bacteria	bacteria per 1 ml	>500	4		-	50





No. 45 Marz Aragatsotn Community Mulqi**1. ACCESSIBILITY TO THE SITE**

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Fair	Possible	
2	Intake	Fair	Possible	
3	Intake	Fair	Possible	
4	Intake	Fair	Possible	
5	Transmission pipeline	Fair	Possible	Pipeline is mostly far from the road
6	Reservoir	Fair	Possible	

Water main

**2. INTAKE STRUCTURE**

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	Spring	40°35'04.9"	44°22'27.3"	1,892	1828	Masonry	2.0	No
2	Spring	40°35'02.7"	44°22'30.3"	1,897	1996	Steel	1.0	Yes
3	Spring	40°35'04.9"	44°22'36.6"	1,898	1996	Steel	0.5	Yes
4	Spring	40°34'51.9"	44°22'36.7"	1,897	1820	Concrete	1.0	Yes

**3. TRANSMISSION PIPELINE**

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	150	50	Steel	0.8	1970	Medium	Yes
	100	80	Steel	1.9	1996	Little	Yes
	200	80	Steel	0.95	1996	Little	Yes
	250	25	Steel	0.4	1980	Medium	Yes

**4. RESERVOIR**

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m <sup>3</sup> )	Rehabilitation Necessity (Y/N)
1	40°35'05.3"	44°22'27.2"	1,882	Steel	Circle	h=3m,d=2.5m	60	Yes

**5. CHLORINATION**

No.	Existence (Y/N)	Location	Chlorine type	Chlorine duration
1	Yes	Reservoir	Powder	15times per month

**6. DISTRIBUTION PIPELINE**

No.	Pipeline length (m)	Pipe diameter	Material	Year	Leakage	Rehabilitation Necessity (Y/N)
1	3,000	100	Steel	1968	Huge	Yes
2	3,000	50	Steel	1968	Huge	Yes

**7. PUMP STATION**

Existence (Y/N)	Power source	Type	Capacity (l/s)	Pump head (m)	Tank cap. (m <sup>3</sup> )	House size (m)	Rehabilitation Necessity (Y/N)
Yes	Commercial	Centrifugal	12.45	55	60	4x6x3	Yes

**8. PUBLIC TAPS**

No. of taps	Old one (year)	New one (year)	Valves (Y/N)	Valve rate (%)	Rehabilitation Necessity (Y/N)
15	1968	1996	No	0	Yes

**9. DRAINAGE SYSTEM**

Existence	Rehabilitation	Remarks
No		

## Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

<b>Marz</b>	<b>Aragatsotn</b>
<b>Number and Name of Community</b>	<b>No.45 Mulqi</b>
<b>District</b>	<b>Aparan</b>

No.	Question	Answer
-----	----------	--------

### A: Baseline Data

A1	Actual population in 2001	637
A2	Actual population in 2007	650
A3	Number of households	178
A4.1	Elderly people	75
A4.2	Population in labor force (age from 16 to 62)	426
A4.3	Children	149
A5.1	Pensioners	85
A5.2	Unemployed	0
A5.3	Receiving benefits	14
A6	Average monthly income of household (AMD)	30,000
A7	Number of medical ambulance staion/first and health post	absent
A8	Number of beds in each medical ambulance staion	0
A9	Number of school	1
A10	Number of pupils	90

### B: Budget

B1	Annual Budget of the community 2004, in thousand AMD	1,444
	Annual Budget of the community 2005, in thousand AMD	1,604
	Annual Budget of the community 2006, in thousand AMD	3,340
	Annual Budget of the community 2007, in thousand AMD	760
	Annual Budget of the community 2008, in thousand AMD	is not planned.
B2	Amount spent in drinking water sector 2004, in thousand AMD	100
	Amount spent in drinking water sector 2005, in thousand AMD	80
	Amount spent in drinking water sector 2006, in thousand AMD	110
	Amount spent in drinking water sector 2007, in thousand AMD	50
	Amount spent in drinking water sector 2008, in thousand AMD	is not planned.

### C: Socio-Economic Survey

C1	Major industries of the community:	dairy, meat
C2	Is there any community activities carrying out by women? 1-Yes, 2-No	no

### D: Water Usage and Water Demand Survey

D1	Does the community hold water use permit? 1-Yes, 2-No	no
D2	Water use permit number	-
D3	Date of expiry of water use permit	-
D4	Planned date of obtaining water use permit	2007
D5	Present condition of the water supply volume of Domestic use	insufficient
D6	Present condition of the water supply volume of Irrigation water	almost sufficient
D7	Number of house connection to drinking water system	178
D8	How many house connection household set the water meter	10%
D9	Number of public taps	2
D10.1	How is the regime of water supply in your community in the dry season?	regularly 1hour, 7-8 HHs - 24 hrs
D10.2	How is the regime of water supply in your community in the wet season?	regularly 1hour, 7-8 HHs - 24 hrs
D11	What time of day water is given?	-
D12	Are you pleased with duration of domestic water supply?	mainly displeased
D13	Are hours of water supply convenient?	mainly inconvenient
D14.1	How long the taps are open to provide the domestic water (cooking, washing, foodstuffs, dishes, Landry, bathing, etc) of each household a day?	-

No.	Question	Answer
D14.2	Estimate quantity of domestic water use of each household (litter per day)	300
D15.1	How long the taps are open to provide the each household for filling	-
D15.2	Estimate quantity of water for filling containers of each household (litter per	difficult to answer
D16	Drinking water monthly water fee per household	1000drams
D17	How often do you usually pay water fees?	each month
D18	Water fee structure 1Flat rate, 2 Having water tariff	flat rate
D19	Where do you acquire the irrigation water?	from river by pumps
D20	Are you satisfied with irrigation water supply volume?	is not sufficient

### E: Present Operation and Maintenance Works

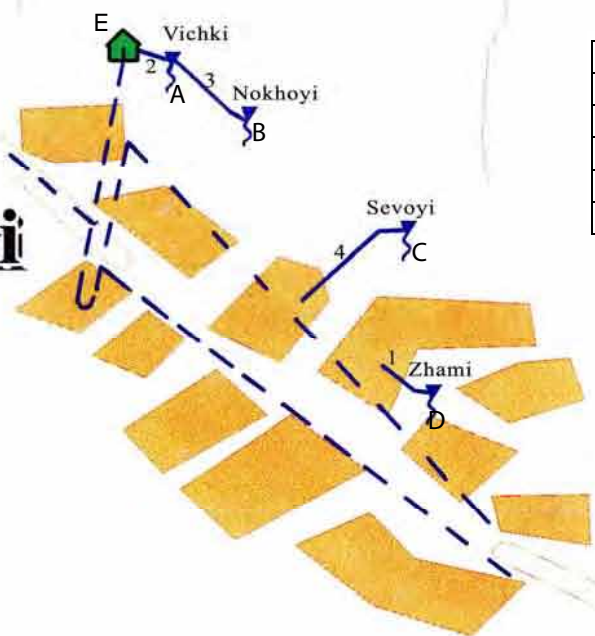
E1	Name of responsible for water supply	Grigoryan Nairy
E2	Position	administration head
E3	Telephone	(094)846009
E4	Quantity and present condition of the water supply facilities: spring/ intake	2- rehabilitated.
E5	Quantity and present condition of the water supply facilities:	absent
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	absent
E7	Quantity and present condition of the water supply facilities: net/distribution pipes	deteriorated
E8	Quantity and present condition of the water supply facilities: public tap	2 rehabilitated.
E9	Quantity and present condition of the water supply facilities: pump	1-partially repaired
E10	Who is the owner of the water supply facilities?	community
E11	Who is engaged in the water supply facilities repairing works?	community and residents
E12	How do you repair the water supply facilities?	by ourselves
E13	Who is in charge of the repair work in the community?	nobody
E14	How you prepare O&M costs?	collections from residents, community budget
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	300,000
	Labor cost (AMD)	0
	Repair cost(AMD)	100,000
	Others(AMD)	0
	Total (AMD)	400,000
E16	Do the residents participate in the O&M works?	manpower
E17	What kind of OM method is preferable to you?	water fee

### F: Initial Environmental Examination (IEE)

F1	Are any of the following areas located inside or around the project site?	
F1.1	National park, protected area designated by the government (coast line, water lands, reserved are for ethnic or indigenous people, cultural heritage), and areas being considered for national parks or proposed areas.	absent
F1.2	Virgin forests, tropical forests	absent
F1.3	Ecological improvement habits areas (coral reef, mangrove wetland, tidal	absent
F1.4	Habit of valuable species protected by domestic laws or international treaties	absent
F1.5	Likely salts cumulus or soil erosion areas on a massive scale	absent
F1.6	Remarkable desertification trend areas	absent
F1.7	Archaeological historical or cultural valuable areas	absent
F1.8	Living areas of ethic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent







**Mulki**

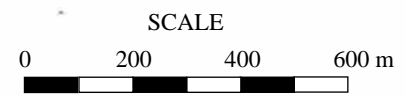


	N	E	H (m)
A	40°35'04.9"Z	4°22'27.3"1	892
B	40°35'02.7"Z	4°22'30.3"1	897
C	40°35'04.9"Z	4°22'36.6"1	898
D	40°34'51.9"Z	4°22'36.7"1	897
E	40°35'05.3"Z	4°22'27.2"1	882

Pipeline length (m)	Pipe diameter (mm)	Material
<b>TRANSMISSION PIPELINE</b>		
1. 150	50	Steel
2. 100	80	
3. 200	80	
4. 250	25	
<b>DISTRIBUTION PIPELINE</b>		
3000	100	Steel
3000	50	

**LEGENDS**

-  Spring intake
-  Pumping station
-  Transmission pipeline
-  Distribution pipeline



Aragatsotn Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
45	Mulqi	JICA STUDY TEAM 2007

Marz : **Aragatsotn**  
Name : **Mulqi**

No.45

No.	Item	Quantity	Unit	Water demand (m3/d)
<b>A. WATER DEMAND</b>				
	1 Population	650	persons	65.0
	2 Factory	-	nos	0.0
	3 School (pupils)	90	pupils	0.9
	4 Medical Ambulance Station	-	nos	-
	5 Polyclinic	-	nos	-
	6 Livestocks (87lit/household)	178	household	15.5
	Sub-total			81.4
	Unaccounted for water (20%)			16.3
1	Average Daily Water Demand			97.7 m3/day
2	Maximum Daily Water Demand			117.2 m3/day
3	Maximum Hourly Water Demand			15.9 m3/hr
<b>B. WATER SUPPLY PLAN</b>				
	1 Water source type	Nr.	Total vol.	
	a Spring	4	4.5 lit/sec	388.8 m3/day
	Total			388.8 m3/day
	2 Required reservoir volume			190 m3

<b>C. WATER SUPPLY FACILITIES REHABILITATION PLAN</b>				
No	Item	Quantity	Unit	
1	Intake			
	1m3	3	nos	
	2m3		nos	
	3m3		nos	
	4m3		nos	
2	Transmission pipe			
	50mm diameter	300	m	
	75mm diameter	600	m	
	90mm diameter		m	
	110mm diameter		m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
3	Reservoir			
4	Distribution pipe			
	50mm diameter	3,000	m	
	75mm diameter		m	
	90mm diameter		m	
	110mm diameter	3,000	m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
5	House connection	-	nos	
6	Water meter installation	178	nos	
7	Public tap	2	nos	
8	Chlorination	1	nos	
9	Pumps	1	nos	

Q=12.45l/sec; H=55m



Water Supply Facilities Rehabilitation Plan		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
Marz	Aragatsotn	
No. 45	Mulqi	JICA STUDY TEAM

STUDY FOR IMPROVEMENT OF  
RURAL WATER SUPPLY AND  
SEWAGE SYSTEMS IN RA

Marz : **Aragatsotn**  
No. : **45**  
Name : **Mulqi**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake	1m3	3	nos	367,700	1,103,100
		2m3		nos	545,000	
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					1,103,100
2	Transmission Pipe	50mm	300	m	5,520	1,656,000
		75mm	600	m	7,160	4,296,000
		90mm		m	8,040	
		110mm		m	9,680	
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					5,952,000
3	Reservoir	50m3		nos	8,363,900	
		100m3		nos	12,968,300	
		150m3		nos	18,804,500	
		200m3		nos	22,524,600	
		250m3		nos	25,952,800	
		300m3		nos	29,630,400	
		350m3		nos	33,528,700	
		400m3		nos	36,388,000	
		450m3		nos	39,392,500	
		500m3		nos	42,520,900	
	Sub-total					
4	Distribution Pipe	50mm	3,000	m	5,520	16,560,000
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	3,000	m	9,680	29,040,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					45,600,000
5	House Connection			nos	74,000	
6	Water Meter Installation		178	nos	80,000	14,240,000
7	Public Tap		2	nos	90,000	180,000
8	Chlorilation Equipment		1	nos	500,000	500,000
9	Pump Replacement		1	nos	10,000,000	10,000,000
10	Drainage and Sewerage concrete surfa		2,400	m	3,600	8,640,000
Total					AMD	86,215,100
					Equivalent to USD	282,191
					Equivalent to JPY	29,771,187
					AMD	USD
	Investment Cost per household		178	HH	484,354	1,585
	Investment Cost per person		650	persons	132,639	434





