

## Chemical and Bacteriological Analyses of Asmara water (2001- 2003)

- A collection of 20 pages with results from different places near Asmara
  - Important collection in order to compare with future results
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1. Drinking water, bact. results from different places where water is distributed by the Mai Nefhi Treatment Plant; sampled 16 sept. 2003
  2. Drinking water, bact. results from different places where water is distributed by the Old Adi Nefas Treatment Plant; sampled 17 sept. 2003
  3. Water from the Dam at Mai Nefhi, raw water; sampled 10 sept. 2003
  4. Water of Mai Nefhi plant after filtration; sampled 10 sept. 2003
  5. Water from the Toker Dam, raw water; sampled 10 sept. 2003. May be that the water is used directly for drinking purposes
  6. Water from the Dam near Adi-Sheka; raw water; sampled 15 sept. 2003. The comment that the water contains a higher percentage of Mn than permitted in WHO standard could indicate that the water is intended for direct supply for consumption
  7. Water from the Dam at Mai Srva; sampled 15 sept. 2003; purpose not indicated
  8. Water from the Toker Dam, raw water; sampled 25 aug. 2003. May be that the water is used directly for drinking purposes
  9. Water from Dam Balincki; sampled 25 aug. 2003. Drinking water.
  10. Water from the Dam near Adi-Sheka; raw water; sampled 25 aug. 2003. The comment that the water contains a higher percentage of Mn than permitted in WHO standard could indicate that the water is intended for direct supply for consumption
  11. Water from Dam at Adi-Nefas, sampled 25 aug. 2003; raw water
  12. Water from Dam Mai-Anbesa, sampled 18 sept. 2003; raw water
  13. + 14 + 15 Report on samples taken on different places including treatment plants, the distribution network, hotels, reservoirs, including comments from the head of the laboratory, sampled 24 sept. 2003
  14. See before in 13
  15. See before in 13
  16. +17 +18 samples taken on different places including treatment plants, the distribution network, hotels, reservoirs, including comments from the head of the laboratory, sampled 5 march 2002
  17. See before in 16
  18. See before in 16
  19. Overview of the drinking water quality in Asmara town, sampled 12 july 2002
  20. Overview of the drinking water quality in Asmara town, sampled 24 sept. 2001

241.1 03CH-19343

Mari Kefli T. P.

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**Water Resources Department**

**Water Laboratory**

Tel. 116265 Fax. 124625 P.O.Box 1488

**Bacteriological Water Quality Lab Report**

Well Ident	Description	Lab- No	
	Water from input (source) and output	1092	
Sub-Zone		Village	Asmara
Date-Sampled	Time-Sampled	Time Arrived	Date-Analysed
16/09/03	9:00am	4:45pm	20/08/03
Sender		Water Use	
Department of Environment		Drinking	

No.	Place	Faecal c./100ml	Total c./100ml
1	Setanta Otto sample-1	0	many
2	Setanta Otto(storage) sample-2	20	0
3	Setanta otto sample-3	8	0
4	Geza Banda sample-4	0	0
5	Geza Banda sample-5	0	many
6	Geza Banda storage sample-6	many	many
7	Geza Banda source sample-7	0	0
8	Sembel source sample-1	0	many
9	Sembel storage sample-2	0	many
10	Sembel source sample-3	0	0
11	Sembel source sample-4	0	4
12	Sembel source sample-5	0	0

Remarks	Those sources which contain either total coliform or faecal coliform or both coliforms are unsafe for drinking. Chlorination is needed prior to use.
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Lab-Head Mebrat Gebrecab

Barcode 19343  
Location 241.103CH

old Adi Refas T.P.

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**Water Resources Department**

**Water Laboratory**

Tel. 116265 Fax. 124625 P.O.Box 1488

**Bacteriological Water Quality Lab Report**

Well Ident	Description	Lab- No 1093	
Sub-Zone		Village Asmara	
Date-Sampled 17/09/03	Time-Sampled 9:00am	Time Arrived 4:00pm	Date-Analysed 17/09/03
Sender Department of Environment		Water Use Drinking	

No.	Place	Faecal c./100ml	Total c./100ml
1	Paradizo sample-1	34	many
2	Paradizo sample-2	0	many
3	Paradizo sample-3	many	many
4	Maitemenai sample-4	many	many
5	Maitemenai sample-5	many	many
6	Maitemenai sample-6	many	many
7	Hazhaz sample-7	many	many
8	Hazhaz sample-8	many	many

Remarks	Those sources which contain either total coliform or faecal coliform or both coliforms are unsafe for drinking. Chlorination is needed prior to use.
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Lab-Head Mebrat Gebreab

**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Mai Nefhi</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 10/9/03		Date - Analysed 16/09/03
Well Ident		Lab-No 2065
Sub-Zone Asmara		Village Mai Nefhi

**Hydrochemical Data**

Cations	Ca	Mg	Na	K	Fe	Mn
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
PPM	32	6.0	14.89	4.35	0.12	0.3

Anions	HCO3	CO3	SO4	Cl	NO3	F
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
PPM	107.36		21	26	9.75	0.0

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 2.86	<b>Anions</b> 3.09	<b>BalErr</b> 3.87%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.52	1.5mg/l
EC, us/cm at 25°c	320	2000mg/l
TDS, mg/l CaCO <sub>3</sub>	162.61	1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	105	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	88	

	Maximum Permissible level	
PH	8.05	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	19.9	
Odor		Agreaceable
color		Colorless
Free Cl,mg/l		

**Water Type**  
Calcium Bicarbonate

<b>Remarks</b>
The chemical quality of the dam water is acceptable by the WHO guidelines.

<b>Analysts:</b>
Teraza, Tesfagiorgis,Michael

<b>Lab- Head:</b>
Mebrat Gebreab

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**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Mai Nefhi Plant</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 10/9/03		Date - Analysed 16/09/03
Well Ident		Lab-No 2064
Sub-Zone Asmara		Village Mai Nefhi

**Hydrochemical Data**

<b>Cations</b>	<b>Ca</b>	<b>Mg</b>	<b>Na</b>	<b>K</b>	<b>Fe</b>	<b>Mn</b>
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
<b>PPM</b>	27.2	10.56	14.68	4.48	0.02	0.1

<b>Anions</b>	<b>HCO3</b>	<b>CO3</b>	<b>SO4</b>	<b>Cl</b>	<b>NO3</b>	<b>F</b>
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
<b>PPM</b>	82.96		42	34	7.53	0.0

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 2.99	<b>Anions</b> 3.3	<b>BalErr</b> 5.00%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.54	1.5mg/l
EC, us/cm at 25°c	341	2000mg/l
TDS, mg/l CaCO <sub>3</sub>	177.82	1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	112	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	68	

		Maximum Permissible level
PH	7.01	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	20.2	
Odor		Agreeable
color		Colorless
Free Cl,mg/l		

**Water Type**  
**Calcium Bicarbonate**

**Remarks**  
The chemical quality of the dam water is acceptable by the WHO guidelines.

**Analysts:**  
Teraza, Tcsfagiorgis, Michael

**Lab- Head:**  
Mebrat Gebreab

**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Toker</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 10/9/03		Date - Analysed 16/09/03
Well Ident		Lab-No 2063
Sub-Zone Asmara		Village Toker

**Hydrochemical Data**

Cations	Ca	Mg	Na	K	Fe	Mn
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
<b>PPM</b>	17.6	6.24	10.26	2.9	0.02	0.2

Anions	HCO3	CO3	SO4	Cl	NO3	F
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
<b>PPM</b>	85.4		10	12	5.32	0.0

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 1.92	<b>Anions</b> 2.03	<b>BalErr</b> 2.70%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.39	1.5mg/l
EC, us/cm at 25°c	218	2000mg/l
TDS, mg/l CaCO <sub>3</sub>	102.88	1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	70	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	70	

	Value	Maximum Permissible level
PH	8.66	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	20.3	
Odor		Agreable
color		Colorless
Free Cl,mg/l		

**Water Type**  
Calcium Bicarbonate

**Remarks**  
The chemical quality of the dam water is acceptable by the WHO guidelines.

**Analysts:**  
Teraza, Tesfagiorgis, Michael

**Lab- Head:**  
Mebrat Gebreab

**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Adi-Sheka</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 15/9/2003		Date - Analysed 16/09/03
Well Ident		Lab-No 2066
Sub-Zone Asmara		Village Adi-Sheka

**Hydrochemical Data**

Cations	Ca	Mg	Na	K	Fe	Mn
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
<b>PPM</b>	22.4	2.88	4.96	3.29	0.22	0.7

Anions	HCO3	CO3	SO4	Cl	NO3	F
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
<b>PPM</b>	73.2		8	10	12.4	0.0

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 1.66	<b>Anions</b> 1.85	<b>BalErr</b> 5.00%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.65	1.5mg/l
EC, us/cm at 25°c	181.2	2000mg/l
TDS, mg/l CaCO <sub>3</sub>	97.72	1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	68	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	60	

		Maximum Permissible level
PH	8.03	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	19.2	
Odor		Agreeable
color		Colorless
Free Cl,mg/l		

**Water Type**  
Calcium Bicarbonate

**Remarks**  
The source water contains manganese higher than the WHO guideline which causes undesirable taste and deposits on food during cooking.

**Analysts:**  
Tcraza, Tesfagiorgis,Michael

**Lab- Head:**  
Mcbrat Gebreab

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**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Mai Srwa</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 15/9/2003		Date - Analysed 16/09/03
Well Ident		Lab-No 2067
Sub-Zone Asmara		Village Mai Srwa

**Hydrochemical Data**

Cations	Ca	Mg	Na	K	Fe	Mn
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
PPM	25.6	5.76	8.72	2.11	0.02	0.2

Anions	HCO3	CO3	SO4	Cl	NO3	F
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
PPM	114.68		4	12	6.65	0.0

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 2.2	<b>Anions</b> 2.41	<b>BalErr</b> 4.50%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.41	1.5mg/l
EC, us/cm at 25 <sup>o</sup> c	241	2000mg/l
TDS, mg/l CaCO <sub>3</sub>	116.55	1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	88	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	94	

	Value	Maximum Permissible level
PH	7.68	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	20.2	
Odor		Agreceable
color		Colorless
Free Cl,mg/l		

**Water Type**  
Calcium Bicarbonate

<b>Remarks</b>
The chemical quality of the dam water is acceptable by the WHO guidelines.

**Analysts:**  
Teraza, Tesfagiorgis, Michael

**Lab- Head:**  
Mebrat Gebrecab



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**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Tokor</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 25/08/03		Date - Analysed 6/9/03
Well Ident		Lab-No 2068
Sub-Zone Asmara		Village Tokor

**Hydrochemical Data**

Cations	Ca	Mg	Na	K	Fe	Mn
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
<b>PPM</b>	17.6	6.24	10.26	2.9	0.02	0.2

Anions	HCO3	CO3	SO4	Cl	NO3	F
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
<b>PPM</b>	85.4		10	12	5.32	0.0

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 1.92	<b>Anions</b> 2.03	<b>BalErr</b> 2.70%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.39	1.5mg/l
EC, us/cm at 25°c	218	2000mg/l
TDS, mg/l CaCO <sub>3</sub>	102.88	1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	70	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	70	

		Maximum Permissible level
PH	8.66	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	20.3	
Odor		Agreeable
color		Colorless
Free Cl,mg/l		

**Water Type**  
**Calcium Bicarbonate**

**Remarks**  
The chemical quality of the dam water is acceptable by the WHO guidelines. Therefore it is safe for drinking .

**Analysts:**  
Tcraza, Tcsfagiorgis,Michael

**Lab- Head:**  
Mebrat Gebrecab

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**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Balineki</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 25/08/03		Date - Analysed 6/9/03
Well Ident		Lab-No 2069
Sub-Zone Asmara		Village Balineki

**Hydrochemical Data**

Cations	Ca	Mg	Na	K	Fe	Mn
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
PPM	25.6	5.76	8.72	2.11	0.11	0.4

Anions	HCO3	CO3	SO4	Cl	NO3	F
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
PPM	114.68		4	12	6.65	0.0

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 2.2	<b>Anions</b> 2.41	<b>BalErr</b> 4.50%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.41	1.5mg/l
EC, us/cm at 25 <sup>o</sup> c	241	2000mg/l
TDS, mg/l CaCO <sub>3</sub>	116.55	1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	88	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	94	

	Value	Maximum Permissible level
PH	7.68	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	20.2	
Odor		Agrecable
color		Colorless
Free Cl,mg/l		

**Water Type**  
Calcium Bicarbonate

**Remarks**  
The chemical quality of the dam water is acceptable by the WHO guidelines. Therefore it is safe for drinking .

**Analysts:**  
Tcraza, Tesfagiorgis, Michael

**Lab- Head:**  
Mebrat Gebrecab

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**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Adi-Sheka</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 25/08/2003		Date - Analysed 6/9/03
Well Ident		Lab-No 2070
Sub-Zone Asmara		Village Adi-Sheka

**Hydrochemical Data**

Cations	Ca	Mg	Na	K	Fe	Mn
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
PPM	22.4	2.88	4.96	3.29	0.5	0.7

Anions	HCO3	CO3	SO4	Cl	NO3	F
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
PPM	73.2		8	10	10.63	0.2

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 1.66	<b>Anions</b> 1.82	<b>BalErr</b> 5.00%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.65	1.5mg/l
EC, us/cm at 25 <sup>o</sup> c	171.2	2000mg/l
TDS, mg/l CaCO <sub>3</sub>	97.72	1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	68	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	60	

		Maximum Permissible level
PH	8.03	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	19.2	
Odor		Agreeable
color		Colorless
Free Cl,mg/l		

**Water Type**  
Calcium Bicarbonate

**Remarks**  
The source water contains manganese and iron higher than the WHO guideline which causes undesirable taste and deposits on food during cooking. However, it is chemically safe for drinking.

**Analysts:**  
Teraza, Tesfagiorgis, Michael

**Lab- Head:**  
Mcbrat Gebreab

(11)

**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Adi-Nefas</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 25/08/2003		Date - Analysed 6/9/03
Well Ident		Lab-No 2071
Sub-Zone Asmara		Village Adi-Nefas

**Hydrochemical Data**

Cations	Ca	Mg	Na	K	Fe	Mn
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
<b>PPM</b>	22.56	5.4	8.94	2.63	0.22	0.5

Anions	HCO3	CO3	SO4	Cl	NO3	F
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
<b>PPM</b>	95.28		12	15.2	3.1	0.0

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 2.03	<b>Anions</b> 2.28	<b>BalErr</b> 5.00%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.097	1.5mg/l
EC, us/cm at 25°c	246	2000mg/l
TDS, mg/l CaCO <sub>3</sub>		1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	84	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	78.4	

		Maximum Permissible level
PH	7.65	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	19.3	
Odor		Agreeable
color		Colorless
Free Cl,mg/l		

**Water Type**  
**Calcium Bicarbonate**

<b>Remarks</b>
The chemical quality of the dam water is acceptable by the WHO guidelines.

<b>Analysts:</b>	Teraza, Tesfagiorgis, Michael
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<b>Lab- Head:</b>	Mebrat Gebreab
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**Water Resource Department  
Water Lab Report**

Tel.116265	Description <b>Dam , Mai -Anbesa</b>	P.O.BOX 1488, Fax 124625
Date -Sampled 18/09/03		Date - Analysed 22/09/03
Well Ident		Lab-No 2072
Sub-Zone Asmara		Village

**Hydrochemical Data**

Cations	Ca	Mg	Na	K	Fe	Mn
Maximum permissible level	200mg/l	150mg/l	200mg/l	12mg/l	0.3mg/l	0.5mg/l
PPM	28.8	10.08	19.75	10.4	0.37	0.5

Anions	HCO3	CO3	SO4	Cl	NO3	F
Maximum permissible level			400mg	600mg/l	50mg/l	1-2mg/l
PPM	95.68		30	42	7.09	0.0

**Calculated Data**

<b>SAR</b>	<b>Cations</b> 3.4	<b>Anions</b> 3.49	<b>BalErr</b> 1.30%
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	Maximum Permissible level	
NO <sub>2</sub> , mg/l		3mg/l
NH <sub>3</sub> , mg/l	0.15	1.5mg/l
EC, us/cm at 25 <sup>o</sup> c	388	2000mg/l
TDS, mg/l CaCO <sub>3</sub>	191.95	1500mg/l
T- Hardness, mg/l CaCO <sub>3</sub>	114	500mg/l CaCO <sub>3</sub>
T- Alkalinity , mg/l CaCO <sub>3</sub>	78.4	

	Value	Maximum Permissible level
PH	7.49	6.5 - 9.2
Turbidity		< 5 NTU
Temp. °c	27.0	
Odor		Agreeable
color		Colorless
Free Cl,mg/l		

**Water Type**  
**Calcium Bicarbonate**

**Remarks**  
The chemical quality of the dam water is acceptable by the WHO guidelines.

**Analysts:**  
Teraza, Tesfagiorgis, Michael

**Lab- Head:**  
Mebrat Gebrecab

**MINISTRY OF LAND, WATER AND ENVIRONMENT  
WATER RESOURCES DEPARTMENT**

*Subject:* Water quality monitoring of Asmara municipal water supply

*Objective:* The primary objective of water sampling and subsequent analysis is to safeguard the health of consumers by assuring the water delivered is safe to drink. This can be assured through the identification of pitfalls during treatment and distribution processes and taking appropriate remedial measures.

Date Sampled: 24.09.01

Date Analyzed: 24.09.01

Station No. St.		EC µs/cm at 25°	pH	Turbidity NTU	Free residual chlorine, mg/l	Total chlorine residual, mg/l	Total Coliform count per 100ml	Feacal Coliform count per 100ml
	<b>Quality requirement</b>	<1000	6.5- 9.2	<5				
	Adinifas and it's supply							
St-1	Adinifas treatment plant	270	5.26	73	<0.1	<0.1	many	0
St-2	Near Coca Cola Company Endakiflay Dukan', st 500, no5	126.4	5.8	29	0.2	0.3	many	0
St-3	Mai Temenay bridge , Near 'Endasa'al Enda Abraham Dukan' St 800, No15	125.4	5.84	12	<0.1	<0.1	many	0
St-4	Hazhaz reservoir	80.1	5.84	12	<0.1	0.2	many	0
St-5	Kagnew, traffic light , Bar Toskana	-	-	-	-	-	-	-
St-11	Bar Lino, Near Edagahamus Mosque Mai- Nefhi and its supply	137.4	5.75	14	0.1	0.3	many	0
St-6	Godaif pumping station, Expo	261	6.46	11	<0.1	0.2	many	0
St-7	Lion Hotel	-	-	-	-	-	-	-
St-8	Sembel pumping station	260	6.8	14	1.5	1.5	0	0
St-9	Zban Sinkey Enda Hagos Dukan, St Awet, No 4	276	6.59	14	<0.1	<0.1	many	0
St-10	Adis-Alem reservoir, gezabanda talian South eastern Zoba Admin office	-	-	-	-	-	-	-
St-12	Bar Moka, Near Cathedral	116.4	5.64	32	<0.1	<0.1	many	0
St-13	Mai- Nefhi treatment plant	264	7.41	41	0.1	0.2	many	0

**Ministry of Land Water and Environment  
Water Resource Department**

Data Evaluation

**1. Adinifas water treatment and it's supply**

**1.1 Faecal Coliform Bacteria**

The water leaving the treatment plant and Adi- Nifas was found to hold the total coliform bacteria.

**1.2 Mai –Nefhi Treatment Plant**

Mai-Nafhi treatment plant and it supplies were free from coliform bacteria but not from total coliform bacteria.

These contaminations in both treatment plants and their supplies indicate there is no residual to disinfectant to take care accidental contamination in the water delivery pipeline system.

We strongly recommend the municipal water supply to apply the right amount of chlorine in Adi-Nifas, Mai-Nefhi treatment plant and in the reservoirs.

**Turbidity**

Clarity is an important water quality parameter of water supply. Suspended matter, such as clay, silt, finely divided organic and inorganic matter, plankton and other microscopic organism causes turbidity in water. If the turbidity exceeds 5NTU, then it is clearly visible in a glass of water and usually rejected by consumer on aesthetic ground. The presence of turbidity can have a significant effect on the microbiological quality of drinking water. The detection of bacteria and viruses in drinking may be complicated by the presence of turbidity.

Turbidity higher than the recommended value was registered in both the Treatment Plant and their supplies. As excessive turbidity can protect microorganisms from the effects of disinfection, stimulate the growth of bacteria in the water, and itself exert a significant chlorine demand, it is vitally important in producing safe drinking water, using chlorine as disinfectant, that turbidity should be kept low, preferably below 1NTU.

Moreover, broken pipelines, which permit water leakage and intrusion of waste, should be replaced with new one.

Water Laboratory:  
Eng. Mebrat Gebreab

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**MINISTRY OF LAND, WATER AND ENVIRONMENT  
WATER RESOURCES DEPARTMENT**

**Subject:** Water quality monitoring of Asmara municipal water supply

**Objective:** The primary objective of water sampling and subsequent analysis is to safeguard the health of consumers by assuring the water delivered is safe to drink. This can be assured through the identification of pitfalls during treatment and distribution processes and taking appropriate remedial measures.

Date Sampled: 5/03/2002

Date Analyzed: 10/03/2002

Station No. St.		EC μs/cm at 25°	pH	Turbidity NTU	Free residual chlorine, mg/l	Total chlorine residual, mg/l	Total Coliform count per 100ml	Feacal Coliform count per 100ml
	<b>Quality requirement</b>	<1000	6.5- 9.2	<5				
	Adinifas and it's supply							
St-1	Adinifas treatment plant	244	7.88	3	0.4	0.5	0	0
St-2	Near Coca Cola Company Endakiflay Dukan', st 500, no5	-	-	-	-	-	-	-
St-3	Mai Temenay bridge , Near 'Endasa'al Enda Abraham Dukan' St 800, No15	-	-	-	-	-	-	-
St-4	Hazhaz reservoir	244	7.90	2	< 0.1	< 0.1	Many	0
St-5	Kagnew, traffic light , Bar Toskana	-	-	-	-	-	-	-
St-11	Bar Lino, Near Edagahamus Mosque	-	-	-	-	-	-	-
	Mai- Nefhi and its supply							
St-6	Godaif pumping station, Expo	310	7.77	3	0.3	0.3	0	0
St-7	Lion Hotel	-	-	-	-	-	-	-
St-8	Sembel pumping station	315	7.78	4	0.5	0.5	0	0
St-9	Zban Sinkey Enda Hagos Dukan, St Awet, No 4	-	-	-	-	-	-	-
St-10	Adis-Alem reservoir, gezabanda talian South eastern Zoba Admin office	-	-	-	-	-	-	-
St-12	Bar Moka, Near Cathedral	-	-	-	-	-	-	-
St-13	Mai- Nefhi treatment plant	333	6.85	1	< 0.1	< 0.1	50	0

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**Ministry of Land Water and Environment  
Water Resource Department**

**N.B** As the Asmara municipality is maintaining the water pipelines there were only five samples collected and these were from the treatment plants and reservoirs.

Data Evaluation

**1. Adinifas water treatment and it's supply**

**1.3 Faecal Coliform Bacteria**

The water leaving the treatment plant and Adi- Nifas was found to be free from total and faecal coliform bacteria, which indicates the contamination. But in the Hazhaz reservoir contaminated by the total coliform bacteria that is an indication of there is no sufficient residual chlorine.

**1.4 Mai –Nefhi Treatment Plant**

Mai-Nafhi treatment plant was free from coliform bacteria but not from total coliform bacteria.

This contamination in the Mai-Nefhi treatment plant indicate there is no residual to disinfectant to take care accidental contamination in the water delivery pipeline system.

We strongly recommend the municipal water supply to apply the right amount of chlorine in Mai-Nefhi treatment plant and in the reservoirs.

**Turbidity**

Clarity is an important water quality parameter of water supply. Suspended matter, such as clay, silt, finely divided organic and inorganic matter, plankton and other microscopic organism causes turbidity in water. If the turbidity exceeds 5NTU, then it is clearly visible in a glass of water and usually rejected by consumer on aesthetic ground. The presence of turbidity can have a significant effect on the microbiological quality of drinking water. The detection of bacteria and viruses in drinking may be complicated by the presence of turbidity.

The degree of clarity measured as turbidity level ranging 1-4NTU, which is acceptable for drinking.

### **Chlorine Residual**

Treated water at Adinifas treatment plant, sembel and godaif pumping stations had sufficient residual chlorine to take care of subsequent contamination, which may occur in the distribution system. However water at Hazhaz reservoir and at Mia Nefhi treatment plant had no free residual chlorine at all, which means there was no guarantee of protection for accidental contamination.

Moreover, broken pipelines, which permit water leakage and intrusion of waste, should be replaced with new one.

Water Laboratory:  
Eng. Mebrat Gebreab

**Water Resource Department  
Water Laboratory**

**Drinking Water Quality in Asmara City**

Date-Sampled 12.07.02

Date Analysed 18.07.02



Well	Description	EC	Ca	Mg	Na	K	Fe	Mn	HCO3	SO4	Cl	NO3	NO2	N-NH <sub>4</sub> F	Hard	
	Maximum permissible level	2000	200	150	200	12	0.3	0.5		400	600	50	3	1.5	500	
Ident	Unit	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
As-01	Adinifas treatment plant	270	44	9.6	10.8	4.32	0.09	0.3	107.36	20	36	5.3	0.02	0.17	0.31	150
As-02	Near Coca- Cola Compay	266	48	13.2	12.6	2.99	0.08	0.3	146.4	19	36	5.3	0.02	0.17	0.2	175
As-03	Mai Temenay bridge	265	42	18	10.5	3.35	0.09	0.3	156.16	26	20	6.2	0.02	0.29	0.21	180
As-04	Hazhaz reservoir															
As-05	Kagnew, traffic light.	336	60	6	18.1	3.87	0.03	0.1	146.4	23	60	3.5	0.02	0.19	0.24	175
As-06	Godaif pumping station	334	32	24	17.8	3.61	0.04	0.2	161.04	26	52	4.9	0.01	0.46	0.21	180
As-07	Lion Hotel															
As-08	Sembel pumping station	340	30	19.2	17.1	3.69	0.03	0.1	146.4	27	48	4	0.02	0.16	0.24	0.31
As-09	Zban-Snkey	336	52	12	17.5	3.35	0.04	0.1	165.92	22	56	4	0.01	0.15	0.08	180
As-10	Adis- Alem reservoir															
As-11	Bar Lino, Near Edagahamus	268	38	13.2	11.2	3.61	0.11	0.3	156.16	18	28	5.8	0.02	0.16	0.23	150
As-12	Bar Moka, Near Cathedral															
As-13	Mai -Nefhi treatment plant	333	36	18	17.8	4.05	0.03	0.1	146.4	25	52	4	0.01	0.21	0.26	165
Average		305	42.4	14.8	14.8	3.65	0.06	0.2	148.03	22.89	43.1	4.8	0.02	0.22	0.22	151

**Remark:** : Chemically, they are all in harmony with water quality standards. Besides they are all fresh water and tastes good.  
They do not consume great deal of soap for lathering.

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**Water Resource Department  
Water Laboratory**

**Drinking Water Quality in Asmara City**

Date-Sampled 24.09.01

Date Analysed 20.10.01

<i>Well</i>	Description	EC	Ca	Mg	Na	K	Fe	Mn	HCO3	SO4	Cl	NO3	NO2	N-NH <sub>4</sub> F	Hard	
	Maximum permissible level	2000	200	150	200	12	0.3	0.5		400	600	50	3	1.5	500	
<i>Ident</i>	Unit	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
<i>As-01</i>	Adinifas treatment plant	154	21.3	1.63	4.54	2.2	0.08	0.2	63.44	23	10	4.4	0.03	0.23	0.01	60
<i>As-02</i>	Near Coca- Cola Compay	133	17.6	1.92	4.19	2.11	0.08	0.2	55.63	28	7.6	4	0.02	0.23	0.2	52
<i>As-03</i>	Mai Temenay bridge	124	12.8	3.84	3.84	2.29	0.1	0.3	34.16	28	6	4.4	0.03	0.24	0.08	48
<i>As-04</i>	Hazhaz reservoir	80.6	6.8	3.36	2.44	1.85	0.14	0.2	19.52	21	2.4	3.1	0.02	0.12	0.04	31
<i>As-05</i>	Kagnew, traffic light,															
<i>As-06</i>	Godaiif pumping station	257	18	8.4	14.7	3.43	0.06	0.2	62.46	25	20.4	3.1	0.02	0.21	0.23	80
<i>As-07</i>	Lion Hotel															
<i>As-08</i>	Sembel pumping station	253	17.2	8.16	14.7	3.52	0.05	0.2	59.05	24	23.2	4.9	0.02	0.1	0.25	77
<i>As-09</i>	Zban-Sakey	287	25.6	7.1	15	3.52	0.04	0.1	100.53	29	22.4	4.4	0.27	0.34	0.31	93.6
<i>As-10</i>	Adis- Alem reservoir															
<i>As-11</i>	Bar Lino, Near Edagahamus	128	11.2	4.13	3.84	2.11	0.1	0.3	35.14	28	4	4.4	0.03	0.25	0.27	45.2
<i>As-12</i>	Bar Moka, Near Cathedral	110	9.6	2.69	3.14	2.11	0.1	0.3	20	32	3.2	4.9	0.02	0.25	0.21	35.2
<i>As-13</i>	Mai -Nefhi treatment plant	252	16	9.5	14.7	3.17	0.09	0.5	71.2	36	11.6	3.5	0.04	0.61	0.23	79.6
Verage		178	15.6	5.07	8.1	2.63	0.08	0.25	52.113	27.4	11.1	4.1	0.05	0.26	0.183	60.2

**Remark:** : Chemically, they are all in harmony with water quality standards. Besides they are all fresh water and tastes good.  
They do not consume great deal of soap for lathering.

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