

ANNEX 1

**FREQUENCIES OF SAMPLING AND SANITARY
INSPECTION**

**Table 1. Frequencies of Sampling - Urban Systems
Physical-Chemical Parameters in the Distribution Network
(samples per year)**

Parameters	Supply areas (population supplied)	Sampling frequency		
		Reduced		Standard
		Ground	Surface	
pH Turbidity Total hardness Alkalinity	<500	1	2	6
	501-5,000	3	6	12
	5,001-10,000	4	9	18
	10001-24,000	6	12	24
	24,001-50,000	1 /4,000 inhab	1 /2,000 inhab	1 /1,000 inhab

**Table 2. Frequencies of Sampling - Urban Systems
Bacteriological Parameters in the Consumer Network
(samples per year)**

Parameters	Supply areas (population served)	Sampling frequency (standard)
Total coliforms Thermotolerant coliforms E. coli	<500	6
	500-5,000	12
	5,001-10,000	18
	10,001-24,000	24
	24,001-50,000	1 /1,000 inhabitants

**Table 3. Frequencies of Sampling - Urban Systems
Physical-Chemical A Parameters in the Outlets of the Treatment Plant,
Groundwater Sources and Service Reservoirs
(samples per year)**

Parameters	Volume of water supplied per day or stored (m ³)	Sampling frequency		
		Reduced		Standard
		Ground	Surface	
pH Turbidity Color Odor Taste Nitrate Nitrite Iron Manganese Aluminum	< 2,000	4	4	4
	2,001-6,000	4	5	6
	6,001 – 12,000	4	6	12
	>12,000	6	12	24

**Table 4. Frequencies of Sampling - Urban Systems
Physical-Chemical B Parameters in the Outlets of the Treatment Plant,
Groundwater Sources and Service Reservoirs
(samples per year)**

Parameters	Sampling frequency (standard)	
	Ground	Surface
Dry residual	3	12
Chloride		
Sulphate		
Calcium		
Magnesium		
Sodium		
Fluoride		
Total hardness		
Alkalinity		
Copper		
Zinc		
Lead		
Arsenic		
Barium		
Cadmium		
Cyanide		
Total chromium		
Mercury		
Selenium		
Phenols		

**Table 5. Frequencies of Sampling - Urban Systems
Bacteriological Parameters in the Outlets of the Treatment Plant,
Groundwater Sources and Service Reservoirs
(samples per year)**

Parameter	Volume of water supplied per day or stored (m ³)	Sampling frequency	
		Reduced	Standard
Total coliforms	<2,000	--	26
Thermotolerant coliforms	2,001-6,000	26	52
E. coli	6,001-12,000	52	104
	>12,000	104	208

Table 6. Sampling Frequencies – Rural and Periurban Systems
(samples per year)

Parameter	Population supplied	Number of samples	Sampling frequency Standard
Treatment plant and sources of groundwater Physical chemical analysis		One sample per source	Surface water every 2 years Groundwater every 5 years
Service reservoirs PH Turbidity Thermotolerant coliforms		One sample per component	3 per year
Distribution network PH Turbidity Thermotolerant coliforms	< 1,000 1,001 – 2,000 2,001 – 5,000	3 4 6	Annual Annual Annual

Table 7. Frequency of Sanitary Inspections of the Treatment Plant and System Components
(inspections per year)

Area	Volume of water supplied or stored (m ³)	Sampling frequency	
		Reduced	Normal
Urban	<2,000	--	3
	2,001 – 6,000	3	6
	6,001 – 12,000	6	12
	>12,000	12	24
Rural	-----	--	2

Standard condition. Number of samples that the supplier should normally take from the supply areas.

Reduced condition. Number of samples to be taken when, after a given number of years (usually three), the parameters comply with the values stipulated in the water quality standard.

For supply areas or service reservoirs that supply or store a combination of groundwater and surface water, the Tables corresponding to surface water should be applied.

ANNEX 2

INFORMATION REQUIRED FOR PLANNING A WATER QUALITY CONTROL PROGRAM

I. Information Required for Planning a Water Quality Control Program

1. Input Information

A. Components

Table 1. Input Information. Components

Component	Name	Code	Place	Operat. Status	Volume (m ³ /d)	Depth (m)	Pumping power
Source							
Surface	X	X	X	X	X		
Ground							
Well	X	X	X	X	X	X	X
Gallery	X	X	X	X	X		
Spring	X	X	X	X	X		
Treatment plants	X	X	X	X	X		
Components							
Storage reservoir	X	X	X	X	X		
Distributing Reserv.	X	X	X	X	X		
Pump station	X	X	X	X	X		
Tank	X	X	X	X	X		
Pressure-relief box	X	X	X	X	X		
Well	X	X	X	X	X	X	X
Gallery	X	X	X	X	X		
Spring	X	X	X	X	X		

B. Supply Areas**Table 2. Supply Areas**

Areas	Medium to large suppliers	Supply Rural or periurban
Region (name)	X	X
District	X	X
Supply area (name)	X	X
Total population	X	X
Population served	X	X
Source		
Surface	X	X
Ground	X	X
Mixed	X	X
Components		
Storage reservoir	X	X
Distributing reservoir	X	X
Pump station	X	X
Tank	X	X
Pressure-relief box	X	X
Well	X	X
Gallery	X	X
Spring	X	X
Level of service		
User connection	X	X
Public faucets	X	X
Tank trucks	X	X
Artesian wells	--	X

C. Standards**Table 3. Standards Water Quality (Limits and Exceptions)**

Parameter	Unit	Concentration	Exception		
			Legal Dispositive	Date	Concentration
Arsenic	mg/L as As	0,005	N/A	N/A	N/A
Lead	mg/L as Pb	0,01	N/A	N/A	N/A
Cadmium	mg/L as Cd	0,003	N/A	N/A	N/A
Sulphate	mg/L as SO ₄ ⁻	200	Directiva 48	11/12/00	250
Chloride	mg/L as Cl ⁻	250	-----	---	-----
Nitrate	mg/L as NO ₃ ⁻	50	-----	---	-----
Iron	mg/L as Fe	0,3	-----	----	-----

D. Sampling Forms

D1 Distribution Network

Table 4. Sampling Forms. Distribution Network

Sample number	Supply area
Date	Time
Address	Neighborhood
Sampling place	Continuity
Network <input type="checkbox"/>	Hours per day _____
Home <input type="checkbox"/>	Days per week _____
Sampling point	
Home <input type="checkbox"/>	
School <input type="checkbox"/>	Chlorine residual _____
Public office <input type="checkbox"/>	pH _____
Shop, store <input type="checkbox"/>	Turbidity _____
Food industry <input type="checkbox"/>	
Other industries <input type="checkbox"/>	
Type of sample	Sampler
First <input type="checkbox"/>	
Confirmation <input type="checkbox"/>	

D2 Components

Table 5. Sampling Forms. Components

Sample number	Code
Date	Time
Sampling point	Type of sample
Storage reservoir <input type="checkbox"/>	First <input type="checkbox"/>
Distributing reservoir <input type="checkbox"/>	Confirmation <input type="checkbox"/>
Pump station <input type="checkbox"/>	
Tank <input type="checkbox"/>	Chlorine residual _____
Pressure-relief box <input type="checkbox"/>	pH _____
Well <input type="checkbox"/>	Turbidity _____
Gallery <input type="checkbox"/>	
Spring <input type="checkbox"/>	
Comments:	Sampler

D3 Sources and Treatment Plants**Table 6. Sampling Forms. Sources and Treatment Plants**

Sample number		Code
Date		Time
Sampling point		Type of sample
Surface source	<input type="checkbox"/>	First
Ground source	<input type="checkbox"/>	Confirmation
Well	<input type="checkbox"/>	Chlorine residual
Gallery	<input type="checkbox"/>	pH
Spring	<input type="checkbox"/>	Turbidity
Treatment plant	<input type="checkbox"/>	
Comments:		Sampler

E. Forms for Sanitary Inspection

Reservoir
Pump station
Tank
Pressure-relief box
Well
Gallery
Spring

F. Forms for Results of Analyses (laboratory report)

Sample number
Results: physical, chemical and microbiological analyses

ANNEX 3

**WORKSHOP PARTICIPANTS
AND REVIEWERS**

WORKSHOP 1

For Spanish speakers
Venue: CEPIS, Lima, Peru

Date: September 2-3, 1999

Experts attending:

Beatriz Cáceres	Advisor	Nelly Nakamatsu	SEDAPAL
Milagros Cadillo	DIGESA	Lidia Oblitas	Advisor
Enrique Calderón	Buenos Aires Univ	Norma Parra	DIGESA
Betty Chung	SUNASS	Ricardo Rojas	PAHO/CEPIS
María Luisa Esparza	PAHO/CEPIS	Felipe Solsona	PAHO/CEPIS
Denise Formaggia	S.E. São Paulo	Eduardo Stuart	DIGESA
Fred Hauchman	USEPA	Carmen Vargas	PAHO/CEPIS
Teresa Lampoglia	PROAGUA/GTZ		

WORKSHOP 2

For English speakers
Venue: Radisson Hotel, Miami, USA

Date: November 18, 1999

Stephanie Adrian	USEPA	Willie Grabow	Pretoria Univ
Nicholas Ashbolt	UNSW	Fred Hauchman	USEPA
Jaimie Bartram	WHO	Guy Howard	Surrey Univ
Xavier Bonnefoy	WHO	Will Robertson	Health Canada
Enrique Calderón	Buenos Aires Univ	Mark Rogers	USEPA
Keith Christman	C.C.C. - USA	Felipe Solsona	PAHO/CEPIS
María Luisa Esparza	PAHO/CEPIS	Paul Taylor	Consultant
John Fawell	WRC-NSF	Terrence Thompson	WHO
Hend Galal-Gorchev	USEPA	Peter Toft	PAHO/WHO
Gerardo Galvis	CINARA	Yitchak Zohar	Israel Min. Health

Reviewers

María Luisa Esparza	PER	PAHO/CEPIS-WHO
Carmen Vargas	PER	PAHO/CEPIS-WHO
Fred Hauchman	USA	USEPA
Enrique Calderón	ARG	ETOSS
Denise Formaggia	BRA	S.E. São Paulo
María Isabel Meca	ARG	Advisor
Jorge Alvarez	ARG	DSA - MoH
Javier Hernández	PER	DIGESA - MoH
Nelly Nakamatsu	PER	SEDAPAL
María Lucía Martelli	BRA	FNS - MoH
Jaimie Bartram	UK	WHO
Betty Chung	PER	SUNASS
Gerardo Galvis	COL	CINARA
Xavier Bonnefoy	DNK	WHO
Teresa Lampoglia	ITA	GTZ
Barry Lloyd	UK	Univ. Surrey
Pablo Chaparro	COL	Vig S.P - MoH
Ignacio Castillo	MEX	C.N.A.
Beatriz Santamaría	MEX	Dir. Construc. & Operations GDF
Sofía Garrido	MEX	C.I. de Recursos del Agua
Manuel Basterrechea	GUT	Advisor
Eugenio Lammel	ARG	Aguas Cordobesas