

## ANNEX 5.3.1



### Annex A5.3.1 Outline of Water Quality and Hydrologic Monitoring

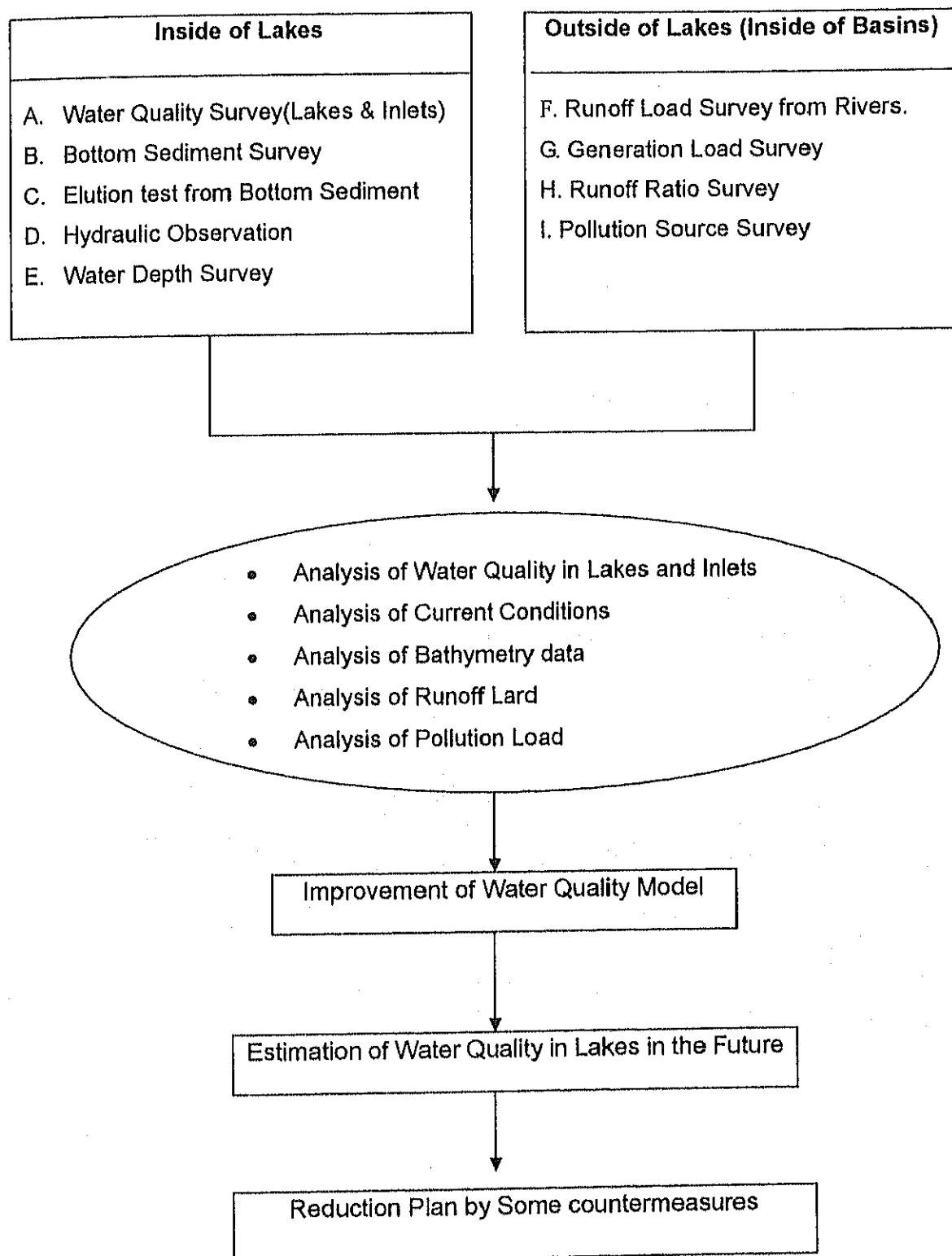


Figure A5.3.1 Survey Flowchart for Water Quality and Hydrologic Monitoring

## Annex A5.3.2 Work Flow for Water Quality and Hydrologic Monitoring

Figure A5.3.2 shows the work flow.

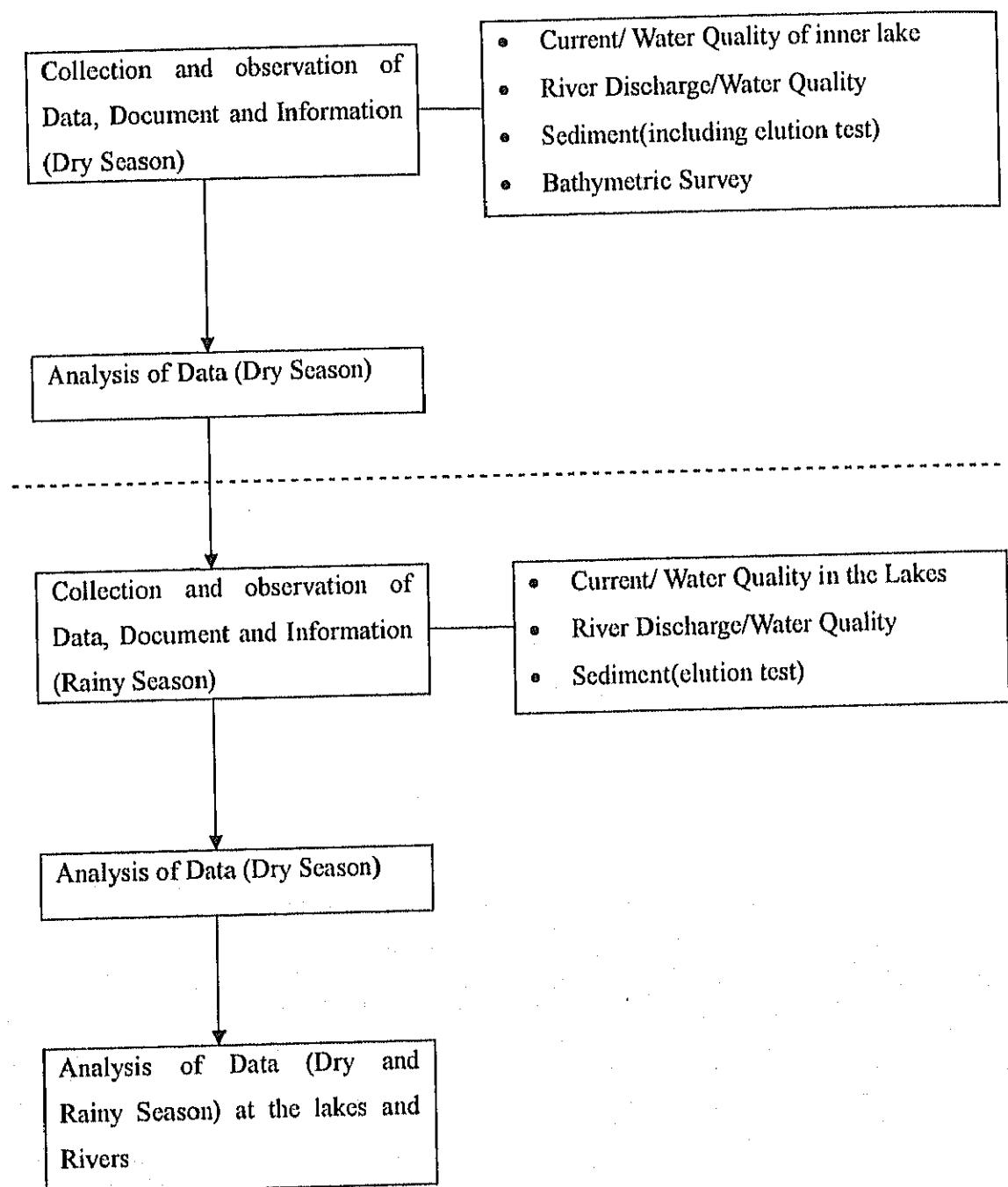


Figure A5.3.2 Work Flow of Water Quality and Hydraulic Monitoring

### **Annex A5.3.3 Scope of Survey and Survey Methods**

In the current study, a six-month monitoring survey shall be conducted, in consideration of seasonal changes, for the following survey items. See Table A5.3.1 for the map of all the monitoring survey points, Figure 5.3.1 for the map of monitoring survey points in the lakes, Figure 5.3.2 for the map of monitoring survey points outside the lakes (inside the basins), and Table A5.3.2 for the scope of the survey.

(1) Inside the lakes (See Figure 5.3.1.)

- A. Water quality survey (Lake water quality and inlet water quality)
- B. Bottom sediment survey (Properties of bottom mud)
- C. Elution test of bottom sediment (Elution load test)
- D. Hydraulic observation (Flow condition in lake)
- E. Water depth survey (Soundings in lake)

(2) Outside lakes (Inside basins; see Figure 5.3.2.)

- F. Inflow load survey (Discharge and water quality of inflowing rivers)
- G. Unit load of pollutant survey (Pollution load from domestic wastewater)
- H. Attenuation ratio survey of small rivers (Attenuation load of tributary rivers)
- I. Pollution source survey (Water quality of wells)

**A. Water quality survey (Lake water quality and inlet water quality)**

The water quality survey is described as follows:

(1) Lake water

- 1) Sampling points: 9 in total
  - (a) Lake Billings: 6 (BL-1, BL-2, BL-3, BL-4, BL-5 and BL-6)
  - (b) Lake Rio Grande Arnu: 3 (RGDE-1, RGDE-2 and RGDE-3)
- 2) Sampling layers: 5 to 3 (Water temperature changes shall be considered when sampling at all of the points)
  - (a) Surface layer: 0.5 m below water surface
  - (b) Bottom layer: 1.0 m above lake bottom
- 3) Sampling count: 4 times , twice in dry season (8/16-18 first time, 9/5-8 second time], twice in rainy season (11/22-23 third time, 2006/1/10-11 fourth time)
- 4) Observation and analysis items
  - (a) On-site observation items: Water temperature, pH, DO and transparency

- (b) Analysis items: General items, eutrophication items, bacteria, heavy metals, plankton (only in surface layer) (See Table A5.3.2 for more information.)
- 5) Sampling method: Use of Motohashi type auto sampler and Van Dorn water sampler

(2) Lake water in small inlets

1) Sampling points: 41 in total

Lake Rio Grande Arm: 11 (RGNA-1 to 11)

Lake Billings: 30 (BLNA-1 to 30)

2) Sampling layers: Surface layer (only the surface layer at all the points)

3) Sampling count: Once (once in dry season 8/16-18, 7/2006)

4) Observation and analysis items

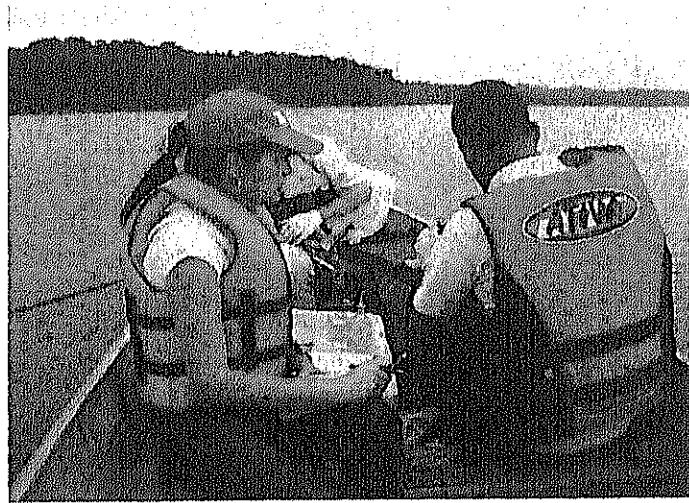
(a) On-site observation items: Water temperature, pH, DO and transparency

(b) Analysis items: General items, eutrophication items and bacteria (See Table A5.3.2 for more information.)

5) Sampling method: Use of Van Dorn water sampler



**Photo A5.3.1** Lake water sampling using a Motohashi type auto sampler (Rio Grande Arm)



**Photo A5.3.2 Water quality monitoring on Lake Billings (Taquacetuba intake point)**

**B. Bottom sediment survey (Properties of bottom mud)**

The bottom sediment survey is described as follows:

- 1) Sampling points: 35 in total (5 points first time, 30 points second time)
  - (a) First time: Lake Billings: 3 points (S-1, S-2 and S-3), Lake Rio Grande Arm: 2 points (S-4 and S-5)
  - (b) Second time: Lake Billings only: 30 points (including the previously mentioned 5 points)
- 2) Sampling layers: 1 (only the surface layer at all the points)
- 3) Sampling count: Once (2006/7/12) Twice (2006/7)
- 4) Observation and analysis items
  - (a) On-site observation items: Mud temperature, soil property and pH
  - (b) Analysis items: General items, eutrophication items, bacteria, heavy metals and granularity (See Table A5.3.2 for more information.)
- 5) Sampling method: Use of Ekman-Birge type bottom sampler

**C. Elution test of bottom sediment (Elution load test)**

The elution test of bottom sediment is described as follows:

- 1) Elution test of bottom sediment
  - (a) Sampling points: 2 are planned
  - (b) Sampling layers: 1 (surface layer)
  - (c) Sampling count: Once (dry season)
  - (d) Analysis items: pH, Conductivity, DO, BOD, COD, Redox potential, TN, NH4-N, TP, PO4-P (10 items), anaerobic-aerobic conditions (maintained at 20°C)

- (e) Analysis period: 10 days (sampling conducted once)

#### D. Hydraulic observation (Flow condition n the lake)

Hydraulic observation is described as follows:

- 1) Fixed-point flow condition observation (narrow area below the Imigrantes bridge on Lake Billings)
  - (a) Observation points and observation layers: Observation at 1 point in 1 layer
  - (b) Observation count and period: Once in rainy season (observation for 5 days and nights, 2006/6)
  - (c) Observation method: Installation of a flow meter (Acoustic Doppler Current profiler)

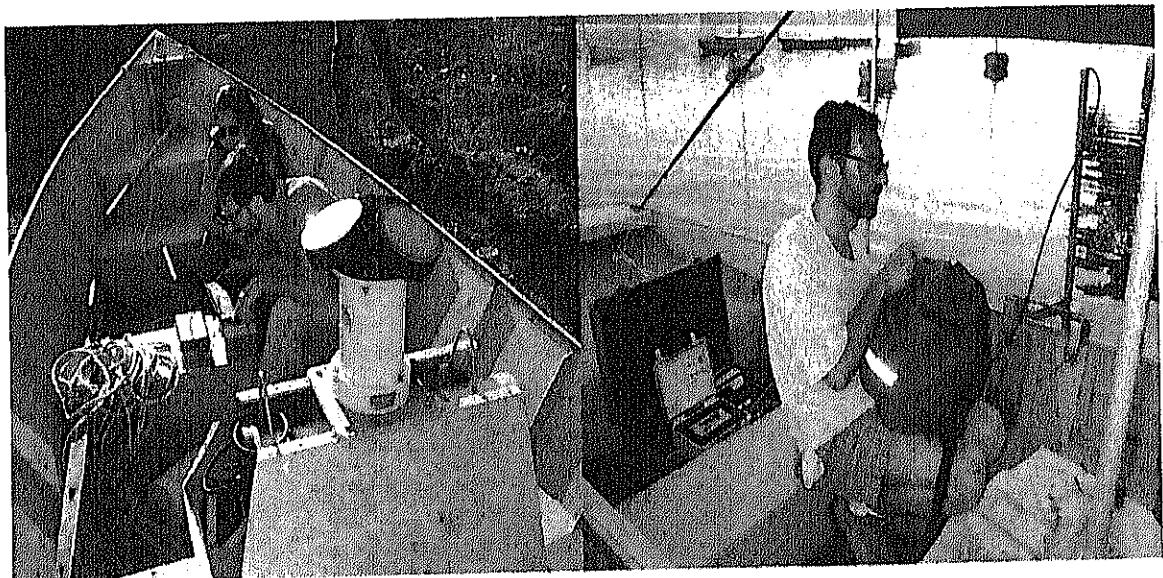


Photo A5.3.3 Installation of ADCP

Photo A5.3.4 Using of Eco-Sounder at RGA

#### E. Water depth survey (Soundings in the lake)

The water depth survey is described as follows:

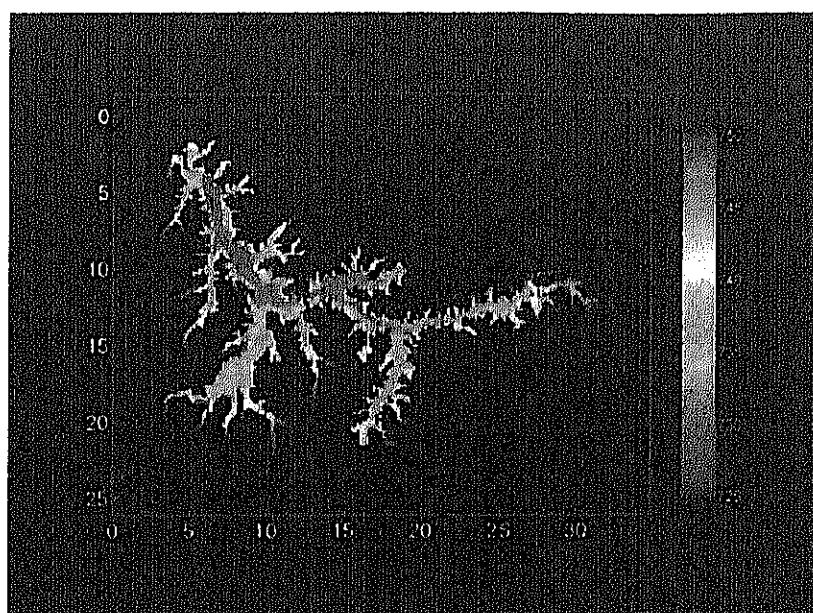
(1) Lake Rio Grande Arm water depth survey

For Lake Rio Grande Arm, there is a bathymetric map created by EMAE from 1984 to 1986. We shall conduct a sounding survey based on the existing map data by applying Eco-Sound(Coasta Survey Depth Sounder(200kHz) and correct the previous bathymetric map.

(2) Lake Billings water depth survey

For Lake Billings, there is a bathymetric map created by EMAE from 1984 to 1986. This is the basic data for the water quality analysis model owned by CETESB, which has been

digitized (see Figure A5.3.3). In 2004, EMAE created a new bathymetric map, the data of which shall be digitized and incorporated into the water quality model.



**Figure A5.3.3 Lake Billings Bathymetric Map (Created in IDB Project Based on Bathymetric Map Created by EMAE from 1984 to 1986)**

#### F. Inflow load survey (Discharge and water quality of inflowing rivers)

The inflow load survey (Discharge and water quality) is described as follows:

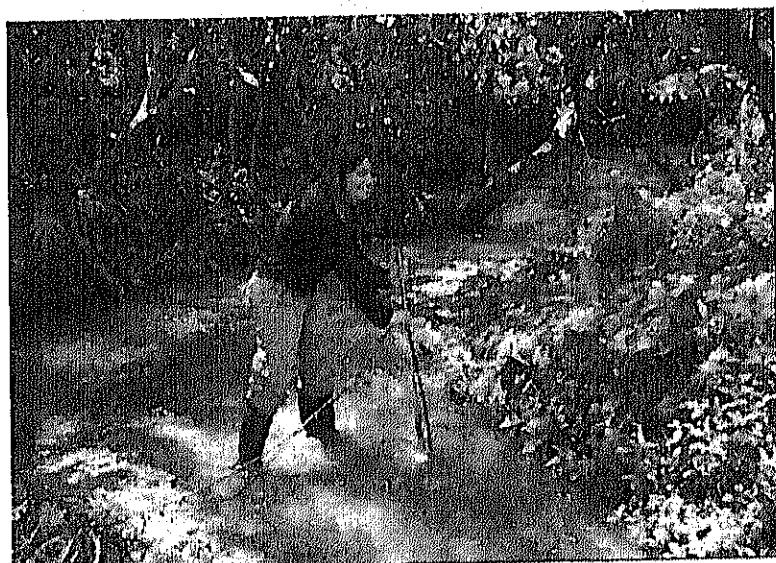
- 1) River discharge observation (observation of the discharge of sewage treatment plants by the Parshall Flume scale)
  - (a) Observation points and observation layers: 20 points (including two sewage treatment plants), surface layer
  - (b) Observation count: 4 times in total, including twice in dry season and twice in rainy season (8 model rivers to be observed, 6 times in total).
  - (c) Observation method: Use of an electromagnetic flow meter (Flow mate 2000) (See photograph.)
- 2) Water quality survey
  - (a) Sampling points: 20 in total (including 2 at the drain outlets of the sewage treatment plants)
  - (b) Sampling layers: Surface layer
  - (c) Sampling count: 4 times (first time in dry season [8/3-5], second time [8/16-18], twice in rainy season on undecided dates)
  - (d) Observation and analysis items
    - a) On-site observation items: Water temperature, pH, DO and transparency
    - b) Analysis items: General items, eutrophication items, bacteria and heavy metals

(See Table A5.3.2 for more information.)

- (e) Sampling method: Use of Van Dorn water sampler



**Photo A5.3.5 Electromagnetic flow meter (Flow mate 2000) used in discharge observation.**



**Photo 5.3.6 Discharge observation (Ribeirao Varginha**

#### **G. Unit load of pollutant survey (Pollution load from domestic wastewater)**

The unit load of pollutant survey (discharge and water quality) is described as follows: To conduct a unit load of pollutant survey in irregular area, we selected a study area in the Alvarenga river basin and observed the water quality and discharge every 3 hours for 24 hours each on September 3 and 4.

##### **1) Discharge observation**

- (a) Observation points: 1
  - (b) Observation count: Once in dry season, continuous observation conducted every 3 hours for 24 hours, 9 times in total
  - (c) Observation method: Use of an electromagnetic flow meter (Flow mate 2000)
- 2) Water quality survey
- (a) Sampling points: 20 in total (including 2 at the drain outlets of the sewage treatment plants)
  - (b) Sampling layers: Surface layer
  - (c) Sampling count: 4 times (first time in dry season [August 3-5, 2005], second time [August 16-18, 2005], twice in rainy season on undecided dates)
  - (d) Observation and analysis items
    - a) On-site observation items: Water temperature, pH, DO and transparency
    - b) Analysis items: General items, eutrophication items, bacteria and heavy metals (See Table 5.3.3 for more information.)
  - (e) Sampling method: Electromagnetic flow meter, Flow-mate 2000



Photo A5.3.7 24-hour continuous observation in irregular area (Alvarenga basin)

#### H. Pollution load runoff ratio survey of rivers (Runoff load in tributary rivers)

The runoff ratio survey of rivers (discharge and water quality) is described as follows:

- 1) River discharge observation
  - (a) Observation points: 4 points
  - (b) Observation count: Once in dry season

- (c) Observation method: Use of an electromagnetic flow meter (Flow mate 2000)
- 2) Water quality survey
- (a) Sampling points: 4 in total
  - (b) Sampling layers: Surface layer
  - (c) Sampling count: Once (once in dry season [September 2, 2005])
  - (d) Observation and analysis items
    - a) On-site observation items: Water temperature, pH, DO and transparency
    - b) Analysis items: General items, eutrophication items and bacteria (See Table A5.3.2 for more information.)
  - (e) Sampling method: Use of Van Dorn water sampler
- I. Pollution source survey (Water quality of wells)
- 1) Water level observation
- (a) Observation points: 1
  - (b) Observation count: Once in dry season
  - (c) Observation method: Tape measure
- 2) Water quality survey
- (a) Sampling points: 2 in total
  - (b) Sampling layers: Surface layer
  - (c) Sampling count: Once (once in dry season [September 2, 2005])
  - (d) Observation and analysis items
    - a) On-site observation items: Water temperature, pH, DO and transparency
    - b) Analysis items: General items, eutrophication items and bacteria (See Table A5.3.2 for more information.)
  - (e) Sampling method: Use of plastic buckets

**Table A5.3.1 Coordinates of Monitoring Points**

	No.	Afuentes	E	N
Lakes	RGDE-1	Captação SABESP	343861	7370420
	RGDE-2	Garganta do Meio	349697	7372038
	RGDE-3	Encontro Ribeirão Pires e Rio Grande	352842	7375126
	BL-1	Chegada Braço Cocaia	330067	7376420
	BL-2	Chegada Braço Bororé	332006	7371631
	BL-3	Chegada Braço Taquacetuba	334794	7367776
	BL-4	Captação de água no Taquacetuba	331671	7362036
	BL-5	Chegada Braço Rio Grande	339568	7368337
	BL-6	Sumidouro	344245	7365356
	RGNA-1	Foz do Rio Grande	353874	7374341
Narrow inlets	RGNA-2	Foz do Ribeirão Pires	353431	7375889
	RGNA-3	Meio Braço Pedroso	348392	7373813
	RGNA-4	Foz Braço Pedroso	348348	7372670
	RGNA-5	Braço da divisa	347687	7372542
	RGNA-6	Frente do Parque Estoril	344565	7371500
	RGNA-7	Eletropaulo 1	348754	7370111
	RGNA-8	Eletropaulo 2	350021	7370466
	RGNA-9	Esporte Clube Santo André	349941	7373012
	RGNA-10	Braço Mansão, Rod. Índio Tibiriçá	352027	7373032
	RGNA-11	Tronco das Andorinhas	352869	7376375
	S-1	Fim do Braço do Bororé	332232	7371839
Sediments	S-2	Fim do Braço Taquacetuba	334933	7368012
	S-3	Fim do Braço do Rio Grande	339592	7368639
	S-4	Captação SABESP	344282	7370365
	S-5	Encontro Ribeirão Pires e Rio Grande	352846	7375138
	R-1	Córrego Cocaia	328275	7372405
Inflow River	R-2	Sem Nome	328869	7369214
	R-3	Ribeirão da Varginha	329159	7365587
	R-4	Ribeirão Colônia	327127	7361693
	R-5	Ribeirão Vermelho	328232	7359584
	R-6	Ribeirão Taquacetuba	331051	7358852
	R-7	Rio Krucutu	335369	7357830
	R-8	Rio Pequeno	354612	7368516
	R-9	Rio Grande	356983	7373479
	R-10	Ribeirão Pires	354252	7376590
	R-11	Córrego nº 6	347569	7373718
	R-12	Ribeirão das Lavras	337752	7371024

No.	Afuentes	E	N
R-13	Córrego Alvarenga	337047	7373113
R-14	Córrego do Pereira	334318	7374983
R-15	Córrego Grota Funda	334261	7376211
R-16	Estrada Alvarenga, 2411	331639	7378511
R-17	Canal do Rio Pinheiros	327084	7379332
R-18	ETE Riacho Grande	343806	7369612
R-19	ETE Jardim Pinheiros	336842	7371396
R-20	Ribeirão Verginha	329595	7364602
Unit Load of Pollutants/Wells	Wc24H	R. Amadeu	336018
	P-1	Poço R. Amadeu, 219	335987
	P-2	Poço Nakahara	338217
Branch of Rivers	WW-1	Ribeirão da Estiva	359056
	WW-2	Alto Ribeirão Pires	357633
	WW-3	Recreio da Borda	349099
	WW-4	Alto Córrego Alvarenga	338836

**Table A5.3.2 Scope of Survey and Water Quality Survey Items**

		C3					C2			
	Parâmetros	A-1	A-2	A-3	A-4	B	A	B	C-1	C-2
1	pH	X	X	X	X	X	X	X	X	X
2	water temp.						X	X		
3	air temp.						X			
4	conductivity	X	X	X			X	X		
5	water color							X		
6	transparency							X		
7	redox potential								X	X
8	water contents								X	
9	thickness								X	
10	DO (dissolved oxygen)	X	X	X	X	X	X	X		X
11	TSS	X	X	X	X	X	X	X		
12	TOC	X	X	X	X	X	X	X	X	X
13	BOD	X	X	X	X	X	X	X		
14	COD	X	X	X	X	X	X	X		
15	DOC	X	X	X		X	X	X		
16	Ortophosphate									X
17	Total phosphorus (T-P)	X	X	X	X	X	X	X	X	X
	ammonia nitrogen (NH <sub>4</sub> -N)									
18		X	X	X	X	X	X	X		
19	nitrate nitrogen (NO <sub>2</sub> -N)	X	X	X		X	X	X		
20	nitrous nitrogen (NO <sub>3</sub> -N)	X	X	X		X	X	X		
21	NKT						X	X		
22	total nitrogen (T-N)	X	X	X	X	X			X	
23	fecal coliform (F-colí)	X	X	X	X	X	X	X		
24	chlorophyll-a						X	X		
25	phytoplankton						X			
26	total iron (Fe)	X		X		X	X	X		X
27	Mn	X		X		X	X	X		X
28	Hg	X		X		X	X	X	X	X
29	Cu								X	
30	Zn								X	
31	Ni								X	
32	Cd								X	
	TOTAL	18	15	18	10	18	24	20	12	9
	Discharge	X	X	X		X				



## ANNEX 5.3.2

## Material Anexo 5.3.2 Qualidade de Água na Represa Billings

Tabela A5.3.1

Dados brutos das análises laboratoriais das 6 campanhas dos tributários da represa Billings.

Código	Estações de Monitoramento	Data (dia/mês)	Hora**	Tempo** (°C)	Vazão** (m³/s)	Temp. da água** (°C)	pH	Conduktividade (µS/cm)	Transparência** (m)	Turbidez (NTU)	OD (mg O <sub>2</sub> /L)	SST (mg C/L)	COT (mg O <sub>2</sub> /L)	DBO (mg C/L)	DCO (mg C/L)	COD (mg C/L)	PO <sub>4</sub> (mg P/L)	P-T (mg P/L)	P <sub>org.</sub>	N-NH <sub>3</sub> (mg N/L)	N-NO <sub>2</sub> (mg N/L)	N-NO <sub>3</sub> (mg N/L)	NKT (mg N/L)	N-T (mg N/L)	N <sub>org.</sub> (NMP/100ml)	Coliformes Fecais (NMP/100ml)	Coliformes Totais (NMP/100ml)	Fe (mg Fe/L)	Mn (mg Mn/L)	Hg (mg Hg/L)	Zn (mg Zn/L)	Cu (mg Cu/L)	Ni (mg Ni/L)
R-1	Córrego Cocala	03/08/05	15:32	Bom	26	0.3609	22	6.88	468	>0.07	6.7	n.d.	52	30	136	33	3.67	n.d.	22.3	n.d.	n.d.	26.6	0.29	3.00 x 10 <sup>-6</sup>	n.d.	n.d.	n.d.	n.d.					
		23/08/05	13:53	Bom	27	0.3668	23	6.84	480	>0.30	n.d.	n.d.	60	44	143	210	34	4.16	n.d.	27.2	n.d.	n.d.	40.2	0.48	5.0 x 10 <sup>-6</sup>	9.0 x 10 <sup>-6</sup>	0.751	0.046	n.d.				
		27/08/05	12:30	Chuvoso	18	0.5551	17	6.85	402	0.09	n.d.	270	2.6	15	145	2.5	1.15	1.46	0.27	13.93	n.d.	n.d.	17.91	0.29	5.0 x 10 <sup>-6</sup>								
		26/10/05	12:50	Nublado	27	0.3910	23	7.04	448	0.1	1.4	40	21	70	115	20	1.81	2.79	0.54	14.88	n.d.	n.d.	18.42	0.10	500.0 x 10 <sup>-3</sup>								
		30/11/05	15:40	Nublado	25	0.4146	23	6.89	516	0.13	1.2	20	13	63	128	11	1.33	2.1	0.58	13.59	0.052	n.d.	18.05	0.18	9.00 x 10 <sup>-6</sup>	1.445	0.227	n.d.					
		06/01/06	15:40	Bom	26	0.6246	25	6.92	404	0.13	1.4	44	21	83	182	17	1.75	2.26	0.30	12.7	n.d.	n.d.	12.0	0.01	500.0 x 10 <sup>-3</sup>	1.609	0.268	n.d.					
R-2	Jardim Varginha	04/08/05	14:40	Bom	25	0.0392	22	6.91	471	0.165	47.1	n.d.	16	26	1	9	18	2.3	n.d.	28.6	n.d.	n.d.	59.2	0.02	500.0 x 10 <sup>-3</sup>	0.084	0.029	n.d.	n.d.				
		23/08/05	16:00	Bom	27	0.0634	20	6.92	476	0.27	n.d.	17	20	73	122	16	1.8	n.d.	25.8	n.d.	n.d.	28.6	0.15	1.6 x 10 <sup>-6</sup>	5.0 x 10 <sup>-6</sup>	0.726	0.258	n.d.					
		30/11/05	18:35	Chuvoso	25	0.1027	22	6.88	603	0.14	n.d.	18	6.5	52	95	7.7	1.30	1.81	0.18	16.87	0.058	n.d.	25.34	0.48	700 x 10 <sup>-3</sup>	0.806	0.391	n.d.					
		06/01/06	15:00	Bom	27	0.0605	23	6.83	480	0.16	n.d.	17	17	117	216	14	0.122	2.23	17.29	14.2	n.d.	22.7	0.80	24.0 x 10 <sup>-3</sup>	0.724	0.39	n.d.						
		04/08/05	15:20	Bom	25	0.0140	21	6.24	38.5	>0.30	3.07	5	n.d.	2.6	1	8	1.5	n.d.	0.103	n.d.	0.11	0.19	0.3	2.4 x 10 <sup>-3</sup>	0.32	0.022	n.d.	0.02					
		23/08/05	15:00	Bom	27	0.0142	19	6.37	51.2	>0.30	n.d.	21	5.1	1	8	4.5	n.d.	<0.045*	0.053	n.d.	0.15	0.31	1.27	20	1.3 x 10 <sup>-3</sup>	n.d.	n.d.	n.d.					
R-3	Ribeirão da Varginha	20/11/05	16:50	Nublado	25	0.0398	22	6.23	60.1	>0.30	1.8	28	7.9	2	50	6.5	0.078	0.153	1.01	n.d.	0.6	0.847	10.84	0.04	60	13.4	0.427	n.d.					
		06/01/06	14:50	Bom	27	0.0541	22	6.24	45.2	>0.30	2	16	11	6	22	9.5	<0.025*	<0.045*	0.8	n.d.	0.183	<0.15	0.333	0.82	20	4.49	0.209	n.d.					
		24/08/05	13:18	Bom	25	0.0704	22	6.87	55.8	>0.30	4.59	8	n.d.	4	3	6	3.5	n.d.	0.087	n.d.	0.032	n.d.	0.18	1.78	1.08	0.25	9.0 x 10 <sup>-3</sup>	0.121	0.021	n.d.	n.d.		
		25/08/05	14:30	Nublado	16.5	0.0580	18.9	6.7	89.1	>0.30	n.d.	10	3.8	8	11	3.1	n.d.	0.067	n.d.	1.44	n.d.	2.33	2.33	0.62	9.0 x 10 <sup>-3</sup>	24.0 x 10 <sup>-3</sup>	1.862	0.616	n.d.				
		27/08/05	14:10	Nublado	16.0	0.2482	16.0	6.76	62	>0.30	5.2	92	2.8	2	24	2.4	0.072	0.648	8.01	n.d.	1.21	0.39	8.88	10.37	5.48	1.7 x 10 <sup>-3</sup>							
		25/10/05	15:20	Bom	26	0.1482	21.0	6.88	72.5	>0.30	5	6	7	4	50	6.5	0.058	0.078	0.39	0.05	0.27	0.28	0.02	1.85	9.0 x 10 <sup>-3</sup>	1.483	0.239	n.d.					
R-4	Ribeirão Colônia	30/11/05	18:00	Nublado	24.0	0.1082	22.0	6.85	80.1	>0.30	4.8	5	6.1	4	40	5.5	0.054	0.131	1.43	0.07	0.083	0.14	1.68	1.903	1.13	5.0 x 10 <sup>-3</sup>	1.307	0.064	n.d.				
		06/01/06	13:05	Parcialmente Nublado	25.0	0.2297	23.0	6.74	72	>0.30	4.0	6	9.4	5	35	7.8	0.054	0.085	0.57	0.18	0.231	0.13	0.45	0.511	0.50	5.0 x 10 <sup>-3</sup>	0.11	0.021	n.d.	n.d.			
		04/08/05	12:45	Bom	22	0.0179	16	6.86	142.0	>0.30	7.33	2.4	2	11	3	10	1.5	n.d.	2.44	n.d.	0.1	10.7	18.8	6.89	130	9.0 x 10 <sup>-3</sup>	2.021	0.068	n.d.				

**Tabela A5.3.1**

Dados brutos das análises laboratoriais das 6 campanhas dos tributários da represa Billings.

Código	Estações de Monitoramento	Data (dd/mm)	Hora**	Tempo**	Temp. do ar** (°C)	Vazão** (m³/s)	Temp. da água** (°C)	pH	Conduktividade (µS/cm)	Transparência** (m)	Turbidez (NTU)	OD (mg O₂/L)	SST (mg P/L)	COT (mg C/L)	DBO (mg O₂/L)	COD (mg C/L)	PO₄ (mg P/L)	P-T (mg P/L)	P org. (mg N/L)	N-NH₃ (mg N/L)	N-NO₂ (mg N/L)	N-NO₃ (mg N/L)	NKT (mg N/L)	N-T (mg N/L)	N org. (NMP/100ml)	Coliformes Fecais (NMP/100ml)	Coliformes Totais (NMP/100ml)	Fe (mg Fe/L)	Mn (mg Mn/L)	Hg (mg Hg/L)	Zn (mg Zn/L)	Cu (mg Cu/L)	Ni (mg Ni/L)				
R-11	Córrego Número 6	05/08/05	15:20	Bom	27	0,0126	21	6.73	356	0,06	85,5	n.d.	38	27	8	77	51	3,58	18,7	n.d.	n.d.	48	48	1,57	3,00 x 10 <sup>-6</sup>	2,04	0,103	n.d.	0,06	0,008	n.d.						
		25/08/05	9:55	Nublado	17	0,0144	18	6.84	442			2,0	91	34	139	248	22	3,93	31,83	n.d.	n.d.	45,47	45,47	0,43	5,0 x 10 <sup>-6</sup>	1,665	0,096	n.d.	0,06	0,008	n.d.						
R-11	Córrego Número 6	01/12/05	15:20	Parcialmente Nublado	28	0,0125	22	7,05	358	0,11		2,2	18	13	115	170	11	1,78	2,59	0,46	10,66	1,344	n.d.	13,31	14,854	0,22	180,0 x 10 <sup>-3</sup>	1,22	0,117	n.d.	2,272	0,170	n.d.				
		05/01/06	10:00	Nublado	21	0,0215	20	6,78	301	0,16		2,8	43	19	44	121	18	1,32	1,81	0,37	4,62	0,608	n.d.	10,7	10,708	1,31	900 x 10 <sup>-3</sup>	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.				
R-12	Ribeirão das Lavras	03/08/05	10:10	Bom	24	0,0445	23	7,04	453	> 0,30		23	0,6	11	13	38	74	11	6,84			25,3	n.d.	n.d.	60	1,37	500,0 x 10 <sup>-3</sup>	1,60 x 10 <sup>-6</sup>	2,17	0,252	n.d.	n.d.	n.d.	n.d.			
		23/08/05	9:35	Bom	21	0,0240	18	7,09	498	0,13		n.d.	10	17	72	117	15	3,21			28	n.d.	n.d.	36,8	36,8	0,27	500,0 x 10 <sup>-3</sup>	16,0 x 10 <sup>-6</sup>	2,17	n.d.	n.d.	n.d.	n.d.				
R-13	Córrego Alfarenga	23/08/05	10:20	Chuvoso	14	0,0703	15	7,01	517	> 0,30		2,4	239	3,6	16	173	3	0,777	0,669	0,24	0,07	n.d.	11,84	12,1	0,81	1,6 x 10 <sup>-6</sup>	2,4 x 10 <sup>-6</sup>	3,116	0,528	n.d.	2,232	0,419	n.d.				
		25/10/05	9:40	Parcialmente Nublado	25	0,0624	22	7,23	455	0,22		2	5	3	56	347	2,7	1,78	2,02	0,13	13,33	n.d.	n.d.	20,48	20,48	0,84	500,0 x 10 <sup>-3</sup>	2,72	0,376	n.d.	1,042	0,353	n.d.				
R-14	Córrego Pereira	05/11/05	11:30	Nublado	25	0,0155	22	6,98	513	0,15		2,8	24	13	45	110	12	1,47	1,51	0,03	10,5	0,142	n.d.	21,242	1,00	800 x 10 <sup>-3</sup>	16,0 x 10 <sup>-6</sup>	3,00 x 10 <sup>-6</sup>	1,09	0,148	n.d.	n.d.	n.d.	n.d.			
		03/08/05	12:04	Bom	25	0,0148	21	6,85	995	0,03		224	n.d.	168	132	339	661	113	8			53	n.d.	n.d.	78	78	0,43	9,00 x 10 <sup>-6</sup>	16,0 x 10 <sup>-6</sup>	3,00 x 10 <sup>-6</sup>	1,768	0,111	n.d.				
R-14	Córrego Pereira	23/08/05	11:10	Bom	27	0,0273	22	7,24	526	0,03		n.d.	65	113	265	733	72	8,15			36,1	n.d.	n.d.	40,7	40,7	0,13	24,0 x 10 <sup>-6</sup>	3,08	0,232	n.d.	3,007	0,207	n.d.				
		27/09/05	10:35	Nublado	16	0,0245	17	6,97	857	0,03		n.d.	503	1,6	188	203	1,5	3,43	4,16	0,30	19,81	n.d.	n.d.	46,45	46,45	1,37	16,0 x 10 <sup>-6</sup>	1,768	0,111	n.d.	n.d.	n.d.	n.d.				
R-15	Córrego Grota Funda	25/10/05	10:20	Parcialmente Nublado	25	0,0245	22	7,04	767	0,03		2,7	201	67	347	510	60	4,33	4,04	0,07	23,4	n.d.	n.d.	48	48	1,05	16,0 x 10 <sup>-6</sup>	1,672	0,240	n.d.	1,165	0,24	n.d.				
		30/11/05	12:45	Chuvoso	24	0,0167	22	6,85	838	0,03		0,2	177	41	341	638	38	3,74	3,26	0,67	20,28	0,014	n.d.	35,76	35,774	0,22	3,0 x 10 <sup>-6</sup>	1,672	0,240	n.d.	1,165	0,24	n.d.				
R-16	Estrada Alvarenga, 2411	05/01/06	13:10	Parcialmente Nublado	23	0,0191	23	6,74	768	0,03		1,6	188	61	275	615	40	3,07	8,71	0,83	15,4	n.d.	n.d.	34,6	34,6	1,24	16,0 x 10 <sup>-6</sup>	1,672	0,240	n.d.	1,165	0,24	n.d.				
		03/08/05	12:35	Bom	27	0,0810	21	6,88	701	0,08		105	n.d.	28	76	239	392	65	7,68			60	n.d.	n.d.	73	73	0,48	9,00 x 10 <sup>-6</sup>	60,0 x 10 <sup>-6</sup>	1,768	0,111	n.d.	n.d.	n.d.			
R-16	Estrada Alvarenga, 2411	23/08/05	11:30	Bom	27	0,0810	22	6,88	659	0,08		n.d.	140	76	268	498	57	7,68			318	1,5	75	100	1,5	1,64	2,19	0,42	14,49	n.d.	n.d.	20,13	0,39	9,00 x 10 <sup>-6</sup>	1,768	0,111	n.d.
		27/09/05	11:00	Nublado	16	0,1544	16	7,1	451	0,08		n.d.	318	1,5	75	100	1,5	1,64	2,19	0,42	14,49	n.d.	n.d.	33,87	33,87	0,20	5,0 x 10 <sup>-6</sup>	1,672	0,240	n.d.	1,165	0,24	n.d.				
R-17	Canal do Rio Juruátaba	06/01/06	10:20	Bom	25	0,0185	18	6,89	697	0,27		2,6	66	14	14	52	12	0,969	0,669	0,66	3,44	n.d.	n.d.	7,19	7,19	1,09	900 x 10 <sup>-3</sup>	1,672	0,240	n.d.	1,165	0,24	n.d.				
		04/08/05	10:20																																		

Tabela A5.3.2

Carga dos Tributários da Represa Billings

Código	Estações de Monitoramento	Data (d/m/ano)	Hora**	Tempo**	Vazão** (m³/s)	OD (l/dia)	SST (l/dia)	COT (l/dia)	DBO (l/dia)	DQO (l/dia)	COD (l/dia)	PO <sub>4</sub> (l/dia)	P-T (l/dia)	N-NH <sub>3</sub> (l/dia)	N-NO <sub>2</sub> (l/dia)	N-NO <sub>3</sub> (l/dia)	NKT (l/dia)	N-T (l/dia)	Fe (l/dia)	Mn (l/dia)	Hg (l/dia)	Zn (l/dia)	Cu (l/dia)	Ni (l/dia)	
R-1	Córrego Cocala	03/08/05	15:32	Bom	0.3609	n.d.	1.6212	1.1224	4.2401	5.7990	1.0289		0.1144	0.6953	n.d.	n.d.	0.8917	0.8917	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	
		23/08/05	13:55	Bom	0.3666	n.d.	1.9002	1.3935	4.5289	8.5511	1.0768		0.1314	0.8614	n.d.	n.d.	1.2732	1.2732	0.0238	0.0014	n.d.	n.d.	n.d.	n.d.	
		27/09/05	12:30	Chuvoso	0.5551	n.d.	12.9494	0.1247	0.7194	6.9543	0.1199	0.0552	0.0700	0.6681	n.d.	n.d.	0.8590	0.8590							
		25/10/05	12:50	Nublado	0.3916	0.0474	1.3533	0.7105	2.3682	3.8906	0.6766	0.0612	0.0944	0.5027	n.d.	n.d.	0.5555	0.5555							
		30/11/05	15:40	Nublado	0.4146	0.0430	0.7164	0.4657	2.2568	4.5851	0.3940	0.0476	0.0752	0.4868	0.0019	n.d.	0.5749	0.5768	0.0518	0.0081	n.d.				
		06/01/06	15:40	Bom	0.6246	0.0756	2.3745	1.1333	4.4791	9.8217	0.9174	0.0944	0.1230	0.6854	n.d.	n.d.	0.6908	0.6908	0.0868	0.0138	n.d.				
		04/08/05	14:40	Bom	0.0392	n.d.	0.0541	0.0947	0.0034	0.0304	0.0541		0.0078	0.0974	n.d.	n.d.	0.1989	0.1969	0.0002	0.0001	n.d.	n.d.	n.d.	n.d.	
R-2	Jardim Varginha	23/08/05	16:00	Bom	0.0634	n.d.	0.0931	0.1095	0.3996	0.6679	0.0985		0.0104	0.1418	n.d.	n.d.	0.1631	0.1631	0.0040	0.0014	n.d.				
		30/11/05	16:35	Chuvoso	0.1027	n.d.	0.1686	0.0754	0.4614	0.8430	0.0683	0.0122	0.0169	0.1506	0.0005	n.d.	0.2248	0.2248	0.0080	0.0034	n.d.				
		06/01/06	15:00	Bom	0.0605	n.d.	0.0889	0.0889	0.6116	1.1238	0.0732	0.0006	0.0117	0.0742	n.d.	n.d.	0.1187	0.1187	0.0038	0.0020	n.d.				
R-3	Ribeirão da Varginha	04/08/05	15:20	Bom	0.0140	0.0060	n.d.	0.0030	0.0012	0.0073	0.0018		0.0001	n.d.	n.d.	0.0001	0.0002	0.0004	0.0004	0.0000	n.d.	0.0000	n.d.	n.d.	
		23/08/05	15:00	Bom	0.0142	0.0032	0.0258	0.0063	0.0012	0.0074	0.0055		0.0001	0.0001	n.d.	n.d.	0.0002	0.0004	0.0006	n.d.	n.d.	n.d.			
		30/11/05	16:50	Nublado	0.0398	0.0062	0.0963	0.0272	0.0069	0.1994	0.0224	0.0003	0.0005	n.d.	0.0002	n.d.	0.0017	0.0019	0.0461	0.0015	n.d.				
R-4	Ribeirão Colônia	06/01/06	14:50	Bom	0.0541	0.0093	0.0748	0.0514	0.0234	0.1028	0.0444	0.0001	0.0002	n.d.	0.0009	n.d.	0.0007	0.0016	0.0210	0.0014	n.d.				
		04/08/05	13:10	Bom	0.0796	0.0550	n.d.	0.0275	0.0206	0.0413	0.0241		0.0006	0.0002	n.d.	0.0012	0.0122	0.0135	0.0008	0.0001	n.d.	n.d.	n.d.		
		25/08/05	14:30	Nublado	0.0590	0.0408	0.0510	0.0199	0.0459	0.0561	0.0158		0.0003	0.0073	n.d.	n.d.	0.0119	0.0119	0.0095	0.0031	n.d.				
		27/09/05	14:10	Nublado	0.2482	0.1115	1.9729	0.0558	0.0429	0.5147	0.0515	0.0015	0.0139	0.0259	n.d.	0.0084	0.2140	0.2224							
		25/10/05	15:20	Bom	0.1482	0.0640	0.0768	0.0896	0.0512	0.6401	0.0832	0.0007	0.0010	0.0006	n.d.	0.0033	0.0072	0.0105							
		30/11/05	18:00	Nublado	0.1082	0.0449	0.0467	0.0570	0.0374	0.3738	0.0514	0.0005	0.0012	0.0063	0.0008	0.0013	0.0157	0.0178	0.0137	0.0022	n.d.				
		06/01/06	13:05	Parcialmente Nublado	0.2257	0.0897	0.1170	0.1833	0.0975	0.6825	0.1521	0.0011	0.0017	0.0035	0.0045	0.0025	0.0088	0.0158	0.0255	0.0012	n.d.	n.d.	n.d.		
R-5	Ribeirão Vermelho	04/08/05	12:45	Bom	0.0179	0.0037	0.0031	0.0170	0.0046	0.0293	0.0154		0.0023	0.0038	n.d.	0.0002	0.0304	0.0305	0.0002	n.d.	n.d.	n.d.	n.d.		
		25/08/05	14:05	Nublado	0.0172	0.0116	0.0074	0.0163	0.0089	0.0817	0.0149		0.0004	0.0024	n.d.	n.d.	0.0045	0.0030	0.0001	0.0001	n.d.				
		27/09/05	15:20	Nublado	0.4303																				
		25/10/05	16:00	Bom	0.3823																				
		30/11/05	18:20	Nublado	0.0882	0.0472	0.0381	0.1295	0.0229	0.3353	0.1143	0.0006	0.0042	0.0087	0.0005	n.d.	0.0098	0.0103	0.0143	0.0007	n.d.				
R-6	Ribeirão Taquacetuba	06/01/06	12:30	Bom	0.9434	0.1304	0.8151	1.7117	0.4891	3.0159	1.2226	0.0070	0.0179	0.0253	n.d.	n.d.	0.0685	0.0685	0.2039	0.0088	n.d.				
		04/08/05	12:07	Bom	0.0353	0.0244	0.0153	0.0089	0.0031	0.0153	0.0055		0.0001	n.d.	n.d.	0.0004	n.d.	0.0004	0.0005	n.d.	n.d.	n.d.	n.d.		
		25/08/05	13:25	Nublado	0.0166	0.0110	0.0174	0.0044	0.0028	0.0450	0.0042		0.0002	0.0002	n.d.	0.0002	0.0004	0.0006	0.0030	0.0001	n.d.				
R-7	Rio Curicutu	30/11/05	18:40	Nublado	0.0496	0.0283	0.0557	0.0159	0.0086	0.0943	0.0129	n.d.	0.0002	n.d.	n.d.	0									

**Tabela A5.3.2**

Carga dos Tributários da Represa Billings

Código	Estações de Monitoramento	Data (d/m/ano)	Hora**	Tempo**	Vazão** (m³/s)	OD (t/dia)	SST (t/dia)	COT (t/dia)	DBO (t/dia)	DQO (t/dia)	COD (t/dia)	PO <sub>4</sub> (t/dia)	P-T (t/dia)	N-NH <sub>3</sub> (t/dia)	N-NO <sub>2</sub> (t/dia)	N-NO <sub>3</sub> (t/dia)	NKT (t/dia)	N-T (t/dia)	Fe (t/dia)	Mn (t/dia)	Hg (t/dia)	Zn (t/dia)	Cu (t/dia)	Ni (t/dia)		
R-11	Córrego Número 6	05/08/05	15:20	Bom	0.0126	n.d.	0.0414	0.0294	0.0067	0.0838	0.0555		0.0039	0.0204	n.d.	n.d.	0.0523	0.0523	0.0022	0.0001	n.d.	0.0001	0.0000	n.d.		
		25/08/05	9:55	Nublado	0.0144	0.0032	0.1132	0.0423	0.1729	0.3086	0.0274		0.0049	0.0396	n.d.	n.d.	0.0566	0.0566	0.0021	0.0001	n.d.					
		01/12/05	15:20	Parcialmente Nublado	0.0125	0.0024	0.0194	0.0140	0.1242	0.1836	0.0119	0.0019	0.0028	0.0115	0.0015	n.d.	0.0144	0.0158	0.0013	0.0001	n.d.					
		05/01/06	18:00	Nublado	0.0215	0.0052	0.0799	0.0353	0.0817	0.2248	0.0297	0.0025	0.0034	0.0086	0.0000	n.d.	0.0199	0.0199	0.0042	0.0003	n.d.					
		03/08/05	10:10	Bom	0.0445	0.0031	0.0423	0.0500	0.1384	0.2844	0.0423		0.0267	0.0972	n.d.	n.d.	0.2306	0.2306	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.		
R-12	Ribeirão das Lavras	23/08/05	9:35	Bom	0.0240	0.0026	0.0394	0.0353	0.1493	0.2426	0.0311		0.0067	0.0601	n.d.	n.d.	0.0763	0.0763	0.0045	0.0005	n.d.					
		30/11/05	10:00	Nublado	0.0449	0.0078	0.0737	0.0287	0.0504	0.1901	0.0272	0.0055	0.0080	0.0663	0.0002	n.d.	0.0817	0.0819	0.0121	0.0020	n.d.					
		05/01/06	10:20	Nublado	0.0705	0.0365	0.0305	0.0609	0.0365	0.1706	0.0524	0.0021	0.0023	0.0222	n.d.	n.d.	0.0615	0.0615	0.0136	0.0026	n.d.					
		03/08/05	11:33	Bom	0.2954	n.d.	1.0208	0.5869	3.1644	5.3080	0.5104		0.1023	1.0718	n.d.	n.d.	1.0973	1.0973	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.		
		23/08/05	10:20	Bom	0.3447	n.d.	1.1914	0.6255	3.7531	4.9445	0.5362		0.1117	0.9561	n.d.	n.d.	1.1378	1.1378	0.0646	0.0055	n.d.					
R-13	Córrego Alvarenga	27/09/05	10:05	Chuvoso	0.6703	0.1390	13.8414	0.2085	0.9266	10.0191	0.1737	0.0450	0.0559	0.3515	n.d.	0.0151	0.6857	0.7008								
		25/10/05	9:40	Parcialmente Nublado	0.3624	0.0626	0.1566	0.0939	1.7223	10.8665	0.0846	0.0557	0.0633	0.4174	n.d.	0.6417	0.6417									
		30/11/05	11:00	Nublado	0.3059	0.0317	1.0043	0.2564	2.1672	4.2816	0.2432	0.0753	0.0883	0.8162	0.0016	n.d.	1.1188	1.1204	0.0719	0.0099	n.d.					
		05/01/06	11:30	Nublado	0.3155	0.0709	0.6542	0.3544	1.2267	2.9985	0.3271	0.0401	0.0412	0.2862	0.0039	n.d.	0.5752	0.5790	0.0502	0.0096	n.d.					
		03/08/05	12:04	Bom	0.0148	n.d.	0.2146	0.1686	0.4330	0.8443	0.1443		0.0102	0.0677	n.d.	n.d.	0.0971	0.0971	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.		
R-14	Córrego Pereira	23/08/05	11:10	Bom	0.0273	n.d.	0.1555	0.2663	0.6740	1.7275	0.1697		0.0192	0.0851	n.d.	n.d.	0.0959	0.0959	0.0047	0.0003	n.d.					
		27/09/05	10:35	Nublado	0.0245	n.d.	1.0648	0.0034	0.3345	0.6202	0.0032	0.0073	0.0094	0.0415	n.d.	0.0983	0.0983									
		25/10/05	10:20	Parcialmente Nublado	0.0245	0.0057	0.4254	0.1418	0.7344	1.0793	0.1270	0.0092	0.0098	0.0495	n.d.	0.1016	0.1016									
		30/11/05	0:40	Chuvoso	0.0167	0.0003	0.2554	0.0592	0.4920	0.9206	0.0548	0.0054	0.0090	0.0422	0.0000	n.d.	0.0516	0.0516	0.0044	0.0003	n.d.					
		05/01/06	13:10	Parcialmente Nublado	0.0161	0.0022	0.2615	0.0709	0.3825	0.7164	0.0640	0.0051	0.0093	0.0214	n.d.	n.d.	0.0480	0.0480	0.0042	0.0004	n.d.					
R-15	Córrego Grotta Funda	03/08/05	12:35	Bom	0.0810	n.d.	0.1959	0.5317	1.6722	2.7426	0.4548		0.0388	0.3498	n.d.	n.d.	0.5107	0.5107	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.		
		23/08/05	11:30	Bom	0.1380	n.d.	1.6696	0.9064	3.4347	5.9391	0.6798		0.0904	0.4627	n.d.	n.d.	0.5784	0.5784	0.0211	0.0013	n.d.					
		27/09/05	11:00	Nublado	0.1544	n.d.	4.2155	0.0200	1.0005	1.3340	0.0200	0.0205	0.0292	0.1933	n.d.	0.2685	0.2685									
		25/10/05	11:00	Parcialmente Nublado	0.1331	0.0115	0.8627	0.4141	2.4959	3.6806	0.3221	0.0395	0.0576	0.3245	n.d.	0.3896	0.3896									
		30/11/05	12:45	Nublado	0.1163	0.0100	0.4622	0.3115	1.7685	3.0145	0.2914	0.0212	0.0313	0.2543	0.0005	n.d.	0.3822	0.3828	0.0158	0.0025	n.d.					
R-16	Estrada Alvarenga, 2411	06/01/06	17:30	Parcialmente Nublado	0.1207	0.0146	0.5631	0.3233	1.0741	2.5758	0.2711	0.0202	0.0322	0.1731	n.d.	0.2524	0.2524	0.0121	0.0025	n.d.						
		03/08/05	13:24	Bom	0.1195	n.d.	0.3098	0.6402	2.3131	4.1306	0.5267		0.0511	0.3408	n.d.	n.d.	0.5060	0.5060	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.		
		23/08/05	11:55	Bom	0.1126	n.d.	2.3351	0.6714	2.8995	5.2346	0.4476		0.0684	0.2909	n.d.	n.d.	0.3337	0.3337	0.0149	0.0011	n.d.					
		30/11/05</																								

**Tabela A5.3.3**

Dados brutos da campanha de trechos intermediários dos tributários da represa Billings.

Código	Estações de Monitoramento	Data (d/m/año)	Hora**	Tempo**	Temp. do ar** (°C)	Vazão** (m³/s)	Temp. da água** (°C)	pH	Conduvidade (µS/cm)	Transparéncia** (m)	OD (mg O₂/L)	SST (mg Cl/L)	COT (mg Cl/L)	DBO (mg O₂/L)	DQO (mg Cl/L)	COD (mg Cl/L)	P-T (mg P/L)	N-NH₃ (mg N/L)	N-NO₂ (mg N/L)	N-NO₃ (mg N/L)	NKT (mg N/L)	N-T (mg N/L)	Coliformes Fecais (NMP/100ml)	Col-T Totais (NMP/100ml)	Fe (mg Fe/L)	Mn (mg Mn/L)	Hg (mg Hg/L)
WW-1	Ribeirão da Serra	24/08/05	14:15	Parcialmente nublado	23	0,0989	18,5	6,58	28,6	6,8	1	4,2	4	22	3,6	<0,045*	n.d.	n.d.	0,12	0,57	0,69	40	2,4 x 10e3	1,769	0,039	n.d.	
WW-2	Ale Ribeirão Pires	24/08/05	15:25	Parcialmente nublado	22,5	0,0538	21	6,99	314	1,8	15	6,9	34	47	8,1	8,26	15,1	0,305	0,3	68,2	68,805	900,0 x 10e3	3,0 x 10e8	2,82	0,212	n.d.	
WW-3	Recreio da Borda	25/08/05	9:35	Nublado	19,9	0,0168	17	6,88	98	7,8	37	3,4	6	0	3,4	0,188	1,17	0,099	0,6	2,61	3,309	0,0 x 10e3	180,0 x 10e3	1,37	0,204	n.d.	
WW-4	Alto Corregó Alverenga	23/08/05	10:45	Bom	25	0,1697	22	6,78	952	n.d.	224	46	352	595	38	0,06	33,8	n.d.	n.d.	35,8	35,8	(16,0 x 10e3)	30,0 x 10e3	9,43	0,132	n.d.	

\* Limite confiável de detecção alterado por causa da necessidade de dissoluções para a análise laboratorial

\*\* Dados de campo

OD- Oxigênio dissolvido; SST- Sólidos suspensos totais; COT- Carbono orgânico total; DBO- Demanda bioquímica de oxigênio; DQO-Demanda química de oxigênio; COD-Carbono orgânico dissolvido; P-T- Fósforo total;

N-NH₃- Nitrogênio amoniacal; N-NO₂- Nitrito; N-NO₃- Nitrito; NKT- Nitrogênio Kjeldhal total; N-T- Nitrogênio Total; Col-F- Coliformes fecais; Col-T- Coliformes Totais; Fe- Ferro; Mn- Manganês; Hg- Mercúrio;

**Tabela A5.3.4**

Dados brutos das análises laboratoriais da campanha de cargas específicas realizada por 24 horas e de dois poços.

Código	Estações de monitoramento	Data (d/m/año)	Hora**	Tempo**	Temp. do ar** (°C)	Vazão** (m³/s)	Temp. da água** (°C)	pH	Conduvidade (µS/cm)	Transparéncia** (m)	Turbidez (NTU)	OD (mg O₂/L)	SST (mg Cl/L)	COT (mg Cl/L)	DBO (mg O₂/L)	DQO (mg Cl/L)	COD (mg Cl/L)	P-T (mg P/L)	N-NH₃ (mg N/L)	N-NO₂ (mg N/L)	N-NO₃ (mg N/L)	NKT (mg N/L)	N-T (mg N/L)	Coliformes Fecais (NMP/100ml)	Col-T Totais (NMP/100ml)	Fe (mg Fe/L)	Mn (mg Mn/L)	Hg (mg Hg/L)
P-1	Poco - Rua Amadeu, 210	02/09/05	10:45	Nublado	17	0,0091	19	5,78	228	0,21	23,9	4,8	20	1,2	3	7	1	0,07	0,03	0,013	7,39	0,13	7,933	0	23	0,37	0,10	n.d.
P-2	Poco Nakahara	02/09/05	13:00	Nublado	20	0,0091	18	5,3	67,5	> 0,30	2,07	5,8	4	1,4	2	8	1,1	0,028	n.d.	6	0,07	0,07	0	0	0	0,134	0,183	n.d.
W624H	Rua Amadeu	02/09/05	12:00	Nublado	19	0,0091	21	6,68	500	225	4	22	20	334	518	25	4,10	12,5	n.d.	n.d.	0,24	62,4	90,0 x 10e3	0,0 x 10e3	1,35	0,122	n.d.	
			15:00	Nublado	18	0,0075	21	6,88	568	225	4,0	182	71	317	410	20	4,5	11,8	n.d.	n.d.	27,4	27,4	30,0 x 10e3	1,8 x 10e8	2,18	0,162	n.d.	
			18:00	Nublado	18	0,0077	19	6,82	738	229	6	134	60	261	549	25	5,61	10,6	n.d.	n.d.	37,3	37,3	30,0 x 10e3	50,0 x 10e3	1,2	0,124	n.d.	
			21:00	Nublado	12	0,0055	19	7,07	640	101	4,2	158	18	260	438	10	5,1	15,2	n.d.	n.d.	37,3	37,3	30,0 x 10e3	100,0 x 10e3	1,17	0,122	n.d.	
			0:00	Bom	11	0,0042	18	7,28	611	69,8	9,2	35	9,0	161	189	4,1	2,27	13,2	n.d.	n.d.	25,3	25,3	24,0 x 10e3	30,0 x 10e0	1,32	0,203	n.d.	
			3:00	Bom	8	0,0030	17	7,24	358	201	6,8	16	4,1	26	64	4,1	1,3	8,27	0,076	2,63	11,5	14,105	1,8 x 10e3	24,0 x 10e3	1,44	0,254	n.d.	
			6:00	Nublado	11	0,0036	18	7,27	621	187,4	4,8	53	8,7	65	147	6,0	2,08	17,04	1,04	1,08	30,15	38,304	3,0 x 10e3	50,0 x 10e3	1,43	0,210	n.d.	
			9:00	Bom	18	0,0098	19	7,16	693	298	2,8	178	110	302	698	85	11,8	24,74	n.d.	n.d.	88,69	88,69	60,0 x 10e3	60,0 x 10e3	1,57	0,142	n.d.	
			12:00	Nublado	20	0,0149	20	7,02	707	338	5,8	23	77	322	712	40	0,05	12,2	0,331	0,33	30,2	30,801	24,0 x 10e3	30,0 x 10e3	2,37	0,10	n.d.	

\*\* Dados de campo

OD- Oxigênio dissolvido; SST- Sólidos suspensos totais; COT- Carbono orgânico total; DBO- Demanda bioquímica de oxigênio; DQO-Demanda química de oxigênio; COD-Carbono orgânico dissolvido; P-T- Fósforo total;

N-NH₃- Nitrogênio amoniacal; N-NO₂- Nitrito; N-NO₃- Nitrito; NKT- Nitrogênio Kjeldhal total; N-T- Nitrogênio Total; Col-F- Coliformes fecais; Col-T- Coliformes Totais; Fe- Ferro; Mn- Manganês; Hg- Mercúrio;

**Tabela A5.3.5**

Tabela de dados brutos das análises de laboratório dos pontos de coleta das três campanhas nas áreas de remanso.

Código	Estações de Monitoramento	Data (d/m/año)	Hora**	Tempo**	Temp. do ar** (°C)	Vazão** (m³/s)	Temp. da água** (°C)	pH	Profundidade** (m)	Transparéncia** (m)	Cor aparente	Conduvidade (µS/cm)	OD (mg O₂/L)	SST (mg Cl/L)	COT (mg Cl/L)	DBO (mg O₂/L)	DQO (mg Cl/L)	COD (mg Cl/L)	P-T (mg P/L)	N-NH₃ (mg N/L)	N-NO₂ (mg N/L)	N-NO₃ (mg N/L)	NKT (mg N/L)	N-T (mg N/L)	Coliformes Fecais (NMP/100ml)	Col-T Totais (NMP/100ml)	Clorofila-a (µg/L)	Fe (mg Fe/L)	Mn (mg Mn/L)	Hg (mg Hg/L)
RGA-1	Foz do Rio Grande	16/08/05	15:58	Nublado	20	22	7,18	5,78	0,75	381	8,8	4	4,4	4	8	15	<0,													

**Tabela A5.3.6**

Tabela de dados brutos das análises das amostras dos Lagos Billings e Braço do Rio Grande. Dados superficiais e de profundidade, das 4 campanhas.

Código	Estações de Monitoramento	Data (d/m/ano)	Hora**	Tempo**	Profundidade** (m)	Temp. do ar** (°C)	Temp. da água** (°C)	pH	Conduktividade (µS/cm)	Cor aparente	Transparência** (m)	OD (mg O <sub>2</sub> /L)	SST (mg mL)	COT (mg C/L)	DBO (mg O <sub>2</sub> /L)	DOO (mg O <sub>2</sub> /L)	COD (mg CL)	PO <sub>4</sub> (mg PA/L)	P-T (mg PA/L)	N-NH <sub>3</sub> (mg N/L)	N-NO <sub>2</sub> (mg N/L)	N-NO <sub>3</sub> (mg N/L)	NKT (mg N/L)	N-T (mg N/L)	Coliformes Fecais (NMP/100ml)	Coli - Totais (NMP/100ml)	Clorofila-a (µg/L)	Fkoplancton	Fe (mg Fe/L)	Mn (mg Mn/L)	Hg (mg Hg/L)
RGDE-1	Captação SABESP	16/08/05	10:15	Bom	0	21	20	7.39	179.4	30	2	7.4	5	5.9	4	13	5.8	<0.045*	0.18	0.32	0.63	0.05	1	500	nd - feo 8.68	***	0.077	0.028	n.d.		
					5	23.5	20	7.12	186.6	28	4.8	6	3.0	2	17	4.4	0.072	0.131	0.32	0.33	0.85	000	3.0 x 10e3	0.53 - feo 1.71		0.071	0.033	n.d.			
			08/09/05	Nublado	8	24	19.9	0.97	176.6	34	5.2	3	5.7	3	37	5.2	<0.045*	0.297	0.31	<0.15*	0.46	20	2.2 x 10e3	0.53 - feo 6.84		0.114	0.108	n.d.			
					10	25	22	6.79	176.7	51	6.6	8	3.8	3	12	3.2	<0.045*	0.038	0.25	0.51	0.76	300	1.3 x 10e3	0.53 - feo n.d.		0.238	0.28	n.d.			
					0	17	18	7.23	184.1	24	1.55	5.2	3	3.7	1	27	4.1	<0.045*	0.031	0.23	0.29	0.52	40	3.0 x 10e3	1.07 - feo 8.03		0.148	0.068	n.d.		
		11/22/05	16:20	Nublado	3	19	18	7.10	104.7	27	8.6	4	4.7	1	22	4.1	<0.045*	0.033	0.22	0.29	0.51	170	500	nd - feo 8.45	***	0.171	0.078	n.d.			
					7	17	18	7.22	184.6	23	8.6	4	4.7	2	12	4	<0.045*	0.031	0.23	0.37	0.6	110	2.2 x 10e3	1.07 - feo 3.42		0.148	0.07	n.d.			
					10	17	19	7.23	185.2	28	7.2	16	3.8	1	35	3.1	<0.045*	0.033	0.23	0.37	0.6	110	2.2 x 10e3	1.07 - feo 3.42		0.104	0.071	n.d.			
			10/01/06	Bom	0	22	23	7.08	221	18	1.83	8	5	3.7	6	32	3.2	n.d.	0.03	0.2	0.61	1.11	5	500	nd - feo 8.68	***	0.121	0.026	n.d.		
					4	22	22	7.49	220	20	1.2	3	4.6	5	18	3.8	0.048	0.248	0.13	0.23	2.04	3.17	20	nd - feo 8.68		0.08	0.021	n.d.			
RGDE-2	Garganta do Meio	16/08/05	13:58	Bom	3	26	20	7.32	196.3	38	8.4	2	3.8	4	13	3.7	0.059	0.248	0.34	0.77	1.11	1	2.4 x 10e3	7.48 - feo 8.74		0.124	0.032	n.d.			
					5	24	18	6.96	170.8	28	4.6	2	3.8	3	28	3.8	0.046	0.207	0.44	0.27	0.71	0	2.4 x 10e3	10.68 - feo 5.77		0.428	0.082	n.d.			
			08/09/05	Chuvoso	7	23	18.5	6.91	184.3	46	6.5**	8	5	2	18	4.5	<0.045*	0.188	0.24	0.18	0.43	0	800	nd - feo 10.01	***	0.275	0.089	n.d.			
					0	18	18	7.18	209	36	1.28	4	5	3	38	4.6	<0.045*	0.216	0.2	0.03	0.83	5	800	0.63 - feo 7.70		0.278	0.088	n.d.			
					2	18	18	7.07	202	40	8.4	4	5	3	20	4.2	<0.045*	n.d.	0.22	0.67	0.89	2	800	nd - feo 11.60		0.278	0.070	n.d.			
		11/22/05	14:00	Nublado	4	18	18	7.18	203	30	6.2	2	5.3	3	12	4.0	0.268	0.17	0.25	0.39	0.64	2	300	2.87 - feo 10.05		0.284	0.062	n.d.			
					7	16	18	7.39	196.1	38	6.2	5	6.3	4	9	6.3	0.055	0.18	0.28	0.67	0.86	0	230	3.21 - feo 2.03		0.14	0.018	n.d.			
			10/01/06	Parcialmente Nublado	2	23	22	7.1	213	32	0.99	6.2	5	4.2	5	45	3.8	0.013	0.03	0.14	1.25	1.30	40	nd - feo 10.01		0.169	0.031	n.d.			
					5	23	21.6	6.71	210	52	1.2	8	4.4	5	11	4	n.d.	0.07	0.315	0.13	1.42	1.55	0	nd - feo 10.01		0.405	0.218	n.d.			
					7	24	21	6.76	220	52	1.2	8	4.4	5	11	4	0.06	0.04	0.16	1.08	1.82	2	nd - feo 10.01		0.777	0.421	n.d.				
RGDE-3	Encontro entre Rio Grande e Ribeirão Pinheiros	16/08/05	14:56	Bom	0	24	20	7.24	230	140	0.9	7.4	5	7.3	8	61	7.2	0.112	0.565	0.44	1.6	2.04	110	9.0 x 10e3	2.07 - feo 1042		0.277	0.032	n.d.		
					2	24																									

Tabela A5.3.6

Tabela de dados brutos das análises das amostras dos lagos Billings e Braço do Rio Grande. Dados superficiais e de profundidade, das 4 campanhas.

Código	Estações de Monitoramento	Data (d/m/ano)	Hora**	Tempo**	Profundidade** (m)	Temp. do ar** (°C)	Temp. da água** (°C)	pH	Conduvidade (mS/cm)	Cor aparente	Transparéncia** (m)	OD (mg O <sub>2</sub> /L)	SST (mg C/L)	COT (mg C/L)	DBO (mg O <sub>2</sub> /L)	DQO (mg O <sub>2</sub> /L)	COD (mg C/L)	PO <sub>4</sub> (mg P/L)	P-T (mg P/Kg)	N-NH <sub>3</sub> (mg N/L)	N-NO <sub>2</sub> (mg N/L)	N-NO <sub>3</sub> (mg N/L)	NKT (mg N/L)	N-T (mg N/L)	Coliformes Fecais (NMP/100ml)	Coli-Totais (NMP/100ml)	Clorofila-a (µg/L)	Filoplâncton (mg Fe/L)	Fe (mg Mn/L)	Mn (mg Hg/L)	Hg (mg Hg/L)
BL-3	Chegada do Braço Taquaceluba	17/08/05	13:05	Bom	0	28	22	8.82	170.5	95	0.75	10.1	11	8.4	7	40	7	<0.045*	0.049	0.39	0.77	1.16	2	800	4,81 - feo 12,65	***	0.067	0.017	n.d.		
					3	29	19	8.04	169.6	50		7	9	7.5	8	19	6.7	0.084	0.098	0.4	0.79	1.18	23	1,7 x 10 <sup>-3</sup>	4,28 - feo 57,84		0.119	0.02	n.d.		
					6	29	20	7.68	169.3	43		7	1	7.5	6	13	7	0.158	0.141	0.37	0.09	1.08	7	1,3 x 10 <sup>-3</sup>	3,74 - 11,88		0.104	0.031	n.d.		
					9	29	19	7.35	169.2	39		3.8	8	7.2	5	21	6.5	<0.045*	0.123	0.35	0.43	0.78	4	500	2,14 - feo nd		0.116	0.039	n.d.		
					12	28	18	7.48	159.2	51		6.8	7	7.0	7	24	6.0	0.049	0.05	0.04	0.69	1.53	4	1,1 x 10 <sup>-3</sup>	3,74 - feo 4,12		0.115	0.057	n.d.		
		05/09/05	12:20	Nublado	0	25	21	8.11	164,7	89	0.7	6.6	12	6	5	50	6	0.41	<0.025*	0.07	0.72	1.2	192	20	3,0 x 10 <sup>-3</sup>	16,57 - feo nd		0.178	0.078	n.d.	
					2	23	20	7.72	168	92		6	13	6.0	6	24	6.8	0.072	n.d.	0.04	1.06	1.7	20	5,0 x 10 <sup>-3</sup>	nd - feo 17,27		0.17	0.071	n.d.		
					5	23	20	7.83	165,2	60		7,4	6	8.7	6	74	6.4	0.089	<0.025*	0.07	0.68	0.41	1,09	2	3,0 x 10 <sup>-3</sup>	nd - feo 29,88		0.198	0.076	n.d.	
					8	23	20	7.57	163,3	63		8	10	7.1	6	41	6.8	<0.045*	0.07	1.20	0.82	2,1	1	3,0 x 10 <sup>-3</sup>	nd - feo 12,30		0.227	0.088	n.d.		
					11	23	20	7.19	167	83		6.4	9	8.0	6	37	6.0	<0.045*	0.07	1.20	0.82	2,1	1	20,8	***	0,207	0,035	n.d.			
BL-4	Captação da SABESP no Braço Taquaceluba	11/23/05	14:20	Parcialmente Nublado	0	32	26	9.43	162,9	118	0.53	8	23	12,1	8	26	11,3	0.017	0.124	0.07	0.28	1.75	2,11	2	800	4,81 - feo 12,65		0.169	0.038	n.d.	
					3	29	25	9.12	162,3	89		8,4	6	9,3	9	41	8,9	0.016	0.093	0.06	0.09	1.69	2,134	1	800	4,81 - feo 12,65		0.267	0.051	n.d.	
					6	28	23,6	7,75	164,8			5,6	n.d.	9,5	7	30	8	0.016	0.092	0.08	0.033	0,700	1,02	16	2,302	1,3 x 10 <sup>-3</sup>	2,14 - feo 15,82		0.227	0,087	n.d.
					9	28	23	7,27	163,1			2,4	6	8,3	8	30	7,8	0.021	0.07	0.010	0.06	1,5	2,308	4	nd - feo nd	nd - feo 10,55		0.24	0,118	n.d.	
					12	32	22	7,18	162,5			2,9	4	9,7	6	36	9	0.016	0.062	0.04	0,119	0,81	2,28	170	3,189	80,3	***	0,107	0,075	n.d.	
		11/01/06	12:30	Bom	0	29	28	9,23	163,5	85	0.58	9,4	15	7,4	6	32	0,2	0.019	0,063	0.07	0,076	0,23	0,04	1	1,246	1	50,3	0,132	0,018	n.d.	
					3	28	27	9,22	166,6			8,0	15	7,8	6	40	0,8	0.017	0,05	0.010	0,124	0,64	1,33	20	1,64	84,2	0,124	0,018	n.d.		
					6	20	25	7,34	169,7			7,2	6	7,3	6	21	6,8	0.017	0,044	0.02	0,169	0,52	0,34	23	1,028	19,8	0,551	0,168	n.d.		
					8	20	24	7,04	161,3			2,4	6	7,7	7	40	6,1	0.044	0,081	0.02	0,228	0,32	0,62	2,168	3,0 x 10 <sup>-3</sup>	nd - feo nd	0,135	0,018	n.d.		
					13	28	24	9,2	160,2	87	0.76	10	9	8,1	8	28	7,3	0.215	1,25	0,21	1,68	1,87	0	80	3,21 - feo 45,44	***	0,187	0,019	n.d.		
BL-5	Depósito da Rodovia Imigrantes	18/08/05	14:20	Nublado	0	25	22,3	9,2	160,2	60	0.76	7	16	7,8	5	20	6,8	0.192	0,02	0,28	0,84	1,2	20	500	0,62 - feo 28,68		0,124	0,024	n.d.		
					2	23	19,8	7,89	161,7	60		5,8	6	7,6	6	24	7														

