# MONITORING WATER QUALITY BY CAESB

Jun/2013

# Legal Standards for Water

- Irrigation for agriculture
- Drinking Water supply
- Recreation
- Landscaping and lawns
- Animal husbandry
- Bottling and others

Standards depend on intended use and on the water sources. In Brasília we classify in surface and underground waters.

# CAESB
# Focus on Public Water Supply

- Ministry of Health Directive 2914/2011 (former 1469/2000, 518/2004) – Drinking Water Quality
- Defines procedures and responsibilities for water supply companies and health authorities (at Federal, State and Municipal level). Establishes the maximum contaminant levels for drinking water.

# CAESB

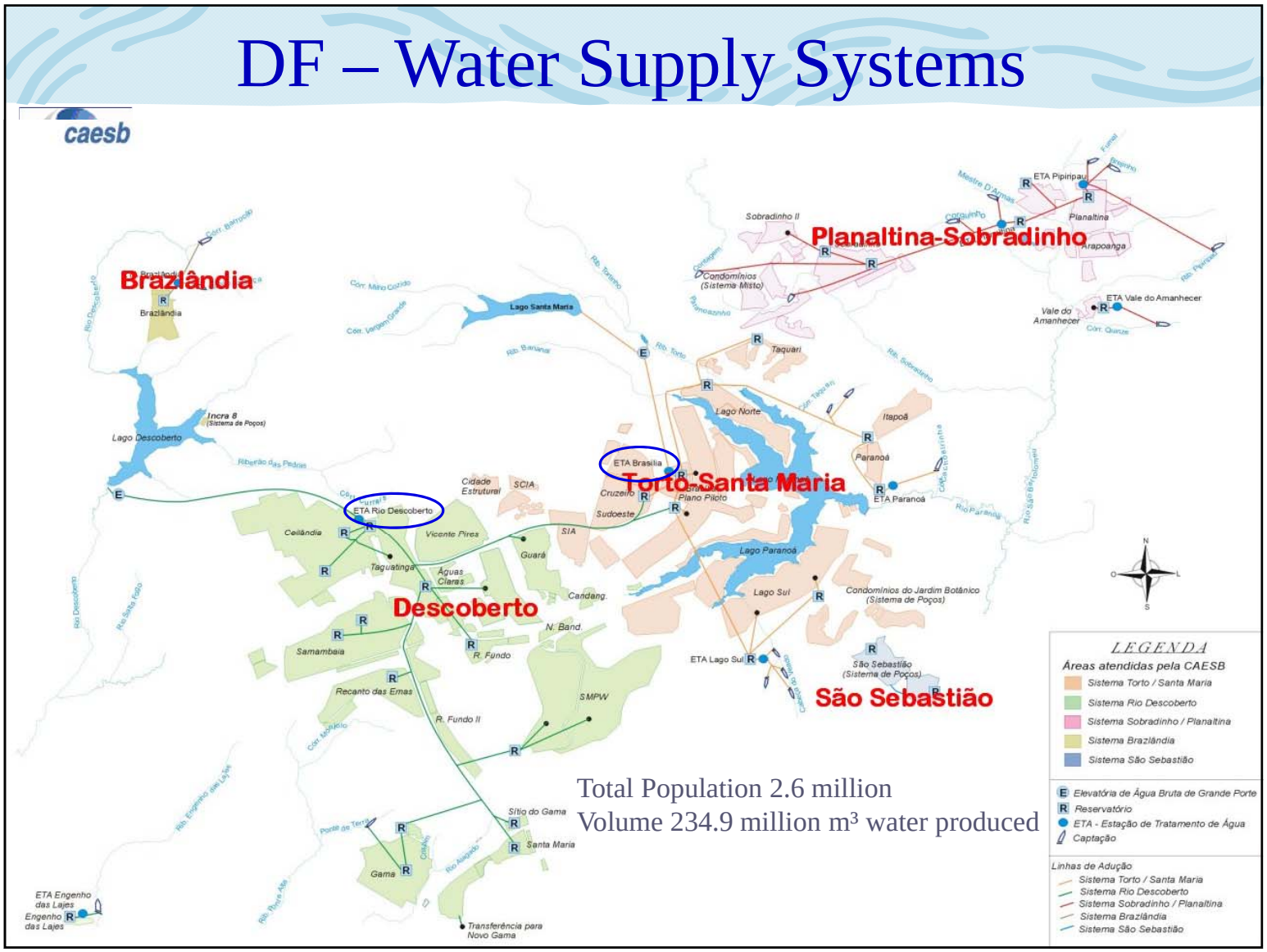
## Focus on Public Water Supply

- Water treatment standards set in Directive 2914/2011 – Ministry of Health
- Sets parameters to measure, sampling frequency and spatial distribution.
- Requires ISO 17025 Quality System
- Needs to implement Water Safety and Security Plan
- Turbidity standard 0.5 uT at Filtered Water stage in Treatment Plants to 2016

# Directive 2914/2011
# Parameters Sample Design

| Parâmetro | Tipo de Manancial | Saída do Tratamento | | Sistema de distribuição (reservatórios e redes) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Número de amostras | | | Frequência | | |
| | | | | População abastecida | | | | | |
| | | Nº Amostras | Frequência | <50.000 hab. | 50.000 a 250.000 hab. | >250.000 hab. | <50.000 hab. | 50.000 a 250.000 hab. | >250.000 hab. |
| Cor | Superficial | 1 | A cada 2horas | 10 | 1 para cada 5mil hab | 40 + (1 para cada 25 mil hab) | Mensal | | |
| | Subterrâneo | 1 | Semanal | 5 | 1 para cada 10 mil hab | 20 + (1 para cada 50 mil hab) | Mensal | | |
| Turbidez, Cloro Residual Livre[1], Cloraminas[1], Dióxido de Cloro[1] | Superficial | 1 | A cada 2 horas | Conforme § 3º do art. 41 | | | Conforme § 3º do art. 41 | | |
| | Subterrâneo | 1 | 2 vezes por semana | | | | | | |
| pH e fluoreto | Superficial | 1 | A cada 2 horas | Dispensada a análise | | | Dispensada a análise | | |
| | Subterrâneo | 1 | 2 vezes por semana | | | | | | |
| Gosto e odor | Superficial | 1 | Trimestral | Dispensada a análise | | | Dispensada a análise | | |
| | Subterrâneo | 1 | Semestral | | | | | | |
| Cianotoxinas | Superficial | 1 | Semanal quando nº de cianobactérias ≥ 20.000 células/mL | Dispensada a análise | | | Dispensada a análise | | |
| Produtos secundários da desinfecção | Superficial | 1 | Trimestral | 1 [2] | 4 [2] | 4 [2] | Trimestral | | |
| | Subterrâneo | Dispensada a análise | Dispensada a análise | 1 [2] | 1 [2] | 1 [2] | Anual | Semestral | Semestral |
| Demais parâmetros [3][4] | Superficial ou Subterrâneo | 1 | Semestral | 1 [5] | 1 [5] | 1 [5] | Semestral | | |

# DF – Water Supply Systems

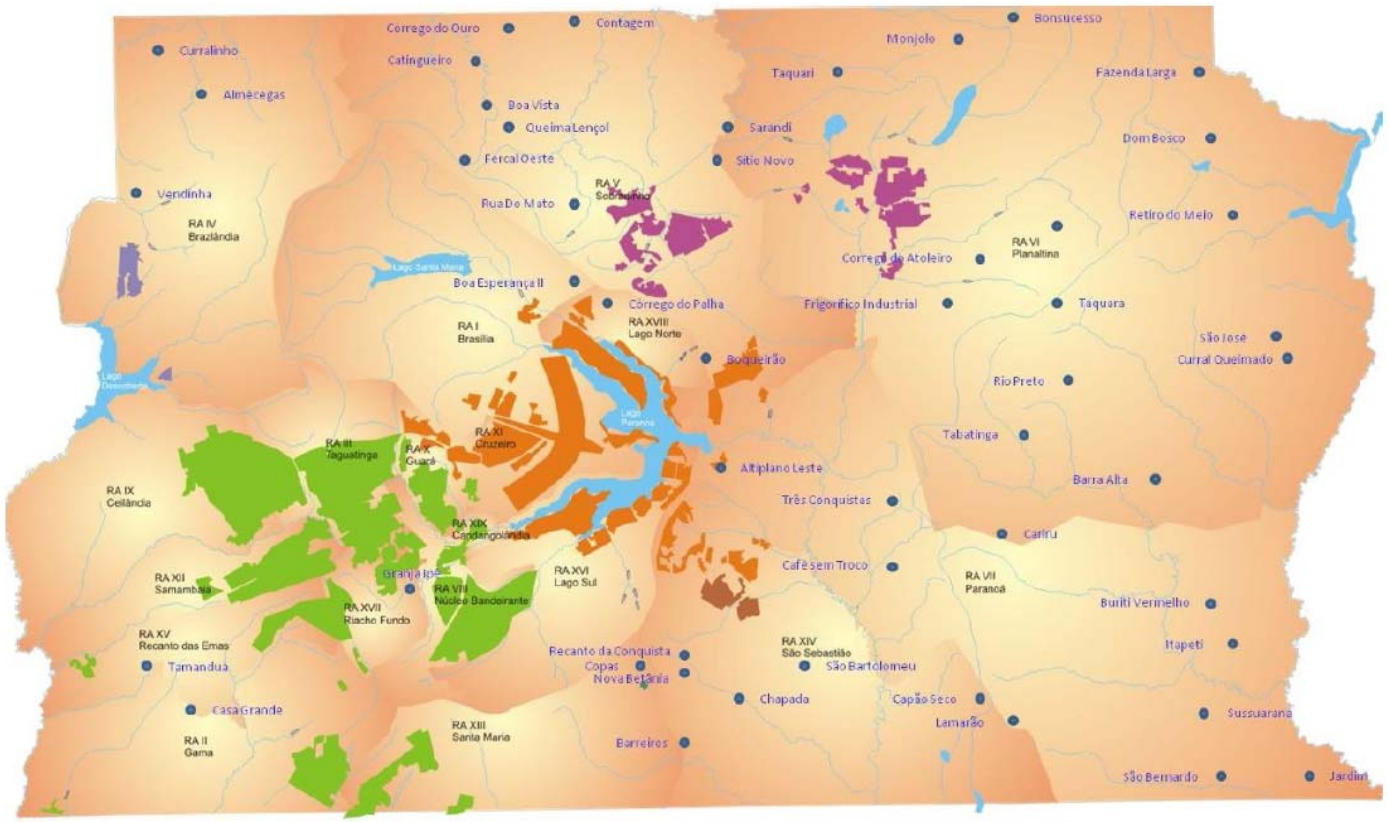


# 11 Water Supply Systems March 2013 Sampling

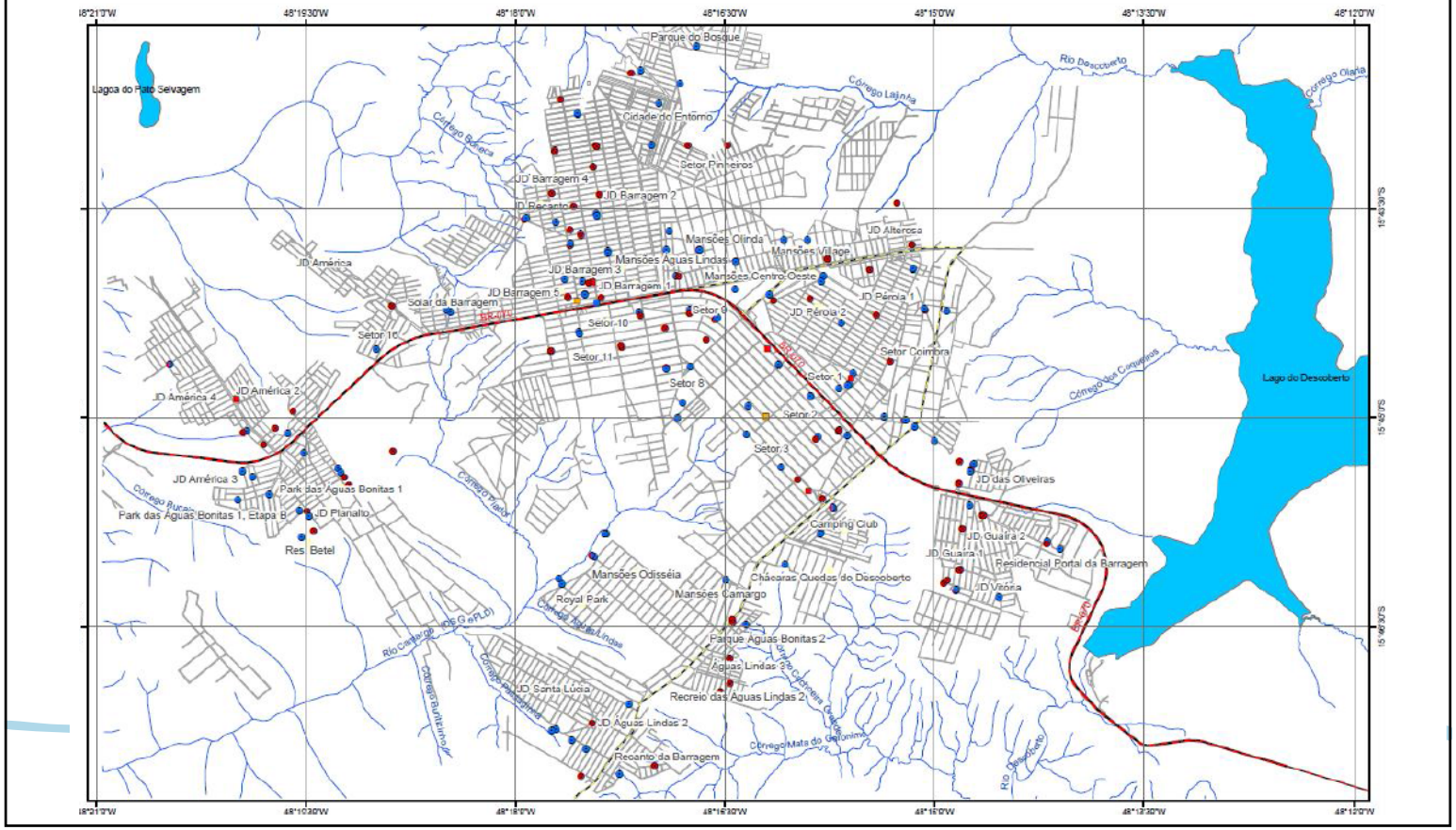
| Sistema de Abastecimento | N° mínimo de amostras exigidas | N° de amostras coletadas |
|---|---|---|
| Torto/ Santa Maria | 253 | 262 |
| Descoberto | 511 | 545 |
| Sobradinho/Planaltina | 172 | 208 |
| São Sebastião | 80 | 88 |
| Brazlândia | 57 | 74 |
| Engenho das Lages | 10 | 15 |
| Incra VIII | 10 | 15 |
| Água Quente | 12 | 17 |
| Papuda | 10 | 15 |
| Basevi | 10 | 16 |
| Chapéu de Pedra | 10 | 13 |
| **Total** | **1.135** | **1.268** |

- Supply System
- Minimal Samples required
- Actual Samples taken

# Monitoring points for Rural Areas: Pop 20,000



# Supply Wells in Águas Lindas de Goiás – Pop 160,000



# MONITORING INITIATIVES

- Treated Water – Directive MS 2914/2011

| Program | Sample Points | Frequency |
|---|---|---|
| Distribution System | 340 | Weekly |
| Water Treatment Plants | 9 | Semestral |
| Simplified Water Treatment Units | 6 | Semestral |
| Urban Well Cloration Units | 119 | Semestral |
| Rural Well Cloration Units | 49 | Biweekly/ Monthly |
| Well Cloration Units: Águas Lindas de Goiás | 114 | Semestral |
| | 40 | Weekly |

# Caesb standard water sample site – public water supply


Standard Point


Sampling Team

# Sanepar Standard Sample site from public water supply

Sanepar – Paraná Sanitation Company
New Implementation - 2013

# Pending Treated Water Parameters

- Fulfilment by lab 55%
- Contracting external laboratory 45%

| PARÂMETROS |
|---|
| Cianotoxinas (Saxitoxinas e Microcistinas) |
| Cryptosporidium |
| Giardia |
| Bromato |
| Clorito |
| LAS - Surfactantes |
| Sabor/ Odor |
| Cianeto livre |
| Cloraminas totais |
| Rádio-226 |
| Rádio-228 |
| Mercúrio total |
| Urânio total |
| 1,1-Dicloroeteno |
| 1,2 Diclorobenzeno |
| 1,2-Dicloroetano |
| 1,2-Dicloroeteno (cis+trans) |
| 1,4 Diclorobenzeno |
| 2,4–D + 2,4,5 T |
| Ácidos Haloacéticos Totais |
| Acrilamida |

| PARÂMETROS |
|---|
| Aldicarb+ aldicarb sulfona +aldicarb sulfóxido |
| Carbendazim + benomil |
| Carbofurano |
| Cloreto de vinila |
| Clorpirifós+clorpirifós oxon |
| Di (etilhexil) ftalato |
| Diuron |
| Glifosato + AMPA |
| Mancosebe |
| Metamidofós |
| Molinato |
| Monoclorobenzeno |
| Parationa metílica |
| Pendimentalina |
| Permetrina |
| Profenofós |
| Tebuconazol |
| Terbufós |
| Tetracloreto de carbono |
| triclorobenzenos |

# Reporting Requirements for treated water

- 116,000 analyzes were carried out in 2012
- Federal District Water, Energy and Sanitation Agency - ADASA “Relatório do Sistema Distribuidor”
- Federal District Secretariat of Health – SES-DF
- Ministry of Health – Siságua System

# Directive 2914/2011

- Article 40. Those responsible for quality control of water systems or alternatives collective water supply for human consumption supplied by source surface and groundwater, must collect samples biannually of raw water, the pickup point for analysis in accordance with the parameters required the specific legislation for the purpose of risk assessment to human health.

# Brazilian Legislation for raw water

- CONAMA 357/2005 - Surface Waters Quality
  - Classify water bodies according to their water uses (present and planned) and define maximum level of contaminants allowed in the water body in each class. It also establishes maximum contaminant level for discharges in water bodies. For some contaminants, such as P, it takes into account if the water body is “lenthic ”, “lothic” or “intermediate”.
- CONAMA 396/2008 – Classify for undergroud Waters Quality

# MONITORING INITIATIVES

- Raw water monitoring – CONAMA Resolution nº 357/2005, 396/2008 and ADASA 350/2006

| Program | Sample Points | Frequency |
|---|---|---|
| Intake | 32 | Bimonthly |
| Alternatives | 3/5 | Monthly/Biannual |
| Limnological | 21 | Monthly |
| Rivers | 16 | Quarterly |
| Recreational Initiative | 9/30 | Weekly/Monthly |
| Wells (urb.+rural+A.Lindas) | 275 | Annual |
| Sewage effluent sites | 43 | Bimonthly |
| Water use licenses | 19 | Biannual |

Alagado

Capão da Onça

Corguinho


Pipiripau


Engenho das Lages


Cachoeirinha


Ponte de Terra

Paranoazinho

Contagem

Descoberto

Torto

# Pending Raw Surface Water Parameters

| PARÂMETROS |
|---|
| Cianotoxinas |
| Ensaio ecotoxicológico |
| Sabor/ Odor |
| Corantes |
| Resíduos sólidos |
| Cianeto livre |
| Cloro residual total |
| Berílio total |
| Mercúrio total |
| Urânio total |
| Vanádio total |
| Acrilamida |
| Benzidina |
| Criseno |
| 2,4–D |
| Demeton (Demeton-O + Demeton-S) |
| 1,2-Dicloroetano |
| 1,1-Dicloroeteno |
| Gution |
| Malation |
| Paration |
| PCBs - Bifenilas policloradas |
| Substâncias tensoativas que reagem com o azul de |
| 2,4,5–T |
| Tetracloreto de carbono |
| Toxafeno |
| 2,4,5-TP |
| Tributilestanho |

- Fulfilment by lab 71%

# Pending Raw Underground Water Parameters

| PARÂMETROS |
|---|
| Cianeto |
| Berílio total |
| Mercúrio total |
| Molibdênio |
| Urânio total |
| Vanádio total |
| 1,1-Dicloroeteno |
| 1,2-Dicloroeteno (cis+trans) |
| 1,2 Diclorobenzeno |
| 1,2-Dicloroetano |
| 1,4 Diclorobenzeno |
| 2,4–D |
| Acrilamida |
| Aldicarb+ Aldissulfona +aldissulfóxido |
| Bentazona |
| Carbofuran |
| Cloreto de vinila |
| Clorofórmio |
| Clorpirifós |
| Clorotalonil |
| Criseno |
| Malation |
| Molinato |
| PCBs - Bifenilas policloradas |
| Pendimentalina |
| Permetrina |
| Propanil |
| Tetracloreto de carbono |

- CONAMA 396/2008
- Fulfilment by lab 65%

# Reporting Requirements
# Raw Water

- 33,000 analyzes were carried out in 2012
- Federal District Water, Energy and Sanitation Agency – ADASA “Relatório do Sistema Produtor”
- Water Quality Index – WQI calculated with 8 parameters : Color , Turbidity, Tot Fe, $NH_3$,COD,pH, Cl and Total coliforms.
- Recreational Water Quality Map – Paranoá Standards by CONAMA 274/2000 Resolution

# Managing the Water Quality Laboratory of the CAESB

- The UniLIMS is a corporate system that allows the automation and management of programming procedures sample collection, automatic collection of the results of the analysis and management of all activities of all laboratories.
- The supervision stations allow to observe and monitor, in real time, all activities of the laboratories, improving reliability, efficiency and productivity.

# UniLIMS - Model Process Analysis Laboratory - MPLA

caesb

Regulamentações Governamentais

P1
Planejamento e Programação de Coletas

P2
Coleta de Amostras

P3
Recepção de Amostras

P4
Realização das Análises nos Laboratórios

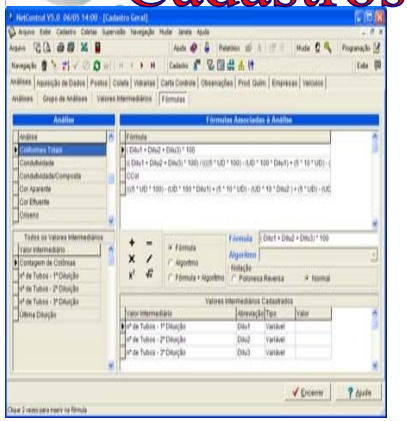
P6
Emissão de Relatórios Gerenciais

Atendimento ao Cliente

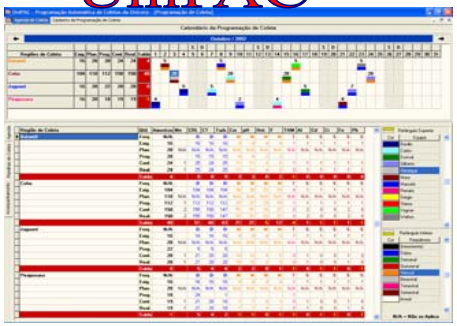
Supervisão e Validação dos Resultados

# NetControl - Aplicativos no MPLA

## Cadastros

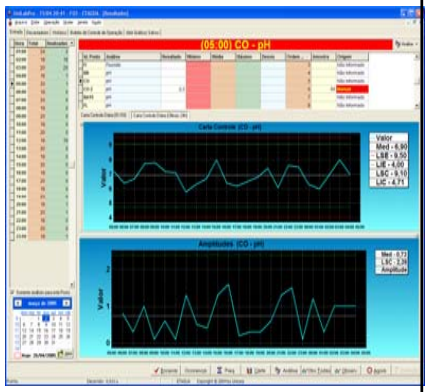


## UniPAC

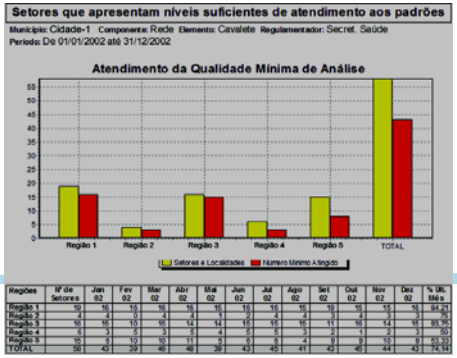


## PocketLab

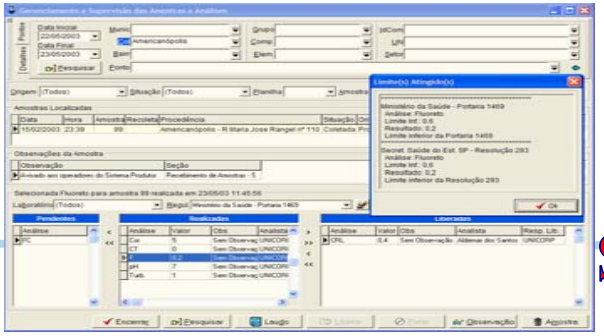
## UniLab



## Gerador de Relatório




## Supervisão



# Challenges and Needs

- Improve supply of analytical grade chemicals for standardized tests
- Enhance equipment maintenance and parts replacement
- Modernize  infrastructure and electricity grid
- Technician training and refresher courses in operation, maintenance, and data management
- Consolidate company wide water quality data systems and geotag all sampling points

# Conclusion

- In 2012, the Central Laboratory of the CAESB analyzed 69,500 samples, for the enforcement of existing legislation and other demands.
- In 2013, will invest about 2 million on services and new equipment to further improve analytical procedures and laboratory capacity.
- The 3-year Germany-Brazil cooperation program enable CAESB to plan for the challenges of water treatment from new sources, incorporating advanced methods and monitoring practices.

# Happy Hours!

- Frimmel, Gudrun, Nicole, Axel, Elly, Robin - ***KIT***
- Cinthia, Cristine, Cristina, Sergio – ***CAESB and UnB***
- Björn - ***TUD***
- Burkhard, Friese, Kerstin, Michael - ***Helmholtz UFZ***

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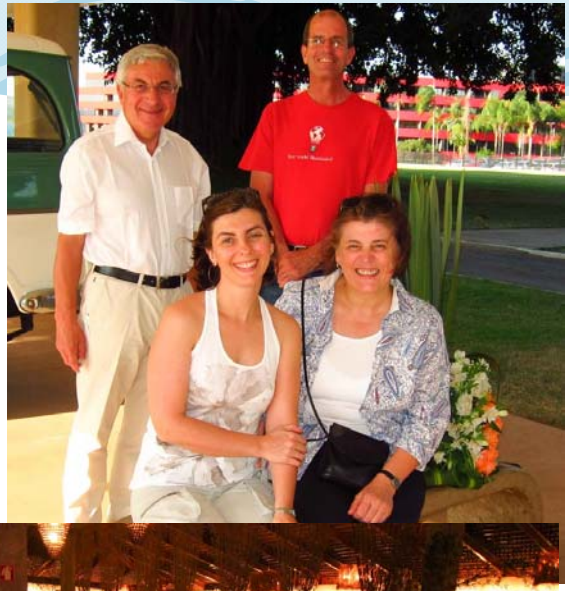

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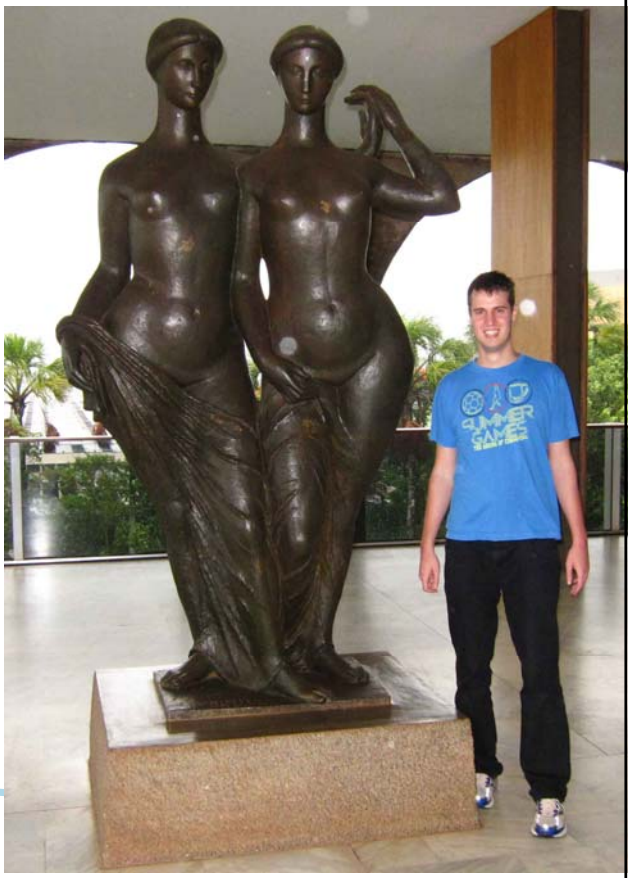

# June 5th – Environment Day

- We shared our lifestyles and examples for sustainability – clean water and urban mobility...

# Obrigada and Danke Schön!


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- Cinthia Pinke Cavalcanti
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