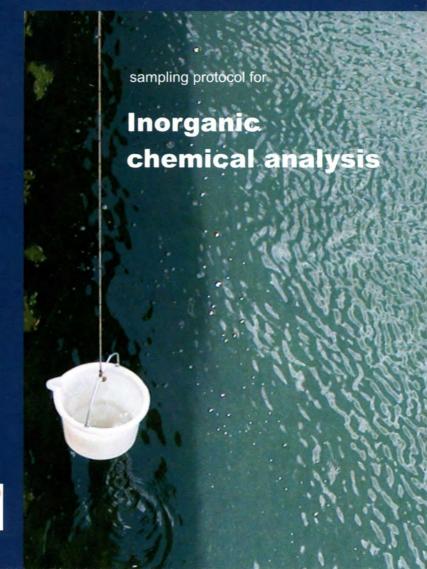
Water
Resource
Quality
Monitoring

VOLUME 1







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sampling protocol for

Inorganic chemical analysis

Resource Quality Services Department of Water Affairs

November 2004

Water Resource Quality Monitoring

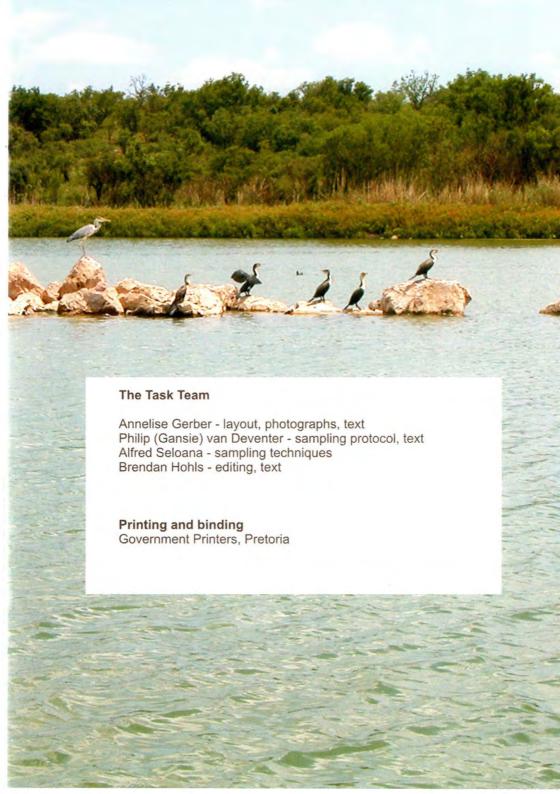
Volume 1: Inorganic chemical analysis

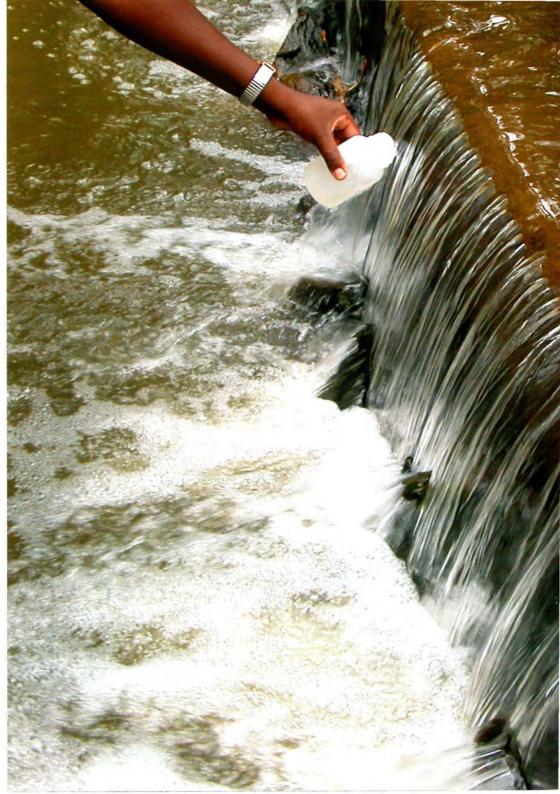
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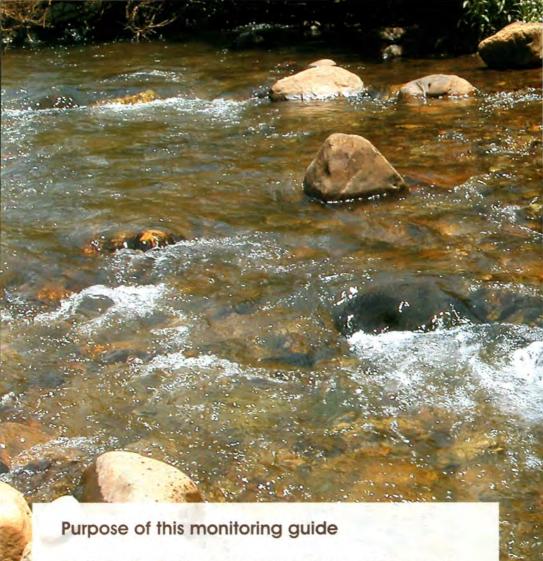




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This Water Quality Monitoring guide is designed to be easy to use, with step by step instructions on the procedures to follow when collecting samples for specific programmes.

The guide is to be used by RQS personnel, regional officers and private monitors who need to collect data regarding the aquatic environment.

The guide also highlights problems and mistakes commonly associated with water quality monitoring.



Water quality monitoring is an activity to collect information on the physical, chemical and biological characteristics of a water resource, be it a river, dam, estuary, wetland or subterraneous ground water.

Monitoring consists of 3 steps:

- i) Data acquisition
- ii) Data storage & manipulation
- iii) Information generation & dissemination

This guide addresses only the first component, namely, the data acquisition phase.



The type of information collected depends on the objectives of the monitoring program concerned.

The information can be worthless or misleading if sampling is not conducted properly.

INORGANIC CHEMICAL ANALYSIS



1. THE MONITORING NETWORK:

The National Chemical Monitoring Network is currently the largest network running at the RQS. Three types of samples are collected for this program.

The MACRO SAMPLE

This is the most common type of sample which is taken and analysed for major inorganic ions. The ions most commonly found in natural waters are the cations calcium, magnesium, sodium and potassium, and the anions bicarbonate, carbonate, chloride and sulphate (Dallas & Day, 1993) The results provide an indication of the ion balance and the inorganic chemical water quality of a water resource (dam, river etc.)



The TURBIDITY SAMPLE

Turbidity relates to how transparent water is. Turbid water is caused by suspended matter, such as clay, silt, fine organic and inorganic matter, soluble coloured organic compounds, plankton and other microscopic organisms that are held in suspension (Harris et al., 1992)



The TRACE METAL SAMPLE

This is the type of sample which is analysed for metals that normally occur in very small (trace) quantities but their presence can either be beneficial, troublesome or toxic. The results, depending on the fraction that was analysed, will give an indication of metals that were dissolved or suspended in the water



2. WHERE TO COLLECT SAMPLES:

A clear distinction should be made between samples collected from flowing sources and samples collected from standing water.



STANDING WATER

- ➤ Dams
- ▶ Lakes
- > Pans



CONTINUE SAMPLING
REGARDLESS OF INFLOW



FLOWING WATER

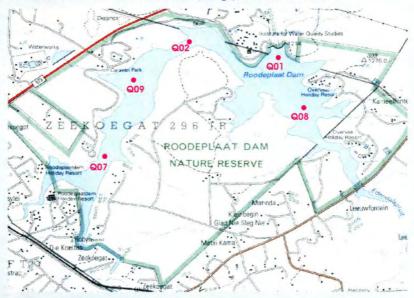
- ➤ Rivers
- ► Canals



STOP SAMPLING WHEN YOU OBSERVE NO FLOW

2.1 Collecting samples from a dam:

> There can be more than one sampling point on a dam.



Points are differentiated by adding a Q number after the dam number e.g. A2R009Q02.



Point Q01 is always opposite the middle of the dam wall, and about 50-100 meters away from the wall.



- ▶ Never sample on one side of an island. Make sure to
- When sampling downstream of a confluence, remember to select a point where water from both parts of the stream are thoroughly mixed.



2.3 Collecting samples from a river with a measuring/gauging structure:

The ideal place to sample is directly below the weir where the water flows through.



Turbidity samples are collected where the water is most turbulent (fast and well mixed).



When the weir is flooded, it is safer to collect the sample downstream from the weir where water is still thoroughly mixed.

3. SAMPLING FREQUENCY:

 Sampling should take place at an optimum frequency, which are determined by Resource Quality Services. Data collectors are notified accordingly.

partment of Water Affairs and Forestry msdb@inf_05_lwgs

MONITORING SCHEDUL

THIS MONITORING SCHEDULE IS EFFECTIVE FOR THE PERIOD 2003-10-21 TO 2003-12-31 AND REPLACES AL

Monitor: DEPARTMENT OF WATER AFFAIRS AND FORESTRY- RESOURCE QUALITY SERVICES

Monitoring Point ID	Monitoring Point Name	Start & End Date	Action Frequency	Monitoring Action	Sample Type	Container
90240	A2R001Q01 HARTBEESPOORT DAM ON CROCODILE RIV: NEAR DAM WALL	1999-02-01 2009-12-31	2 WEEKLY ACTION FREQUENC Y	25M FIXED DEPTH GRAB SAMPLE	MACRO - RQS	350ML WHITE/ BLUE PLASTIC MACR
90240	A2R001Q01 HARIBEESPOORT DAM ON CROCODILE RIV: NEAR DAM WALL	1999-02-01 2009-12-31	2 WEEKLY ACTION FREQUENC Y	25M FIXED DEPTH GRAB SAMPLE	ALGAL ID-RQS LAB PREPARAT	1000ML WHITE PLASTIC BOTT-BIOL
90240	A2R001Q01 HARTBEESPOORT DAM ON CROCODILE RIV: NEAR DAM WALL	1999-10-15 2004-06-30	2 WEEKLY ACTION FREQUENC Y	15M FIXED DEPTH GRAB SAMPLE	HYDROBI OLOGICA L-RQS LAB PREP.	1000ML WHITE PLASTIC BOTT-BIOL
90240	A2R001Q01 HARTBEESPOORT DAM ON CROCODILE RIV: NEAR DAM WALL	1999-10-15 2004-06-30	2 WEEKLY ACTION FREQUENC Y	1M FIXED DEPTH GRAB SAMPLE	HYDROBI OLOGICA L-RQS LAB PREP.	1000ML WHITE PLASTIC BOTT-BIOL

An example of a monitoring schedule showing the sampling frequency.

4. PREPARATION AND CLEANING OF SAMPLE BOTTLES:

Sample bottles must be 100% clean.



- > Sample bottles are washed with special phosphate free cleaning agents.
- Do not use any bottles that were washed with ordinary dishwashing soap otherwise the results may not be valid.

5. GENERAL CONSIDERATIONS REGARDING SAMPLING:

THIS MONITORING SCHEDULE IS EFFECTIVE FOR THE P

Monitor: DEPARTMENT OF WATER AFFAIRS AND FOF

Monitoring	Monitoring Point	Start & End	Action
Point ID	Name	Date	Freque
90240	A2R001Q01 HARTBEESPOORT DAM ON CROCODILE RIV: NEAR DAM WALL	1999-02-01 2009-12-31	2 WEEŁ ACTIO FREQU Y

Make sure that the sample is listed on the monitoring schedule



Make sure that you have the correct sample bottles.



 Make sure that you have the correct tags at hand



 Do not store samples on the windowsill. Even preserved samples can deteriorate.



 Never sample from a tap unless you are instructed to do so



Keep all your sampling equipment clean, do not use for anything else!



Do not use sample bottles as storage jars or candle holders or ashtrays!

6. HOW TO TAKE A SAMPLE:

- Macro sample
- Trace metal sample
- Turbidity sample
- Sampling from a boat
- Sampling from a dam wall
- Sampling in a river

The macro sample:

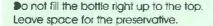
Leave the lid on the bottle until you are ready to take the sample.

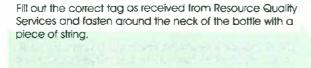
Collect a little bit of water and rinse the bottle.

Pour the water out, away from where the sample will be taken.

Now collect the sample by lowering the bottle into the water.

Perform a forward scoop motion if the boot is not moving.





Store sample in a cooler box or dark container











The trace metal sample:

Leave the lid on the bottle until you are ready to take the sample.

Collect a little bit of water and rinse the bottle. Pour the water out, away from where the sample will be taken.

Now collect the sample by lowering the bottle into the water.

Perform a forward scoop motion if the boat is not moving.

Fill the bottle to the top.



Fill out the correct fag as received from Resource Quality Services and fasten around the neck of the bottle with a piece of string.

Store sample in a cooler box or dark container













The turbidity sample:

Leave the IId on the bottle until you are ready to take the sample.

Collect a little bit of water and rinse the bottle.

Pour the water out, away from where the sample will be taken.

Now collect the sample by lowering the bottle into the water,

Perform a forward scoop motion if the boat is not moving.

Fill the bottle to the top.



Fill out the correct tag as received from Resource Quality Services and fasten around the neck of the bottle with a piece of string.

Store sample in a cooler box or dark container

















Collect the sample by lowering the bottle into the water, Perform a forward scoop motion if the boat is not moving.

or





Use a beaker to collect water and then pour into the sample bottle.



Never take a sample near the motor of a boat

Sampling from



Use a clean bucket to collect water. Make sure not to scrape the bucket against the concrete wall when pulling it up.



Fill the sample bottles immediately



Do not sample at a point where lots of debris have accumulated

Samping in a river.

The sample can be collected using any of the methods shown. Use the method that works best for your particular sampling site.









Never take a sample from a stagnant pool that is not connected to the main flowing river



Wear protective clothing (waders and gloves) when sampling in polluted water



7. TEMPERATURE MEASUREMENTS:

The Monitoring Schedule might request a water temperature reading. The procedure to take such a reading is as follows:

 Temperature should be measured directly in the water to be sampled

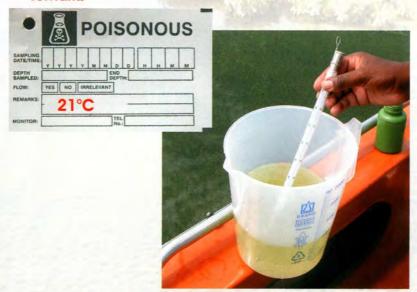
OI

 when collecting water in a beaker, first fill your sample bottle and then read temperature from water left in the beaker

or

 measure the temperature in the water that is used to rinse the bottle

Record the reading on the Macro tag in the space for "remarks"



8. HOW TO PRESERVE A MACRO SAMPLE:

Fill the sample bottle to approximately 2 cm below the neck of the bottle.



Place the sample in a cooler box with ice packs at temperatures between 2° and 6°C.

Freeze if possible and dispatch to the laboratory using courier service.

The faster the samples can be analysed the better.



Do not open the bottle again!



