

FM006 Manual water quality sampling for pesticides

Water Quality and Investigations – Environmental Monitoring and Assessment Science

This document has been modified by Terrain NRM for the Wet Tropics Major Integrated Project

1 Purpose and scope

The purpose of this document is to standardise the methods used to manually collect water samples for analysis of pesticides in the Wet Tropics Major Integrated Project (WTMIP) water quality monitoring programs.

The method outlined in this document applies whenever water samples are manually collected and submitted to a laboratory for pesticide analysis. Manual sample collection refers to the process of collecting samples directly into sample bottles without the use of an intermediate sampling container.

2 Training, competency and responsibilities

Program staff, regional officers and external stakeholders participating in the collection of samples are provided with training in water sampling methods. Records of participant competency are maintained within the Terrain Natural Resource Management (NRM) file management system.

Table 1 Roles and responsibilities of WTMIP program participants

Position	Responsibilities
WTMIP Water Quality Project Officers (Leader/Technician)	<p>Ensure methods described in this field method are followed</p> <p>Provide resources for continued development of this method</p>
WTMIP program staff (including regional officers and external stakeholders)	<p>Follow the methods described in this document</p> <p>Continually review and develop the methods where appropriate</p>

3 Workplace health and safety

Field based work activities must meet Terrain NRM WHS requirements. The following procedures and equipment must be considered prior to undertaking fieldwork:

- Terrain NRM Water Quality Monitoring Risk Assessment
- Trip plan, including call-in schedule and emergency response procedures
- Communication devices required for the trip (e.g. mobile phone, SPOT device, EPIRB)
- First aid kit
- Personal Protective Equipment, such as safety boots, pants, long sleeved shirt, hat, high visibility clothing.

4 Equipment

A list of equipment required for the manual collection of water samples is provided in Appendix A. The quantity of items required will be determined by the number of samples that will be collected during the field trip.

The analysis of pesticides for the WTMIP is sub-contracted by Cairns Regional Council (CRC) Water Laboratory to the Queensland Government Department of Health, Forensic and Scientific Services (QLD Health). The QLD Health pesticide sample bottle is shown in Figure 1. A summary of the bottle type, water quality analyses, minimum sample volume, and sample processing and storage conditions are provided in Table 2.



Figure 1 200 mL amber glass for pesticide collection

Table 2 Bottle type¹, volume processing and storage summary

Amber Glass Bottle	
Analysis type	Pesticides
Bottle volume	200 mL
Minimum sample volume	200 mL
Filter sample?	No
Headspace required	No
Sample storage	Chilled (1-4°C)
Store sample in the dark?	Yes
Maximum holding	Preferably 24 hours, but within 7 days

¹ Each bottle must be made of amber glass and pre-treated by solvent-rinse.

5 Method

Manual samples will be collected directly from the stream into the glass bottles, immersed into an area of representative flow where the water is well mixed. It is important that samples are collected upstream of significant in-stream structures and known point sources of pollutants.

The recommended method for water sample collection for the WTMIP is to fill the sample bottle using an extendable sampling pole with a bottle clamp attachment. Using an extendable sampling pole will assist in reaching an area of representative flow and reduce the risk to the sampler associated with entering the water (i.e. deep water, strong currents or areas potentially inhabited by crocodiles).

For more information on field collection methods, see the Monitoring and Sampling Manual (DES 2018).

5.1 Sampling frequency

Sampling frequency will be determined on a site specific basis to ensure the objectives of the monitoring activities are met. Good sampling coverage during early rainfall runoff events is critical as these periods are often associated with the highest monitored concentrations of many pesticides. Sampling all stages of the hydrograph is necessary to capture changes in pesticide concentration which may exhibit an independent relationship to discharge.

If sampling of events is not possible for any reason the WTMIP Water Quality Project Officers should be notified as soon as possible.

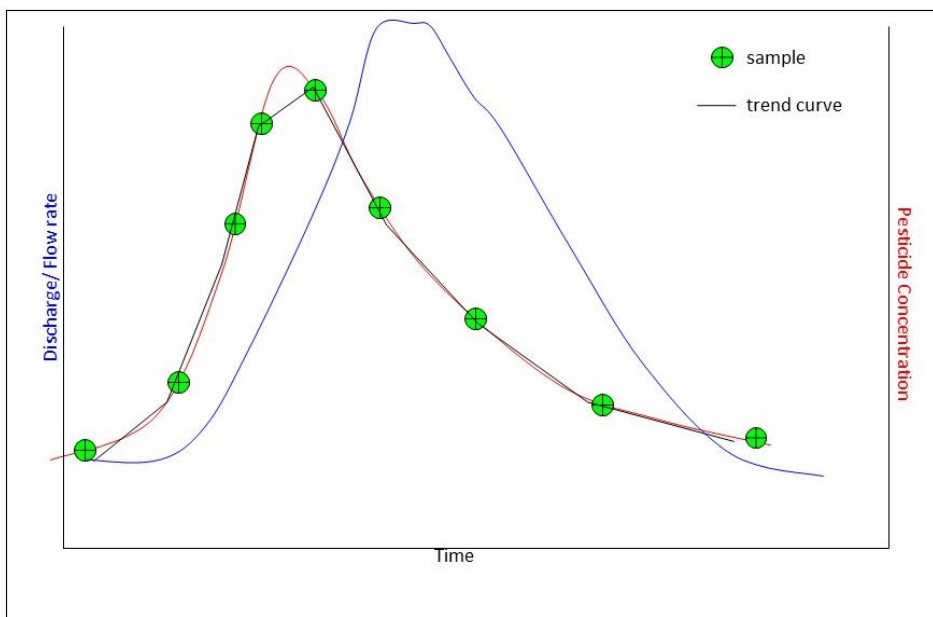


Figure 2 Distribution of sampling frequency to capture changes in pesticide concentration during an event

5.2 Preparation for sampling

To mitigate the risk of sample contamination **it is mandatory that staff wear non-powdered gloves during all stages of sample collection** and avoid touching the mouths of bottles or undersides of lids.

1. Visually inspect all items ensuring the lids of all sample bottles are firmly secured. Discard all items if the integrity is compromised or potential for contamination has occurred.
2. Complete all mandatory documentation (e.g. electronic Chain of Custody form). Mandatory information includes: site name, date, time, sampler's name and the bottles collected.

5.3 Manual sample collection

1. Identify a representative section of the stream to collect the water sample/s.
2. Extend the sampling pole to the required length, ensure the pole is clean, and with clean gloves on, place the amber glass bottle into the clamp attachment.
3. Remove the lid of the sample bottle, taking care not to touch the inside surfaces of the lid or the sample bottle.

Note: Additional care should also be taken to avoid losing the Teflon lid insert. If the Teflon insert does drop out it is important NOT to pick it up and replace the insert back into the lid.

4. Position the sample bottle above the water where the sample will be collected. With the neck of the bottle facing down, submerge it in to the main flow of the stream (avoiding surface contamination) to a depth of approximately 0.3 m.
5. Rotate the submerged sample bottle into the direction of flow and allow the bottle to fill completely with stream water. **DO NOT** rinse the sample bottle when collecting samples for analysis of pesticides.
6. Remove the bottle from the water and replace the lid, ensuring a good seal.
7. Check all information on the sample bottle and mandatory documentation has been completed and is correct.
8. Wrap the sample bottle with a padded sleeve (i.e. bubble-wrap) and place in an esky with sufficient ice bricks to rapidly chill the sample to below 4°C (do not freeze), and keep it in the dark.

5.4 Sample preservation

Whilst in the field all samples should be immediately placed in an esky containing sufficient ice bricks to rapidly cool all samples to below 4°C and the esky stored in a cool dark place. Portable refrigeration units may also be used where available though it is important that samples for pesticide analysis are not frozen at any stage.

On returning to the office all pesticide samples must remain chilled at below 4°C in a designated sample refrigerator. For further information refer to Table 2.

5.5 Sample transport

During field work or when sending samples to the laboratory it is important to ensure an adequate number of ice bricks are placed in eskies with the samples. It is advised that chilled pesticide sample bottles be transported in a separate esky to any frozen bottles (for example if collecting nutrient samples) as this allows greater control over the preservation conditions – a higher ratio of ice bricks may be placed in eskies containing the frozen samples to prevent them from thawing.

In order to minimise contamination through leakage and sample bottles breaking, eskies should be clean, bottle lids must be on tight, glass bottles should be wrapped in padded sleeves and bottles should be packed upright.

It is critical that samples are transported to the laboratory as soon as practical. Sample transport will be co-ordinated by the WTMIP Water Quality Project Officers (Leader/Technician) so that samples are received by the laboratory for analysis within holding periods.

Note: Pesticides have a short holding time and must be received by the laboratory and extracted within 7 days of collection.

6 Water quality control samples

Quality control sampling for the WTMIP follows guidance contained in Monitoring and Sampling Manual (DES 2018). The frequency of collection of water quality control samples will be determined on a site specific basis and based on frequency of sample collection, risk and cost. Advice will be provided from the WTMIP Water Quality Project Officers regarding quality control sampling frequency.

The transport blank, field spike and the deionised water for the field blank must be prepared by a NATA accredited laboratory. It is the responsibility of samplers to ensure they have an adequate supply of quality control samples.

Organisations and staff are encouraged to discuss implementation of quality control sampling prior to commencement of each wet season in order to evaluate the risks of sample contamination.

For information regarding the collection of quality control samples, refer to *FM010 Quality assurance and quality control procedures associated with the collection of water samples*. Further information is also available in the Monitoring and Sampling Manual (DES 2018).

7 Sample documentation

All water quality samples must be accompanied by supporting documentation. Laboratory services for the WTMIP water quality program are provided by Cairns Regional Council (CRC) Water Laboratory. The CRC Water Laboratory has an established Laboratory Information Management System (LIMS) that produces electronic Chain of Custody forms already populated with the sample details. It is the responsibility of the sampler to ensure they understand how to record the relevant information using the CRC Water Laboratory method, and to contact the WTMIP Water Quality Project Officers for advice if required. It is also the responsibility of the sampler to submit the form to the WTMIP water quality team.

8 References

AS/NZS 5667.1:1998, Water quality – Sampling: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples, Standards Australia.

AS/NZS 5667.6:1998, Water quality – Sampling: Guidance on sampling of rivers and streams, Standards Australia.

DES 2018. Monitoring and Sampling Manual: Environmental Protection (Water) Policy. Brisbane: Department of Environment and Science Government. DSITI 2017, FM001 Manual water quality sampling for suspended solids and nutrients

DSITI 2017, FM008 Overnight delivery of water samples

DSITI 2017, FM010 Quality assurance and quality control procedures associated with the collection of water samples

Appendix A Equipment list

Equipment	✓
Solvent-washed 200 mL amber glass bottles with Teflon lid inserts	
Padded sleeve (e.g. bubble-wrap), to place the glass sampling bottles into	
Non-powdered disposable gloves	
Sample documentation (i.e. CRC Water Laboratory electronic Chain of Custody forms, with hard copy forms as back-up) (see Section 9)	
Accurate time equipment (i.e. mobile phone)	
Clean esky/eskies with ice bricks or refrigerator	
Extendable sampling pole with bottle clamp attachment	
Quality control solutions (see Section 6): <ul style="list-style-type: none"> ▪ Laboratory supplied field spike sample ▪ Laboratory supplied transport blank sample ▪ Laboratory supplied Milli-Q water (250 mL per sample) for collecting field blank 	

Version Control

Document History	Date	Amendment	Amended by	Reviewed by	Approved by
Version 1.0			Rohan Wallace	Dr Michael Warne Dr Suzanne Vardy	Dr Christine Williams
Version 1.1		Updated document template	Rohan Wallace		
Version 1.2		Update sample container size to 200mL Update work group name	Rohan Wallace	Rae Huggins	
Version 1.3		Update department name Update document template	Rohan Wallace		
Version 2.0	July 2017	Update of structure Review of procedures	Leigh Anderson	Rohan Wallace	
Version WTMIP 1.0	October 2018	Modified to include details specific to the Wet Tropics Major Integrated Project	Alicia Buckle Emma-Lee Harper (Terrain NRM)	Dr Ryan Turner	

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