



# WAITE ANALYTICAL SERVICES

INFORMATION FOR CLIENTS

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# CHECKLIST FOR CLIENTS

- Contact the laboratory
- Ensure laboratory has your contact details for results and billing
- Identify analysis requirements
- Ensure samples are adequately labelled and packaged
- Ensure quarantine / ethics / GM requirements have been met

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## Booking-in samples for analysis

There is a range of booking forms depending on the category of client and the type of samples, and these forms act as the contract between Waite Analytical Services and the client, so contact the laboratory manager who will provide the necessary information.

Email: [teresa.fowles@adelaide.edu.au](mailto:teresa.fowles@adelaide.edu.au)

Follow the Guidelines for sample selection and preparation, below, and see "Sample Delivery Addresses" for the dispatch method that best suits you.

## Price of analysis

There is a range of prices depending on the category of client and the type of samples, so contact the laboratory manager who will provide the necessary information.

Email: [teresa.fowles@adelaide.edu.au](mailto:teresa.fowles@adelaide.edu.au)

Consultant analyses are straightforward, so prices are fixed. Sometimes research samples require extra preparation before analysis; the cost will be passed on to the client, and will be specified in the quote.

## Routine Methods

**The Standard Plant Suite.** **Al, Fe, Mn, B, Cu, Zn, S, Ca, Mg, P, K,** and **Na** are routinely targeted using acid digestion and Radial View Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES). **Mo, Co, Ni, Cd, Pb, & Se** are reported but are often below the detection limit of the current instrument. **Ti** and **Cr** are now reported and these can help the researcher to determine if the sample may be contaminated by soil or grinders.

Waite Analytical Services has different **acid digestion methods** for its Standard Plant Suite of Elements depending on the Client's main elements of interest.

**OH METHOD: Our preferred method** is a closed tube nitric acid / hydrogen peroxide digest. This gives good recovery for the Standard Plant Suite Elements except Fe, and Al. Fe recoveries are total from plant material. However when soil is part of the sample

(contamination) then this method **DOES NOT** recover all the Fe from the soil fraction.

**Al, Cr** and **Ti** **WILL NOT** be fully recovered from most plant matrix types, however, if **Cr** and **Ti** are seen in this digest then the level of soil contamination is likely to be very high.

Maximum OH digest weight = 0.3 grams dry wt.

**REPORT  
FOOTNOTES give  
important  
information about  
methods  
constraints that  
will help you  
interpret the data**

**HA METHOD:** Nitric acid / hydrochloric acid digest. Our data suggests that **Fe** recoveries are total from plant material. However this method **DOES NOT** recover all the Fe from the soil fraction when soil is part of the sample (*e.g.* contamination). **Al** is similar to **Fe**. The digest maximum weight for leaf tissue = 0.3- 0.4 grams, for grains 0.6-0.8 grams. Maximum wt is species dependent.

**PA METHOD:** Nitric acid / perchloric acid digest. **B** results **MAY** be low due to the loss of this volatile element during the digestion process. **K** **MAY** precipitate as  $KClO_4$  if the levels of **K** are high in the sample. **Ti** **WILL NOT** be fully recovered from all plant matrix types. However the recovery is large enough that it is useful for monitoring of soil contamination in the samples.

Digest maximum weight for leaf tissue = 0.3- 0.4 grams, for grains 0.6-0.8 grams.

*If **B, K, Fe** and **Al** are of equal importance, 2 separate digests are needed (at twice the price)*

If samples are for Standard Plant Suite only and are < digest maximum weight, the whole sample can be digested, grinding is not required, chopping is sufficient.

**Total N** is analysed by Complete Combustion Gas Chromatography. Analysis weight is 0.1 grams. Samples must be powdered or ground (<0.5mm).

**Chloride** samples are analysed by Axial view ICPOES of 4% nitric acid extracts. Maximum extraction wt is 0.1 grams. If samples are for **Cl** only and are < 0.1

grams, grinding may not be required – chopping only may be sufficient. Speak with laboratory staff for further information.

**If samples are for more than one assay, grinding is necessary to get representative, homogenous sub-samples.**

**More about WAS methods can be found in our published papers obtainable on the WAS website from this link:**

**<http://www.adelaide.edu.au/was/research/was-papers/>**

## Quality Assurance

Waite Analytical Services (WAS) takes part in the Plant Analysis Quality Assurance Program of the Australasian Plant and Soil Analysis Council (ASPAC). Go to the following links to find out more about ASPAC: ([www.aspac-australasia.com](http://www.aspac-australasia.com)), or to view WAS certified elements: ([www.aspac-australasia.com - WAS](http://www.aspac-australasia.com - WAS)).

**Contamination must be avoided if accurate results are to be obtained particularly when trace elements are being targeted. Some sources are:**

- **Soil and dust - may not only give false Fe and Al readings, but may distort the values of other elements**
- **Hands & gloves; hand creams, sunscreen may contain zinc, powdered and even “un-powdered” gloves may contaminate.**
- **Packets, vials, tools e.g. non-stainless scissors**

## Guidelines for sample selection and presentation

Select samples at the growth stage to best indicate the nutrient status of interest. Quarantine (overseas), PIRSA Plant Health Risk (interstate) and Biological (non-plant) material will not be received from consultant clients.

### **Diagnostic samples**

Youngest Extended Leaf Blades, or Youngest Open Leaves are commonly sampled and are suitable to indicate the status of mobile elements. Diagnosis of nutritional problems is frequently more reliable if a second sample of the nearest equivalent healthy tissue is submitted at the same time to highlight the differences. Viticulture clients When monitoring viticultural crops, petiole samples are taken at

## Turnaround time

**Researchers:** Students get first priority, especially undergraduate projects.

Waite Campus researchers have next priority for urgent samples. Generally, research samples are analysed on a first come basis, but we are able to negotiate turnaround with clients to meet urgent requirements

### **Consultants - Australian Farm and Horticulture**

**Agronomists** Turnaround time depends on the day of the week samples are received. A rule of thumb is 7 – 10 days. However if we receive samples on Monday, the report will be



sent on Friday of the same week.

flowering. The petiole opposite the bunch is selected. 50 – 100 petioles is a suggested minimum sample size.

### **Representative**

No analysis can give better results than the sample allows. Use standard random, zig-zag or other recognised sampling methods to ensure that the sample is like any other sample taken from the same site.

### **Manageable**

To obtain a representative sample of plant tissue may require the collection of more plant material than is needed for the actual analysis. Samples should be sub-sampled before packaging for dispatch to the laboratory. Advice on sub-sampling is available. Minimum sample size will depend on the

concentration of the target elements, the nature of the crop, the growth stage *etc.*

#### **Minimum size - Total N**

The method requires approx. 50-100 milligrams of material. Samples need to be finely ground and mixed to ensure homogeneity.

#### **Minimum size - ICPOES**

Minimum size depends on the nature of the material, and the target elements. Please discuss this with laboratory staff. Where there is insufficient material supplied for duplicate and repeat analysis we cannot guarantee you results - whilst rare, accidents happen and digests need to be repeated

#### **Homogeneity**

Samples may need to be chopped up or ground depending on size, to ensure a representative and homogenous sample. Grinders are available for use on campus. Clients are expected to prepare samples ready for analysis. It may not be necessary to grind grains that are barley size or smaller – please feel free to discuss the implications with us.

#### **Packaging**

Samples oven dried at 80°C before weighing. For non-genetically-modified material, robust paper envelopes are the preferred option. NOTE: In 2004, WAS found some batches of envelopes were contaminated with B, Al, Ca, Fe and Mn. Alternative batches of envelopes did not have the same problem, which may have been related to the dye used in particular

manufacturing runs. Please exercise caution in the selection of paper envelopes. If in doubt, send envelopes to WAS to check BEFORE using them for your samples. Polycarbonate or polypropylene tubes are usually OK; some other plastics are not suitable for oven drying.

**Plastic bags are unsuitable because they need to be opened for oven drying and this can allow contamination of samples.**

#### **Labelling**

**Each sample packet must identify the client, and uniquely identify the sample;** this might be as simple as experiment and plot number. It is helpful for us to know crop, growth stage and treatments.

**For research clients,** the sample list sent as part of the booking form need to match the packet labelling and needs to take analysis order into consideration.

Samples need to be presented in the order of the sample list.

**For consultant clients** we suggest the labelling format:

- Farmer name
- Sample code
- Crop
- Paddock
- Identify the required tests (see p.3):
  - SPS = Standard Plant Suite
  - N = Total nitrogen
  - Cl = Chloride

## **Billing**



**Invoices , generated quarterly** for jobs completed in the previous three months, are issued in the first week of March, June, September and December. This enables bills to be settled before the end of the financial year or before grants terminate at the end of December.

**University of Adelaide clients:** If debit codes commence “UNIAD”, the transaction will be a simple Journal Entry. You will receive a quarterly log of batch details. Nominate a debit

code on the attached authority, sign it and return it to Teresa Fowles.

**Non University of Adelaide clients:** Must agree to the Standard Terms and Conditions, clients will receive a quarterly log of batch details with an invoice from “Adelaide Research and Innovation” attached. Payment is by cheque or direct debit to Adelaide Research and Innovation. Direct debit instructions are included on the Tax Invoice. Please provide the mailing address and ABN of your institution when presenting samples. To ensure funds are available to pay invoices, raise a purchase order prior to sending samples.

# Standard Terms and Conditions

All clients external to the University of Adelaide need to agree to the Standard Terms and Conditions set out below.

**For Research clients** this is a simple tick box in the booking form for each batch.

**For Consultant clients** the Private Sector Client Details form is completed annually and lasts for the financial year. July 1<sup>st</sup> – June 30<sup>th</sup>

**Capitalised Terms have the meaning given to them in the Service Details to which these Terms and Conditions relate.**

## 1 SERVICES

1.1 ARI will carry out the Services and provide all Deliverables in accordance with the Service Details.

1.2 The Services will be provided by the Delivery Date and will be deemed completed on provision of the Deliverables to the client.

1.3 The Client agrees to make available to ARI any information or materials necessary to carry out the Services.

## 2 INTELLECTUAL PROPERTY

2.1 Each Party retains all rights to existing Intellectual Property used in performance of the Services. Any copyright in the Deliverables passes to the Client under this Agreement upon payment of the Fee. The Client will respect the moral rights of the authors in the Deliverables.

## 3 CONFIDENTIALITY

3.1 Each Party will keep confidential and only use for the purposes of the Services the other party's confidential information unless written approval is obtained. Each Party may disclose such confidential information to its employees and agents as necessary for the performance of the Services.

## 4 PUBLICITY

4.1 Neither party shall use the name or logo of the other party as a consequence of or in connection with this Agreement without the prior written permission of the other party.

## 5 FEE AND PAYMENT

5.1 The Client agrees to pay ARI the Fee and any incidental costs (including GST) in the time and manner set out in the Service Details.

## 6 RISK MANAGEMENT

6.1 ARI does not give any warranty nor accept any liability in relation to the Services or the Deliverables except to the extent, if any, required by law. To the full extent permitted by the law ARI excludes all conditions and warranties relating to the Services and the Deliverables.

6.2 In so far as liability may not be excluded, ARI's total liability is limited to re-performance of the Services or refund of the Fee.

6.3 The Client agrees that it will use the Deliverables at its own risk, that it assumes sole responsibility for interpreting and applying the

Deliverables and any other results of the Consultancy Services. The Client releases and indemnifies ARI against any damage, loss or expense ARI suffers; and indemnifies ARI against any claim, judgment or award in favour of a third party which arises as a result of the use or release of the outcomes of the Services or the Deliverables by the Client.

6.4 Each party will maintain appropriate and enforceable insurance policies to cover liability that arises out of, under or pursuant to this Agreement.

## 7 TERMINATION

7.1 If either party commits a breach of this Agreement, the other party may request in writing that the breach be remedied, and if this is not done within 30 days of the request then the other party may terminate this Agreement immediately.

## 8 UNAVOIDABLE DELAY

8.1 No party will be responsible for performing an obligation under this Agreement where performance is prevented due to any circumstances beyond the reasonable control of that party. If such circumstances continue beyond 14 days either party may terminate this Agreement. ARI shall be entitled to pro rata payment for performance of Services undertaken up until the date of termination.

**9 CONCILIATION** 9.1 If there is a dispute between the parties concerning this Agreement the disputing party shall give written notice specifying details of the dispute to the other party.

9.2 If the dispute is not settled by agreement within 14 days of service of the notice the dispute will be referred to the Client's Chief Executive Officer and the Managing Director of ARI, who will attempt to resolve the dispute by formal or informal mediation.

## 10 GENERAL

10.1 This Agreement constitutes the entire agreement between the parties, and may only be varied by written agreement signed by both parties.

10.2 Should any provision of this Agreement be held by a Court to be unlawful, invalid or unenforceable the validity and enforceability of the remaining provisions shall not be affected.

10.3 Neither ARI, nor any officers, employees or agents of ARI shall by virtue of this Agreement be deemed to be employees of the Client.

10.4 The provisions of Clauses 3, 4, 5, 6, 7, 8, 10.4 and 11 shall survive and be of full effect after expiration or termination of this Agreement.

## 11 GOVERNING LAW

11.1 This Agreement will be governed by law of State of South Australia and the parties submit to the jurisdiction of the Courts of South Australia.

## **Sample delivery address for Australian clients**

### **Mail:**

Mrs. Teresa Fowles,  
Waite Analytical Services  
School of Agriculture Food and Wine  
University of Adelaide  
PMB 1  
Glen Osmond,  
SA, 5064

### **Courier:**

Mrs. Teresa Fowles,  
Waite Analytical Services  
Waite Campus  
The University of Adelaide  
c/o Level 1, Receiving Bay  
Wine Innovation Central Building Cnr Paratoo Rd & Hartley Grove,  
Urrbrae, SA, 5064

### **Hand Deliver:**

Mrs. Teresa Fowles  
Room LG11  
Main Waite Building  
School of Agriculture Food and Wine  
University of Adelaide  
Entrance 1  
Waite Road,  
Urrbrae, SA, 5064

# AUSTRALIAN RESEARCH CLIENTS ONLY



## ***Non -Routine Methods***

Waite Analytical Services has a number of methods that have been customised for research projects.

Discuss your requirements with us.

- Obtain a health certificate that designates the source of the material
- Package the consignment securely
- Enclose a copy of the permit
- Other conditions may apply to permits you obtain

***Residue sample will not be returned to you, it will be incinerated.***

***There are no restrictions on dried or fresh material grown in South Australia, residue sample can be returned to SA clients, and can be requested on the booking form***

## ***Genetically Modified Material***

### **MUST BE IDENTIFIED IN THE BOOKING SHEET**

- Seeds must be heat treated to be unviable.
- All samples must be presented in sealed containers *e.g.* polypropylene or polycarbonate vials.
- Consignments must be accompanied by the documentation required by the client's GM permits
- Residue sample will be disposed of by high temperature incineration, it will not be returned to the client

## ***Plant Material Grown Outside of South Australia***

PIRSA (Primary Industries and Resources of South Australia) have biosecurity regulations to protect SA growers: [PIRSA Biosecurity](#)

For ***dried plant material grown outside of SA***, WAS has a permit obtainable on request, you will need to:

- Package the consignment securely
- Enclose a copy of the permit

***Residue sample will not be returned to you, it will be incinerated.***

For ***fresh plant material grown outside of SA***, WAS has a permit for broad-acre crops available on request, you can apply for a permit for others species (we can provide the form) you need to:

- Talk to us about your requirements
- Ensure you have a permit for your crop

## ***Biological material (non-plant)***

Waite Analytical Services has a limited suite of methods for urine, blood, blood plasma, animal tissue *etc.*

**Potentially Hazardous Material** must be identified in the biological booking forms.

**Ethics Approval** Where relevant, a .pdf or a hard copy of ethics approvals must be supplied when presenting human or animal tissue *etc.*

## ***Suitable liquids***

Discuss the analysis of liquids with laboratory staff before sending. The matrix requirements for the standard method are very specific so many liquids will not be suitable. Send plastic vials, individually labelled with a unique number in permanent marker; 10 mls is the preferred minimum. WAS is able to analyse a limited range of soil solutions, using the Standard Plant Suite method, *e.g.* 1:5 soil water extracts filtered through 0.45 micron filters.

## ***Chloride PLUS sodium***

This procedure uses a 4% nitric acid extract, analysed by Radial view ICPOES. Maximum extraction wt is 0.1 g. This method is applicable when Cl concentrations are >0.15%

## OVERSEAS RESEARCH CLIENTS ONLY



### **Quarantine Material**

**MUST BE  
IDENTIFIED IN THE  
BOOKING SHEET**

**FOR  
SHIPPING LABELS SEE  
PAGES 10 & 11**

**Permits:** Samples must be accompanied by a current species specific permit. This permit is available from laboratory staff. Ensure you meet the conditions stated on the permit.

**New permits:** If your species of interest is not on the permit, a new permit can be arranged for about \$230 AUD and the cost will be passed on to the client.

**Quarantine clearance:** Consignments containing whole seeds are **irradiated** on arrival in Australia by a third-party supplier, hence there will be a cost, which will vary according to the method used. Waite Analytical Services will bill the client for the cost of irradiation. Consignments that contain only plant material that is not whole seeds can be **heat treated** by Waite Analytical Services for no cost to the client.

***Australian Customs will not clear consignments for quarantine inspection  
without sighting these documents, and they will not open the box***

**Documentation for quarantine clearance:** It is essential that the following documents are attached to the **OUTSIDE** of the package:

1. A **tax invoice** on company letter head, stating the value of the shipment (this can state “No commercial value”)
2. A signed **manufacturers declaration** (a statement of what is in the consignment)
3. A **phytosanitary certificate** (this is not a requirement of the permit, but can smooth the way through quarantine and may be an export country requirement)
4. A **list of samples** that matches the packet ID'S & includes the **species** name
5. The **current quarantine “Permit to Import”**

**Documentation for Waite Analytical Services:** The Booking Form for International Clients, available as an excel spreadsheet, should be completed and emailed to: [teresa.fowles@adelaide.edu.au](mailto:teresa.fowles@adelaide.edu.au)  
There are 3 sheets to fill in, be sure to include:

1. Airway bill number
2. Samples list including **species** of EACH sample
3. Main elements of interest
4. Billing address of who pays the bill
5. Agreement to Standard Terms and Conditions

***Package label for quarantine material – whole seeds***

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**CONSIGNMENT CONTAINS WHOLE SEEDS.  
TO BE IRRADIATED BY STERITECH, AUSTRALIA  
AQIS PERMIT ENCLOSED**

**Attn AQIS: SAMPLES FOR TRACE-ELEMENT ANALYSIS PLEASE TAKE CARE  
WHEN INSPECTING (PHONE 08 83037391 FOR INFORMATION)**

**After irradiation forward to:**

TERESA FOWLES c/o  
Level 1, Receiving Bay  
Wine Innovation Central Building  
Cnr Paratoo Road & Hartley Grove.  
The University of Adelaide  
Waite Campus Urrbrae SA 5064

**Forward invoice to:**

Teresa Fowles University of Adelaide  
Waite Analytical Services Laboratory  
PMB1 Glen Osmond  
South Australia  
Australia 5064

***Package label for quarantine material – not whole seeds***

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**CONSIGNMENT DOES NOT CONTAIN WHOLE SEEDS.  
TO BE HEAT TREATED AT UNIVERSITY OF ADELAIDE QAP S1264  
AQIS PERMIT ENCLOSED**

**Attn AQIS: SAMPLES FOR TRACE-ELEMENT ANALYSIS PLEASE TAKE CARE  
WHEN INSPECTING (PHONE 08 83037391 FOR INFORMATION)**

**After inspection forward to:**

SARDI POST ENTRY QUARANTINE  
LAB 2.62  
PLANT RESEARCH CENTRE  
2B HARTLEY GROVE  
URRBRAE, SA, 5064  
QAP No S0195

**Forward invoice to:**

Teresa Fowles University of Adelaide  
Waite Analytical Services Laboratory  
PMB1 Glen Osmond  
South Australia  
Australia 5064