

# NEUTRON PROBE

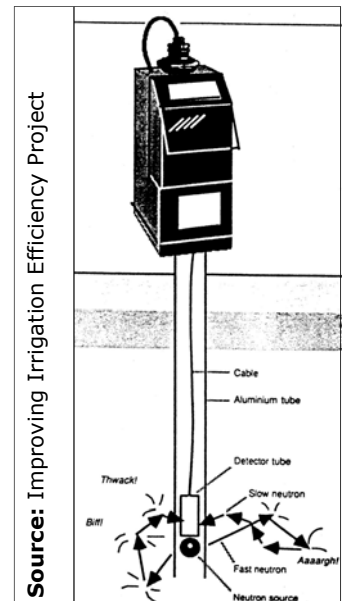
## How does a neutron probe work?<sup>1,2</sup>

A neutron probe is a sophisticated and accurate piece of equipment, requiring calibration and operation by a licensed operator.

The neutron probe comprises;

- a nuclear unit, suspended on a cable, which is both a neutron source and detector
- a housing containing the electronic receptors
- a shield for safe transportation of the radioactive device

The nuclear unit is lowered down a stopped aluminium access tube to set depth intervals. The neutron source starts scattering fast neutrons, which are deflected by hydrogen, most commonly water, and are slowed. The source also detects and counts the returning slow neutrons. The amount of deflection is directly related to the soil moisture in the soil.



## Limitations<sup>1,2</sup>

Because of their high cost and the need to have a licensed operator, neutron probes are usually only bought by large organisations or consultants running a service for smaller operators.

The sphere of influence is related to the moisture content of the soil, with the neutron probe having a greater sphere of influence in drier soil. However, despite this, the neutron probe's sphere of influence is generally greater than other systems regardless of soil moisture content.

## Advantages:<sup>3</sup>

- Accurate in determining soil moisture
- Large sphere of influence
- Not affected by temperature, soil type or pH
- Measurements are interpreted by the Contractor and provided back to you
- Access tubes installed with minimal soil disturbance
- Trained consultant does readings for you
- Reports and advice given by an Irrigation consultant who is familiar with your property

## Disadvantages:<sup>3</sup>

- Costs of service and set-up on-farm
- Licenses required to take readings (radioactive source), hence you are unable to take a reading at will
- Costs of service and set-up on-farm
- Clear access to property and sites required at all times
- Access tubes may become compacted
- Slight delay in receiving readings/reports

The products and companies mentioned on this fact sheet are examples only and are not endorsed in any way. Other tools with similar functions may also be available. Irrigators are advised to speak to an Irrigation consultant or the companies who sell the equipment, for more information on the best system to suit their requirements.

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### Services may include:<sup>4</sup>

- Site selection and installation of soil water monitoring access tubes
- Regular readings of soil water content and water table levels
- Development of soil water graphs for clients
- Provision of irrigation advice including; where to apply water, when to water, and how much to apply
- Measurement of soil salinity

Monitoring sites are established in representative areas of the property to account for the variability in soil type and topography, crop type/variety and irrigation system. Soil moisture readings are likely to be taken more frequently during the irrigation season.

The data is downloaded to a computer to enable production of graphs. A report containing interpretation and advice on irrigation intervals is likely to be provided after each field visit.

Soil samples may be taken to monitor salinity levels to assist irrigation decisions and ensure that the whole irrigation strategy is appropriate.

### Further information

AgriExchange (formerly Yandilla Park Pty Ltd)

[http://www.yandillapark.com.au/Growers/neutron\\_probe\\_service.htm](http://www.yandillapark.com.au/Growers/neutron_probe_service.htm)

Australian Government Code of Practice for using a Neutron Probe

<http://www.ictinternational.com.au/faqnps.htm#code>



#### References:

1. **Charlesworth P** (2000) *Irrigation Insights - Soil Water Monitoring*, National Program for Irrigation Research and Development
2. **Mallee Water Resources Committee and PIRSA** (2000) *Mallee Wells Irrigation Management Course Manual*
3. **Improving Irrigation Efficiency Project** - Irrigation Management Course, Scheduling Workshop Presentation
4. [http://www.yandillapark.com.au/Growers/neutron\\_probe\\_service.htm](http://www.yandillapark.com.au/Growers/neutron_probe_service.htm)