APPENDICES

APPENDIX 1: FIELD EQUIPMENT CHECKLIST

Field notebook, pencils, pens and markers
Map of well locations
Key for wells
Lubricant for locks (WD40 or graphite)
Water level gauge
Tape measure
Paper towels
Folding table and chairs
Conductivity meter and standard solutions for calibration of probes
Thermometer
pH meter and buffer solutions
Spare batteries for all instruments
Beakers, stirrers, wash bottle, funnels, tissue-wipes
Twine (Teflon, nylon, etc)
Bailer (<40 mm in diameter) made of appropriate material
Pump and tubing made of appropriate material
Pump reel and frame
Electric cable
Generator
Fuel and oil
Buckets (calibrated in litres)
Tape
Garden hose
Plastic sheet
Stopwatch or watch that indicates seconds
Chain of Custody and other forms
Sample Containers (bring 20% more than required), all sealed clean and labelled.
Trip blanks and spike solutions
Filtering kits
Acid Box: items for preservation and chemical treatment of samples in field.
Portable iceboxes or coolers and cooler bricks
Max/Min thermometer
Decontamination vessels - washed, rinsed and distilled
Detergent solution (biodegradable), ethanol, concentrated bleach
Deionised water, distilled water
Garden spray cans for wash fluids
Gloves, boots, overalls
Raingear or warm clothing
Sun protective lotion, hat, sunglasses, insect repellent
Camera and film
Toolbox
Soil Auger, shovel
Soil sample containers
Torch, calculator
Business cards/ID, money

MURRAY-DARLING BASIN GROUNDWATER QUALITY MONITORING PROJECT

APPENDIX 2: SUMMARY OF PUBLICATIONS ASSESSED FOR MDB GROUNDWATER SAMPLING

	NSW	QLD	SA	VIC	AGSO	COMM	MDBC	USGS USEPA	INTER-NAT
Agencies involved /contacted	DLWC EPA	DWR DEH	DMESA DENR SA Water	RWC (Sinclair-Knight-Merz) DCNR EPA	Groundwater Quality Project, EGG Technical Group, EGG	DPIE - AWRC - NWQMS The EPA River Monitoring	MDBC - Groundwater Working Group	USGS - NAWQAP USEPA	UNEP WHO UNESCO WMO
Documentation of Sampling Protocols	1992, Jiwan, J and Gates, G, A Practical Guide to Groundwater Sampling	1) 1991, McNeil, V et al -comments on sampling 2) 1992, Rayment & Poplawski, Training Notes on Sampling for WQ Monitoring 3) Hydrographic Porcedure No. 10, Water Quality Sampling, DPI-WR. Very much focussed on surface water. 4) DEH - to do in future 5) Poplawski to do after NWQMS completed.	ISO/TC 147/SC 6 N 120 - Guidance on the Sampling of Groundwater. Australian Centre for Water Quality Sampling Manual, NATA approved.	1) USEPA Guidelines and AWRC Guidelines for ISO 9000 accreditation 2) 1987,Vic EPA, A Guide to the Sampling and Analysis of Water and Wastewater - 5th Edition	1995, unpublished, Procedures and Notes for Pumping and Sampling of Low Yield for Small Diameter Bores for Water Quality Assessment	1) 1991, AWRC-WRMC, A Preliminary Guide to the Standard Operating Procedures for Sampling Contaminated Groundwater 2) NSW EPA doc. to be put into NWQMS doc. on Monitoring and Reporting (analyses only) 3) NWQMS documents - mainly surface water and no detail 4) National River Health Program - not yet available	1993, MDBC-GWG, Groundwater Monitoring Proposal - General Comments - Min. Preservation Requirements	1) 1989, USGS Open File Report 89-396, Well Installation and Documentation, and Ground-Water Sampling Protocols for the Pilot National Water-Quality Assessment Program 2) 1981, USEPA Report No. 600/2-81-160, Manual of Ground-Water Sampling Procedures	1987, WHO, GEMS/Water Operational Guide (GEMS is the Global Environmental Monitoring System)
Document studied	as above	1992, Rayment & Poplawski, Training Notes on Sampling for WQ Monitoring	as above	1987,Vic EPA, A Guide to the Sampling and Analysis of Water and Wastewater - 5th Edition	as above	1991, AWRC-WRMC, A Preliminary Guide to the Standard Operating Procedures for Sampling Contaminated Groundwater	as above	as above	as above)

	NSW	QLD	SA	VIC	AGSO	COMM	MDBC	USGS USEPA	INTER-NAT
Main Document Sources	1) 1985, Barcelona et al, Practical Guide for Sampling Illinois State Water 2) Gibbs et al, Procedures for Collection of Representative Water Quality Data from Monitoring Wells	1) 1985, Barcelona et al, Practical Guide for Sampling Illinois State Water 2) 1988, Garrett, P, How to Sample Groundwater and Soils, A Manual for the Back Pocket	No source document referenced	No source document referenced Mention in text of: 1) Australian Standard AS2031-1986 (containers) 2) Reference list for Methods of Analysis	No source document referenced	1) Dames and Moore SOPs 2) Sampling Guidelines - Industrial Wastes and Pollution Control Samples, WAWA 2) A Guide to the Sampling and Analysis of Water and Wastewater, Vic EPA	1992, Jiwan, J and Gates, G, A Practical Guide to Groundwater Sampling	Various references: 1) 1984, Barcelona et al 2) 1982, Claassen, HC 3) 1981, Pettyjohn et al 4) + many more older references	This document does not constitute a formal publication. 1978, UNESCO/WHO, Water Quality Surveys - a guide for the collection and interpretation of water quality data; Studies and Reports in Hydrology No. 23
Summary of document focus	Purpose: to obtain representative groundwater samples - very specific. Excludes pesticides and organics Very detailed methodology with numerous Tables outlining steps.	Training notes for surface and groundwater. Different chapters by different authors. Moderately descriptive and some Tables.	This international standard is one of a group of standards dealing with the sampling of specific types of water. It is very descriptive and general and useful for the principles of sampling.	Covers all water bodies. Flexible guidelines aimed at pollution monitoring. Very general.	Step-by-step field process specific to AGSO's Groundwater Quality Assessment Program.	Detailed SOPs (Standard Operating Procedures) specific to contaminated groundwater. Full process: drilling to well abandonment. Quite specific.	A few pages on groundwater sampling principles and Minimum Preservation Requirements.	1) Report covers Well Selection, Installation and Sampling for groundwater specific to NAWQA Program. Descriptive with some Tables. 2) Report covers hydrogeological and sampling principles in depth. Also, construction of wells, drilling, development. Sampling section is detailed on samplers but not very strong on other aspects.	Technical document for GEMS. Focuses primarily on surface water and analytical methods.

Compiled by Patty Please, EGG, AGSO - Oct. 1995

MURRAY-DARLING BASIN GROUNDWATER QUALITY MONITORING PROJECT

APPENDIX 3: TOPICS ADDRESSED IN SELECTED SAMPLING MANUALS

The headings on this row are associated with the publications referenced in Table 1	NSW	QLD	SA	VIC	AGSO	AWRC	MDBC GWG	USGS	USEPA
Principles	X	X 1 chapter	X	X linked to EP Act 1970		X in document text	X	X linked to NAWQAP	X
Preparation					X very detailed field equipment			X minor	X data
Indicators	X				X			X	
Location & Frequency	X	X	X					X	X location
Devices/Pumps	X	X	X limited on pumps	X bail vs. pump		X	X minor	X	X drawings
Materials for Devices	X	X				X minor		X minor	X minor
Decontamination	mentioned but no detail		X minor - flaming		X very detailed	X		X	X for micro
Purging	X very thorough	X	X minor	X minor	X	X	X	X	X minor
Field Measurements	X	X	X minor		X	X	X minor	X	X minor

Filtration	mentioned but no detail	**X** SW + GW + effects	**X**	**X** general	**X**	**X**		**X**	
The headings on this row are associated with the publications referenced in Table 1	**NSW**	**QLD**	**SA**	**VIC**	**AGSO**	**AWRC**	**MDBC GWG**	**USGS**	**USEPA**
Containers/ Preservation/Holding/. Transport	**X**	**X** SW + GW + effects	**X** general	**X** general	**X**	**X**	**X**	**X**	**X**
Chain of Custody Documentation	**X**	**X** SW + GW	**X** minor	**X** general	**X**	**X**		**X**	**X** linked to Chain of Custody
QA/QC	**X** + spiking solutions				**X** for different chemical programs		**X** minor	**X**	
Problems	**X** 9 points	**X** 1 chapter				**X** in document text			**X** in document text
Summary of Protocol	**X** total process	**X** for different chemical programs			**X ?** not really a summary	**X** 18 point list		**X** linked with preservation + containers	
Documentation/Forms (distributed to other sections)	**X**	**X**	**X** 14 point list	**X** 8 point list	**X**	**X**		**X**	**X** 18 point list + Chain of Custody Procedure
Items peripheral to groundwater sampling protocol									
Drilling/Soil Sampling						**X**		**X**	**X**
Monitoring/Well Installation		**X**				**X**		**X**	**X**
Surface Water Sampling		**X**		**X**		**X**			

Interpretation of Results		**X**							

Compiled by Patty Please, EGG, AGSO - Oct. 1995