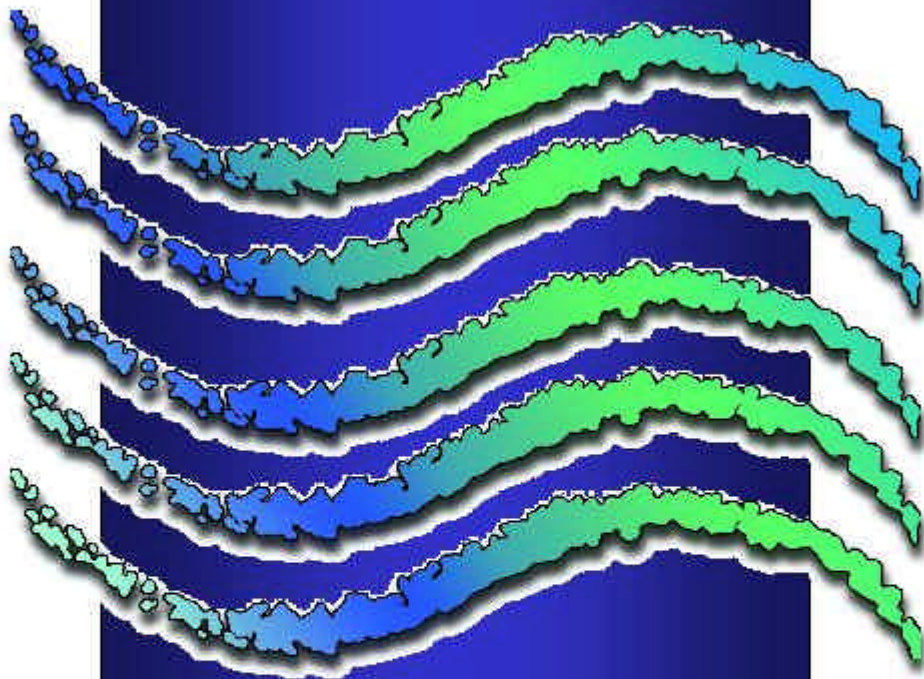


SOUTH AFRICAN
**WATER QUALITY
GUIDELINES**

VOLUME 8
FIELD GUIDE



Department of Water Affairs and Forestry



Second Edition 1996

**SOUTH AFRICAN WATER QUALITY
GUIDELINES
Volume 8: Field Guide
First Edition, 1996**

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SOUTH AFRICA

**South African
Water Quality
Guidelines**

**Volume 8
Field Guide**

**Department of Water Affairs
and Forestry**

**First edition
1996**

Published by
Department of Water Affairs and Forestry
Private Bag X313
PRETORIA
0001

Republic of South Africa
Tel: (012) 299-9111

Printed and bound by
The Government Printer, Pretoria

ISBN 0-7988-5338-7 (Set)
ISBN 0-7988-5346-8 (Volume 8)

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This report should be cited as:

Department of Water Affairs and Forestry, 1996. South African
Water Quality Guidelines (first edition). Volume 8: Field Guide.

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Produced by:
CSIR Environmental Services
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This volume is the eighth in a series of eight volumes comprising the South African Water Quality Guidelines.

- Volume 1: South African Water Quality Guidelines -
Domestic Water Use
- Volume 2: South African Water Quality Guidelines -
Recreational Water Use
- Volume 3: South African Water Quality Guidelines -
Industrial Water Use
- Volume 4: South African Water Quality Guidelines -
Agricultural Water Use: Irrigation
- Volume 5: South African Water Quality Guidelines -
Agricultural Water Use: Livestock Watering
- Volume 6: South African Water Quality Guidelines -
Agricultural Water Use: Aquaculture
- Volume 7: South African Water Quality Guidelines -
Aquatic Ecosystems
- Volume 8: *South African Water Quality Guidelines -
Field Guide***
-

Foreword

The Department of Water Affairs and Forestry is the custodian of South Africa's water resources. Part of its mission is to ensure that the quality of water resources remains fit for recognised water uses and that the viability of aquatic ecosystems are maintained and protected. These goals are achieved through complex water quality management systems which involve role players from several tiers of government, from the private sector and from civil society.

A common basis from which to derive water quality objectives is an essential requirement that enables all role players involved in such a complex system to act in harmony in order to achieve the overarching goal of maintaining the fitness of water for specific uses and to protect the health of aquatic ecosystems. For these reasons the Department initiated the development of the *South African Water Quality Guidelines*, of which this is the second edition. The *South African Water Quality Guidelines* serve as the primary source of information for determining the water quality requirements of different water uses and for the protection and maintenance of the health of aquatic ecosystems.

The process that followed and the wide variety of organizations and individuals involved in the development of these guidelines ensured the acceptance and use of these guidelines by all significant role players, as the *South African Water Quality Guidelines*. These guidelines are technical documents aimed at users with a basic level of expertise concerning water quality management. However, the role players involved in the different water use sectors are expected to use these guidelines as a basis for developing material to inform water users in specific sectors about water quality and to empower them to effectively participate in processes aimed at determining and meeting their water quality requirements.

The Department recognises that water quality guidelines are not static and will therefore update and modify the guidelines on a regular basis, as determined by ongoing research and review of local and international information on the effects of water quality on water uses and aquatic ecosystems. The process of developing water quality guidelines, and the involvement of key role players, is a continuing one. The second edition is published in a loose leaf, ring binder format to facilitate the regular updating of the guidelines. All those who want to comment on and make suggestions concerning the *South African Water Quality Guidelines* are invited to do so at any time by contacting the Director: Water Quality Management, Department of Water Affairs and Forestry, Private Bag X313, Pretoria 0001.

Finally I wish to express my sincere appreciation to all those who have been involved in the development of these guidelines. I also look forward to their continued involvement in maintaining one of the corner-stones of the water quality management system in South Africa.



Professor Kader Asmal MP
Minister Of Water Affairs and Forestry

May 1996

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Introduction

The *South African Water Quality Guidelines Field Guide*, Volume 8 of the South African Water Quality Guidelines series, is a compilation of all the different Target Water Quality Ranges (TWQR) for all the different water use sectors dealt with in volumes one to seven. These include Domestic Water Use (Volume 1), Recreational Water Use (Volume 2), Industrial Water Use (Volume 3), Irrigation Water Use (Volume 4), Livestock Watering (Volume 5), Aquacultural Water Use (Volume 6) and Aquatic Ecosystems (Volume 7).

The Target Water Quality Range (TWQR) for a particular constituent and water use is defined as the range of concentrations or levels at which the presence of the constituent would have no known adverse or anticipated effects on the fitness of the water assuming long-term continuous use, and for safeguarding the health of aquatic ecosystems. For the aquatic ecosystems guidelines the TWQR is not a water quality criterion as it is for other water uses, but rather a management objective that has been derived from quantitative and qualitative criteria.

The reason for summarising the TWQR for the different water sectors in a field guide is to allow the user of the guide to quickly assess whether water of a particular quality is of any concern for a particular water use. If the quality is within the TWQR one can immediately conclude that water quality in that particular case is not an issue to the water use concerned. However, if the water quality falls outside the TWQR it does not mean that the water is unsuitable for a particular use, but rather that the particular situation must be more thoroughly assessed by referencing the comprehensive guidelines and by obtaining expert opinion if required.

The *Field Guide* has been designed for quick reference to the TWQR, and it is important for the user to refer back to the specific water use sector(s) for more detailed information. Further the *Field Guide* also serves as a quick and easy reference for comparison of the TWQRs for different water use sectors to determine the fitness for use for water.

The *Field Guide* consists of a table for each constituent that is included in the South African Water Quality Guidelines. For many of the water quality constituents, a TWQR is not given for all the different water use sectors. This is in part due to the following :

- ! The constituent is NOT RELEVANT to a specific use sector, for example, the constituent ‘sodium absorption ratio’ is only relevant to irrigation water use and no other water use sector.

- ! The information for a particular use sector and constituent has not yet been developed, and is therefore NOT AVAILABLE.

For each constituent in the *Field Guide* where a TWQR is not given, the reason for it is clearly indicated as either NA (the information not available) or as NR (not relevant). If the information is NOT AVAILABLE for a particular water quality constituent and water use sector, it may be because :

- ! The constituent is not perceived to be of primary concern to that particular water use sector;
- ! The constituent is not considered to be a widespread problem in South Africa;
- ! The constituent is of concern for the water use sector in question and is a problem in South Africa, but information concerning its effects on the water use still needs to be developed and/or modified for conditions in South Africa.

For certain constituents and water use sectors the user of the *Field Guide* will be referred to other constituents, or directly to the guidelines. For example :

- ! for the constituent calcium for industrial water use, the user is referred to two other constituents, namely alkalinity and total hardness, since the calcium concentration is determined as calcium carbonate
- ! for system variables such as temperature, pH, and inorganic phosphorous and nitrogen for aquatic ecosystems, the TWQRs have been determined as a percentage difference from that which usually occurs in a particular aquatic ecosystem, and the user is referred directly to the guidelines.

In all cases when using the *Field Guide* the user must refer back to the specific guideline for a particular water use sector and constituent as provided in the comprehensive guidelines, in order to obtain more detailed information to assess the fitness for use of water.

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 1 (a)			
	0 - 50 (b)			
	0 - 0.8 (c)			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	0 - 15		-	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	< 6.0 (d)		NA	NA
	< 2000 (e)			

NA - Not available

NR - Not relevant

(a) Fg/R chRa

(b) bg algal cells/mR

(c) Fg/R of Microcystin

(d) Blue-green algae colonies/0.5 mR counted in a 2 min. scan at 200× magnification

(e) Microcystin cells/mR

Alkalinity*
(mg CaCO₃/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact	Intermediate Contact		
	NA	NA		
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 50	0 - 120	0 - 300	0 - 1 200
<i>AGRICULTURE</i>	Livestock Watering	Irrigation		Aquaculture
	NA	NA		20 - 100

NA - Not available

* See Total Hardness

Aluminium
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.005			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.15			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 5		0 - 5	# 0.03

NA - Not available

NR - Nor relevant

Ammonia
(mg NH₃/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.007			
<i>DOMESTIC</i>	Human Consumption			
	0 - 1.0			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	0 - 0.025 (a) 2.0 - 0.3 (b)

NA - Not available
NR - Not relevant

(a) Cold-water species
(b) Warm-water species

Arsenic
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.01			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.01			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1		0 - 0.1	0 - 0.05

NA - Not available

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption (fibres/R)			
	0 - 1i 10⁶			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NR

NA - Not available

Atrazine
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.01			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.002			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	< 0.0002

NA - Not available
NR - Not relevant

Beryllium
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		0 - 0.1	NA

NA - Not available

Boron
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 5		0 - 0.5	NA

NA - Not available

Cadmium
(Fg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.15			
<i>DOMESTIC</i>	Human Consumption			
	0 - 5			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 10		0 - 10	0 - 0.2

NA - Not available

Calcium
(mg Ca/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 32			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1 000		NA	NA (a)

NA - Not available

(a) See Total Hardness guideline

Carbon Dioxide CO₂
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	12

NA - Not available

NR - Nor relevant

Chemical Oxygen Demand
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 10	0 - 15	0 - 30	0 - 75
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NR

NA - Not available

Chloride
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 100			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 20	0 - 40	0 - 100	0 - 500
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1 500 (a)		0 - 1.00	0 - 600
	0 - 3 000 (b)			

NA - Not available

(a) Monogastrics & Poultry

(b) Other livestock

Chromium(VI)
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.007			
	# 0.012 (a)			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.05			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1		0 - 0.1	# 0.002

NA - Not available

(a) Chromium (III)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1		0 - 0.05	NA

NA - Not available

Coliforms
(counts/100 mR)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 (b) 0 - 5 (c)			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	0 - 150 (b) 0 - 130 (a)		0 - 1 000 (b)	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 200 (b)		< 1 (b)	NA

- NA - Not available
NR - Not relevant
(a) *E. Coli*
(b) Faecal coliforms
(c) Total coliforms

Coliphages
(counts/100 mR)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	0 - 20		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NA

NA - Not available

NR - Not relevant

Copper
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.0003			
<i>DOMESTIC</i>	Human Consumption			
	0 - 1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 0.5 (a)		0 - 0.2	0.005
	0 - 1 (b)			
	0 - 5 (c)			

NA - Not available

- (a) Sheep & pre-weaned calves
- (b) Cattle
- (c) Horses, pigs & poultry

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.001			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	# 0.05

NA - Not available

Dissolved Organic Carbon
(mg C/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 5			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NR

NA - Not available

Dissolved Oxygen
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	80 % - 120 % of saturation			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact	Intermediate Contact		
	NA	NA		
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NR	NR	NR	NR
<i>AGRICULTURE</i>	Livestock Watering	Irrigation		Aquaculture
	NA	NA		6 - 9 (a) 5 - 8 (b)

NA - Not available

NR - Nor relevant

(a) Cold-water species

(b) Intermediate species & warm-water species

Endosulfan
(Fg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.01			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	< 0.003

NA - Not available

Enteric Viruses
(TCID₅₀/10R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC (TCID₅₀/10 R)</i>	Human Consumption			
	< 1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	0		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NA

NA - Not available

NR - Not relevant

Faecal Streptococci

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	0 - 30		0 - 230	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NA

NA - Not available

NR - Not relevant

Fluoride
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.75			
<i>DOMESTIC</i>	Human Consumption			
	0 - 1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 2 (a)		0 - 2	NA
	0 - 6 (b)			

NA - Not available

- (a) All other livestock
- (b) Ruminants

Iron
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 0.1	0 - 0.2	0 - 0.3	0 - 10.0
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 10		0 - 5	0.01

NA - Not available

Lead
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.0002			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.01			
<i>RECREATION</i>	Full Contact	Intermediate Contact		
	NA	NA		
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i> (mg/R)	Livestock Watering	Irrigation		Aquaculture
	0 - 0.1 (a) 0 - 0.5 (b)	0 - 0.2		0 - 0.01

NA - Not available

(a) All other livestock

(b) Pigs

Lithium
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		0 - 2.5	NA

NA - Not available

NR - Not relevant

Magnesium
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 30			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 500		NA	NA

NA - Not available

Manganese
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.18			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.05			
<i>RECREATION</i>	Full Contact	Intermediate Contact		
	NA	NA		
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 0.05	0 - 0.1	0 - 0.2	0 - 10.0
<i>AGRICULTURE</i>	Livestock Watering	Irrigation		Aquaculture
	0 - 10	0 - 0.02		# 0.1

NA - Not available

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.04			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.001			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1.0		NA	0 - 0.001

NA - Not available

Molybdenum
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 0.01		0 - 0.01	NA

NA - Not available

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1		0 - 0.20	NA

NA - Not available

Nitrate/Nitrite
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	See Nitrogen (inorganic)			
<i>DOMESTIC</i>	Human Consumption			
	0 - 6 (a & b)			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 100 (a)		See Nitrogen	0 - 0.05 (a)
	0 - 10 (b)		(inorganic)	

NA - Not available

(a) NO₃

(b) NO₂

Nitrogen
(Inorganic)
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	See guideline			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering	Irrigation		Aquaculture
	NA	0 - 0.5 (a)		NR

NA - Not available

(a) Irrigation equipment

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NR

NA - Not available

Organic Carbon
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 5			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NA

NA - Not available

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	See guideline			
<i>DOMESTIC</i>	Human Consumption			
	6 - 9			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	6.5 - 8.5		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	7.0 - 8.0	6.5 - 8.0	6.5 - 8.0	5 - 10
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		6.5 - 8.4	6.5 - 9.0

NA - Not available

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 30			
<i>DOMESTIC</i>	Human Consumption			
	0 - 1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	# 1 000

NA - Not available

Phosphorus
(Inorganic)
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	See guideline			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	# 0.1

NA - Not available

Potassium
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 50			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NA

NA - Not available

Protozoan Parasites
(cysts or oocysts/10 R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	< 1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NA (a)

NA - Not available

NR - Not relevant

(a) See guideline

Radionuclides
(Bq/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.5 (a)	0 - 0.228 (d)		0 - 0.42 (g)
	0 - 1.38 (b)	0 - 0.42 (e)		
	0 - 0.89 (c)	0 - 11 (f)		
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NA

- NA - Not available
- (a) Gross α activity
- (b) Gross β activity
- (c) ²³⁸Uranium
- (d) ²³²Thorium
- (e) ²²⁶Radium
- (f) ²²²Radon
- (g) ²²⁸Radium

Selenium
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	# 0.002			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.02			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 50		0 - 0.02	0 - 0.3

NA - Not available

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 5	0 - 10	0 - 20	0 - 150
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NA

NA - Not available

Sodium
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 100			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 2 000		# 70	NA (a)

NA - Not available

(a) See Total Dissolved Solids guideline

Sodium Absorption Ratio

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NR			
<i>DOMESTIC</i>	Human Consumption			
	NR			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NR		NR	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NR	NR	NR	NR
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NR		0 - 1.5	NR

NR - Not relevant

Sulphate
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 200			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 30	0 - 80	0 - 200	0 - 500
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1 000		NA	NA

NA - Not available

Sulphides
(mg/R)

	TWQR (mg/R)			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	0 - 0.001 (a)

NA - Not available

(a) H₂S

Suspended Solids
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact	Intermediate Contact		
	NA	NA		
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 3	0 - 5	0 - 5	0 - 25
<i>AGRICULTURE</i>	Livestock Watering	Irrigation		Aquaculture
	NA	0 - 50 (a)		< 50 mg/R (b) < 20 000 mg/R (c)

NA - Not available

- (a) Clogging of drip irrigation systems
- (b) Clear water species
- (c) Turbid water species

Total Dissolved Solids
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	See guideline			
<i>DOMESTIC</i>	Human Consumption			
	0 - 450			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 100	0 - 200	0 - 450	0 - 1 600
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1 000 (a)		# 40	NA (d)
	0 - 2 000 (b)			
0 - 3 000 (c)				

NA - Not available

- (a) Dairy, pigs & poultry
- (b) Cattle & horses
- (c) Sheep
- (d) See Total Dissolved Solids guideline

Total Hardness
(mg CaCO₃/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	0 - 50	0 - 100	0 - 250	0 - 1 000
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		+ 0.2	See guideline

NA - Not available

Trihalomethanes
(Fg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 100			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	NA

NA - Not available

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	\$ 3.0 (a)		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		NA	# 25 (b)

NA - Not available

(a) Secchi disc depth (m)

(b) Clear water species

Uranium
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	NA			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	NA		0 - 0.01	NA

NA - Not available

Vanadium
(mg/R)

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	NA			
<i>DOMESTIC</i>	Human Consumption			
	0 - 0.1			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 1		0 - 0.10	NA

NA - Not available

	TWQR			
<i>AQUATIC ECOSYSTEMS</i>	< 0.002			
<i>DOMESTIC</i>	Human Consumption			
	0 - 3			
<i>RECREATION</i>	Full Contact		Intermediate Contact	
	NA		NA	
<i>INDUSTRY</i>	Category 1	Category 2	Category 3	Category 4
	NA	NA	NA	NA
<i>AGRICULTURE</i>	Livestock Watering		Irrigation	Aquaculture
	0 - 20		0 - 1	# 0.03

NA - Not available