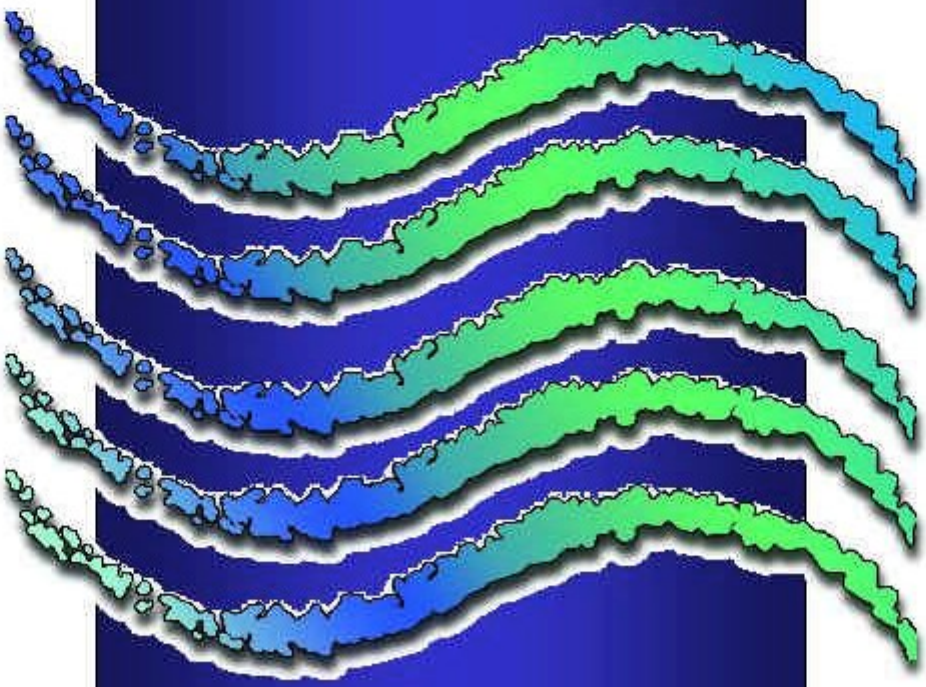
SOUTH AFRICAN

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

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Edited by S Holmes, CSIR Environ mental Services

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Republic of South Africa

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.

This guideline contains edits for correct presentation of symbols – see last page for details.

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

NA - Not available
NR - Not relevant
(a) µg/L chla
(b) bg algal cells/ mL
(c) µg/L of Microcystin
(d) Blue-green algae colonies/0.5 mL counted in a 2 min. scan at 200× magnification
(e) Microcystin cells/ mL

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

NA - Not available

* See Total Hardness

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">≤ 0.005</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 0.15</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NR</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">0 - 5</td><td>0 - 5</td><td>≤ 0.03</td></tr>
</table>

NA - Not available

NR - Nor relevant

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">≤ 0.007</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 1.0</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NR</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">NA</td><td>NA</td><td>0 - 0.025 (a)
2.0 - 0.3 (b)</td></tr>
</table>

NA - Not available
NR - Not relevant

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

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">≤ 0.01</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 0.01</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>0 - 1</td><td colspan="2">0 - 0.1</td><td>0 - 0.05</td></tr>
</table>

NA - Not available

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption (fibres/L)</td></tr>
<tr><td colspan="4">0 – 1 x 10 ⁶</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">NA</td><td>NA</td><td>NR</td></tr>
</table>

NA - Not available

<table>
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<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">≤ 0.01</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 0.002</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NR</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>NA</td><td colspan="2">NA</td><td>< 0.0002</td></tr>
</table>

NA - Not available
NR - Not relevant

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">NA</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">NA</td><td>0 - 0.1</td><td>NA</td></tr>
</table>

NA - Not available

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

NA - Not available

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">≤ 0.15</td></tr>
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<tr><td colspan="4">0 - 5</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">0 - 10</td><td>0 - 10</td><td>0 - 0.2</td></tr>
</table>

NA - Not available

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

NA - Not available

(a) See Total Hardness guideline

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

NA - Not available

NR - Nor relevant

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

NA - Not available

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

NA - Not available

(a) Monogastrics & Poultry
(b) Other livestock

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">≤ 0.007
≤ 0.012 (a)</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 0.05</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">0 - 1</td><td>0 - 0.1</td><td>≤ 0.002</td></tr>
</table>

NA - Not available

(a) Chromium (III)

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">NA</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>0 - 1</td><td colspan="2">0 - 0.05</td><td>NA</td></tr>
</table>

NA - Not available

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

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

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 1</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">0 - 20</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NR</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">NA</td><td>NA</td><td>NA</td></tr>
</table>

NA - Not available

NR - Not relevant

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

NA - Not available

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

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">≤ 0.001</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">NA</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
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<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">NA</td><td>NA</td><td>≤ 0.05</td></tr>
</table>

NA - Not available

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

NA - Not available

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

NA - Not available

NR - Nor relevant
(a) Cold-water species
(b) Intermediate species & warm-water species

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">≤ 0.01</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">NA</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">NA</td><td>NA</td><td>< 0.003</td></tr>
</table>

NA - Not available

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC ($TCID_{50}$/10 Q)</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">< 1</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">0</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NR</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>NA</td><td colspan="2">NA</td><td>NA</td></tr>
</table>

NA - Not available

NR - Not relevant

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

NA - Not available

NR - Not relevant

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

NA - Not available

(a) All other livestock
(b) Ruminants

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

NA - Not available

	TWQR			
AQUATIC ECOSYSTEMS	**≤ 0.0002**			
DOMESTIC	**Human Consumption**			
	0 - 0.01			
RECREATION	**Full Contact**		**Intermediate Contact**	
	NA		NA	
INDUSTRY	**Category 1**	**Category 2**	**Category 3**	**Category 4**
	NA	NA	NA	NA
AGRICULTURE **(mg/ℓ)**	**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

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">NA</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NR</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">NA</td><td>0 - 2.5</td><td>NA</td></tr>
</table>

NA - Not available

NR - Not relevant

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 30</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>0 - 500</td><td colspan="2">NA</td><td>NA</td></tr>
</table>

NA - Not available

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

NA - Not available

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">≤ 0.04</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 0.001</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>0 - 1.0</td><td colspan="2">NA</td><td>0 - 0.001</td></tr>
</table>

NA - Not available

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">NA</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">0 - 0.01</td><td colspan="2">0 - 0.01</td><td>NA</td></tr>
</table>

NA - Not available

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

NA - Not available

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

NA - Not available

(a) NO_3
(b) NO_2

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

NA - Not available

(a) Irrigation equipment

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

NA - Not available

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 5</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>NA</td><td colspan="2">NA</td><td>NA</td></tr>
</table>

NA - Not available

	TWQR			
AQUATIC ECOSYSTEMS	See guideline			
DOMESTIC	**Human Consumption**			
	6 - 9			
RECREATION	**Full Contact**		**Intermediate Contact**	
	6.5 - 8.5		NA	
INDUSTRY	**Category 1**	**Category 2**	**Category 3**	**Category 4**
	7.0 - 8.0	6.5 - 8.0	6.5 - 8..0	5 - 10
AGRICULTURE	**Livestock Watering**	**Irrigation**	**Aquaculture**	
	NA	6.5 - 8.4	6.5 - 9.0	

NA - Not available

	TWQR			
AQUATIC ECOSYSTEMS	≤ 30			
DOMESTIC	**Human Consumption**			
	0 - 1			
RECREATION	**Full Contact**	**Intermediate Contact**		
	NA	NA		
INDUSTRY	**Category 1**	**Category 2**	**Category 3**	**Category 4**
	NA	NA	NA	NA
AGRICULTURE	**Livestock Watering**	**Irrigation**	**Aquaculture**	
	NA	NA	≤ 1 000	

NA - Not available

	TWQR			
AQUATIC ECOSYSTEMS	See guideline			
DOMESTIC	**Human Consumption**			
	NA			
RECREATION	**Full Contact**		**Intermediate Contact**	
	NA		NA	
INDUSTRY	**Category 1**	**Category 2**	**Category 3**	**Category 4**
	NA	NA	NA	NA
AGRICULTURE	**Livestock Watering**	**Irrigation**	**Aquaculture**	
	NA	NA	**≤ 0.1**	

NA - Not available

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 50</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">NA</td><td>NA</td><td>NA</td></tr>
</table>

NA - Not available

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">< 1</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NR</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>NA</td><td colspan="2">NA</td><td>NA (a)</td></tr>
</table>

NA - Not available

NR - Not relevant

(a) See guideline

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">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)</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>NA</td><td colspan="2">NA</td><td>NA</td></tr>
</table>

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

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

NA - Not available

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

NA - Not available

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

NA - Not available

(a) See Total Dissolved Solids guideline

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

NR - Not relevant

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

NA - Not available

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

NA - Not available

(a) H_2S

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">NA</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>0 - 3</td><td>0 - 5</td><td>0 - 5</td><td>0 - 25</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>NA</td><td colspan="2">0 - 50 (a)</td><td>< 50 mg/L (b)
< 20 000 mg/L (c)</td></tr>
</table>

NA - Not available

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

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

NA - Not available

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

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">NA</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">NA</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>0 - 50</td><td>0 - 100</td><td>0 - 250</td><td>0 - 1 000</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td>Livestock Watering</td><td colspan="2">Irrigation</td><td>Aquaculture</td></tr>
<tr><td>NA</td><td colspan="2">< 0.2</td><td>See guideline</td></tr>
</table>

NA - Not available

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

NA - Not available

<table>
<tr><td></td><td colspan="4">TWQR</td></tr>
<tr><td>AQUATIC ECOSYSTEMS</td><td colspan="4">NA</td></tr>
<tr><td rowspan="2">DOMESTIC</td><td colspan="4">Human Consumption</td></tr>
<tr><td colspan="4">0 - 1</td></tr>
<tr><td rowspan="2">RECREATION</td><td colspan="2">Full Contact</td><td colspan="2">Intermediate Contact</td></tr>
<tr><td colspan="2">≥ 3.0 (a)</td><td colspan="2">NA</td></tr>
<tr><td rowspan="2">INDUSTRY</td><td>Category 1</td><td>Category 2</td><td>Category 3</td><td>Category 4</td></tr>
<tr><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">AGRICULTURE</td><td colspan="2">Livestock Watering</td><td>Irrigation</td><td>Aquaculture</td></tr>
<tr><td colspan="2">NA</td><td>NA</td><td>≤ 25 (b)</td></tr>
</table>

NA - Not available

(a) Secchi disc depth (m)
(b) Clear water species

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

NA - Not available

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

NA - Not available

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

NA - Not available

Statement regarding this version of the document on 2019-11-18

The South African Water Quality Guidelines are available from http://www.dwa.gov.za/iwqs/wq_guide/index.asp as individual volumes in PDF format. This is not the official source for these documents, which is at http://www.dwa.gov.za/Dir_WQM/docsFrame.htm (Enter the following in the search box: water quality guidelines, which will return the link to South African Water Quality Guidelines, with all the guideline PDF files in a single 10Mb ZIP file.)

The original documents were written in WordPerfect 6.0, using non-standard WordPerfect symbol fonts. These are now rarely installed on users' computers, and even when they are present some PDF readers (e.g. Adobe) do not detect them. A "font not found" warning occurs, and even installing the non-copyright version of the WP font set WPFONTS.EXE does not work in all circumstances. Using an alternative PDF reader is sometimes successful.

For these reasons, Mike Silberbauer has produced this document by converting the PDF file to MS Word, then replacing the special characters with standard characters, where possible. For example, the curly litre sign is replaced with a capital L. The new document had certain formatting differences from the original, for example some bullet points were missing, and the typeface was not exactly the same.

The document was then converted back to PDF for distribution.

The printed copies remain the definitive version of these documents.