



Aquaculture management and the *Environment Protection (Water Quality) Policy*

EPA 488/03 – The introduction of the Environment Protection (Water Quality) Policy 2003 will have a number of implications for the aquaculture industry. This information sheet advises the industry and associated management agencies on how the Water Quality Policy will directly affect the management of aquaculture in South Australia.

Introduction

The *Environment Protection (Water Quality) Policy 2003* (Water Quality Policy) has been introduced by the Environment Protection Authority (EPA) to provide a consistent approach to the protection of water quality across all South Australian waters. It encompasses marine, estuarine and inland waters (including underground and surface water), and replaces the *Environment Protection (Marine) Policy 1994* and certain other environment protection policies. The Water Quality Policy covers:

- water quality objectives (environmental values plus water quality criteria)
- management and control of point and diffuse sources of pollution
- obligations relating to particular activities
- water quality criteria, discharge limits and listed pollutants.

Further information on the Water Quality Policy can be found in the EPA's *The Environment Protection (Water Quality) Policy – an overview* (June 2003); both the overview and a copy of the Water Quality Policy with an accompanying explanatory report are available on the EPA web site – www.epa.sa.gov.au/pub.html – or call (08) 8204 2004.

Object of the Water Quality Policy

The object of the Water Quality Policy is 'to achieve the sustainable management of the waters of the State by protecting and enhancing water quality while allowing economic and social development'. To this end, the policy seeks to promote best practice in environmental management and aims to encourage the management of waste via the 'waste management hierarchy' that identifies, in order of preference, the following waste management strategies:

- **avoiding** the production of waste
- **minimising**, as far as reasonably practicable, the production of waste
- **reusing** waste
- **recycling** waste
- **recovering** part of waste for re-use
- **treating** waste to reduce potentially degrading impacts
- **disposing** of waste in an environmentally sound manner.

The Water Quality Policy requires industry to ensure that various forms of pollution are where possible prevented, or at least managed, controlled and reduced so that water quality objectives can be met.

Implications for aquaculture

Since the introduction of the *Aquaculture Act 2001*, applications relating to new aquaculture licences, licence amendments and lease conversions are referred to the EPA for comment and endorsement. Additionally, the EPA is a mandatory referral agency under the *Development Act 1993*. The EPA must assess all applications with regard to the objects of the *Environment Protection Act 1993* and associated Environment Protection Policies – including the Water Quality Policy. Therefore, any applications referred to the EPA will now be assessed in accordance with the provisions specified in the Water Quality Policy.

Licensees should also note that all activities, including those not directly related to the farming of fish (e.g. operation and maintenance of vessels and onshore facilities, net cleaning, disposal/deposit of harvest water, fish processing waste and rubbish), will need to comply with the policy.

Every individual, business, industry (including aquaculture) and all government authorities will have certain obligations under the Water Quality Policy. These include:

- to avoid discharging or depositing waste or listed pollutants into any waters, bores or mine shafts, or onto land where it might enter the water
- not to exceed discharge limits
- not to cause environmental harm
- not to contravene the water quality criteria specified in the policy at the point of discharge unless the EPA permits a mixing or attenuation zone to be established
- comply with controls for waste water storage lagoons.

Failure to comply with these requirements may result in an on-the-spot fine or, depending on the seriousness of the offence, prosecution.

A summary of clauses within the Water Quality Policy directly applicable to aquaculture is presented in Table A; however, operators should note there are other clauses in the Water Quality Policy that will apply to their operation.

Avoiding wastewater discharge

The Water Quality Policy requires an operator to take all reasonable and practicable measures to avoid the discharge of waste (including wastewater) into any waters, or onto land where it may enter surrounding waters (including inland, marine and underground waters). Aquaculture operators must ensure that any discharge:

- is appropriately managed according to the waste management hierarchy
- does not cause environmental harm
- meets the water quality criteria for the relevant environmental values.

Clause 16 of the policy enables the EPA, in conjunction with industry and the general community, to set discharge limits for particular activities that can be applied in the form of a concentration or rate. These discharge limits will be specified in Schedule 3 of the Water Quality Policy and will complement the water quality objectives for the receiving waters.

Preventing environmental harm

The cornerstone of the *Environment Protection Act 1993* is the (s25) General Environmental Duty to avoid 'environmental harm'. Environmental harm is defined in the Environment Protection Act, and is further specified in the Water Quality Policy – 'a person, **by discharging or depositing a listed pollutant into any waters**, must not cause any of the following:

- loss of seagrass or other native aquatic vegetation
- a reduction in numbers of any native species of aquatic animal or insect
- an increase in numbers of any non-native species of aquatic animal or insect
- a reduction in numbers of aquatic organisms necessary to a healthy aquatic ecosystem
- an increase in algal or aquatic plant growth
- the water to become toxic to vegetation on land
- the water to become harmful or offensive to humans, livestock or native animals
- an increase in turbidity or sediment levels.

Listed pollutants are specified in Schedule 4 and Schedule 5 of the Water Quality Policy. Some pollutants relevant to aquaculture include therapeutic compounds, animal (including fish) faeces, fertilisers, sediments, dead fish and nutrients.

All aquaculture operators have an obligation to avoid adverse environmental impacts. If an adverse impact does occur as a result of aquaculture related activities, the operator will be in breach of the Environment Protection Act and/or the Water Quality Policy.

Promoting environmental values

The Water Quality Policy defines a set of 'protected environmental values' to promote a healthy ecosystem that will benefit both the environment and industry. Environmental values exist for marine and freshwater aquatic ecosystems, recreation and aesthetics, potable use, agriculture/aquaculture and industry. These values are defined by water quality characteristics (chemical, physical, microbiological or biological measures) and criteria (values) and are adopted from nationally accepted criteria. They are specified in Table 1 of Schedule 2 of the Policy.

Water quality objectives assign the appropriate protected environmental values and corresponding water quality criteria for a particular water body. When more than one environmental value is designated for a particular water body, the most stringent set of criteria for the environmental values will apply.

Environmental values and corresponding water quality criteria specified in the Water Quality Policy that may be applicable to aquaculture are listed in Table B of this information sheet. However, aquaculture operators should note there will be additional water quality characteristics and corresponding criteria listed within the specified environmental values that could be applicable in some circumstances.

Aquaculture operators should note that aquaculture has also been designated as a protected environmental value (Table C).

Creating wastewater storage lagoons

Wastewater storage lagoons (settlement ponds) are used by many aquaculture facilities to collect and treat wastewater discharged from an aquaculture venture. The Water Quality Policy specifies that a person who constructs/manages a wastewater storage lagoon must comply with the following:

- the lagoon must be constructed so that polluted water cannot intercept with any underlying seasonal water table
- the lagoon must be constructed of or lined with an impervious material
- measures must be incorporated to control overflow, flooding and/or leakage
- where required, a sufficient number of monitoring bores must be installed and properly placed to ascertain the presence of potential leakage
- the lagoon must not pose any risks to the health of any animals
- a distance of greater than 600 mm must be maintain between the level of the wastewater and the level of the maximum carrying capacity of the lagoon.

Guidelines for wastewater lagoon construction are available from the EPA.

Industry management tools

The following tools will assist industry in managing its activity in an environmentally sustainable manner. They can provide a mechanism to support the development of environmental management plans which are practical and applicable, and which will comply with the Water Quality Policy. For further information on the procedure involved in applying these tools, please contact the EPA on (08) 8204 2004.

Improving management practices and system design

The preferred option for minimising the potential for environmental harm is to improve the management practices or the design of the aquaculture system. Opportunities for improving management practices and/or system design include:

- engaging suitable wastewater treatment processes (biological and mechanical filtration, waste water storage lagoons, etc.) to remove solids, organic carbon and dissolved nutrients from wastewater before discharge
- improving feeding practices to maximise food conversion ratios and minimise waste

- positioning culture equipment (cages) within a buffer zone inside the lease area so that waste emanating from cages does not contravene the water quality criteria outside the lease area
- incorporating a wastewater storage lagoon on the site to collect and treat wastewater before discharge
- recycling or reusing the wastewater produced by the farm.

In addition the policy allows for the development of Codes of Practice that will provide guidelines, advice and information on how an individual undertaking a particular activity (e.g. aquaculture) can meet the specific requirements of the Water Quality Policy and operate under 'best environmental practice'. The EPA supports the development of Codes of Practice for each industry sector.

Amending environmental values/water quality criteria

Although default values have been set for environmental values and water quality criteria, under some circumstances they may be altered to reflect the different conditions within a specified water body. Individuals, water quality management agencies and other bodies (PIRSA, aquaculture representative committees) can apply to the EPA to change the default environmental values for specific zones of marine and inland waters.

The process to change values will involve the preparation of a regional or locally based environmental management plan that has included extensive community based consultation. Such a plan would need to clearly:

- define the geographic area within which the environmental values are to be changed
- demonstrate a clear and transparent justification for the proposed changes
- indicate whether environmental values set elsewhere would be impacted by the proposed changes
- provide a detailed explanation of the consultation process that has occurred, including consideration of the feedback resulting from the consultation
- provide other relevant documentation that would be sufficient to satisfy the EPA that a change to protected environmental values is justified.

In deciding whether or not to approve the proposed changes the EPA will ensure that they are justified, community consultation has been adequate, changes will not impact on environmental values that have been set elsewhere, and statutory requirements have been met. When the EPA is satisfied that an amendment is justified, a recommendation will be made to the relevant Minister to vary the protected environmental value for that particular water body or segment of the coast.

Designating mixing zones

Under some circumstances, disposal of wastewater from an aquaculture venture to a surface water body (marine or freshwater) may be the only option available, or may represent a lower net environmental risk than other means of disposal.

A mixing zone is an allocated area where water quality objectives for the receiving waters at the point of discharge may not be achievable. A number of requirements must be met before the EPA will endorse the allocation of a mixing zone; they including the following:

- In marine waters the zone must not have a radius exceeding 100 m and must be at least 200 m from the mean low water mark of the coast at spring tides.
- In other waters, the zone must not exceed 20 m in radius.
- The zone must not impact on other users or pose a significant risk to other aquaculture areas, potable water intakes, marine parks, or other areas of high conservation value.
- The zone must also be sustainable and must not contravene the water quality objectives of the waters outside the mixing zone.

It should be noted that a marine aquaculture lease is effectively a mixing zone; however, licensees will need to ensure that water quality objectives outside the lease area are not contravened.

Designating attenuation zones

An attenuation zone features the same principles as a mixing zone but applies to underground waters rather than surface waters. As with mixing zones, there are a number of requirements that must be met before the EPA approves an attenuation zone; they include the following:

- The zone must not be located within a water protection area as defined in section 61 of the Environment Protection Act.
- The zone must not extend beyond the boundaries of the landowner's property unless the consent of adjoining landowners has been obtained.
- The aquifer into which wastewater is being discharged must not have high permeability properties.
- The zone must also be sustainable and must not contravene the water quality objectives of the water outside the attenuation zone.

Additional requirements

Use of antifoulants

The biofouling of equipment used for culturing fish and shellfish in the marine environment can be a significant problem. Antifoulants are sometimes used in the aquaculture industry to minimise the impact of biofouling. The Water Quality Policy specifies a number of requirements for antifoulants; these include:

- Any equipment coated with an antifoulant must only be cleaned in a dry dock, above the high water mark of any waters, or below the high water mark of any waters when the tide is out to such an extent that there is no tidal water coming into contact with the vessel, structure or equipment.
- Antifoulant residues must not enter any waters or come in contact with land below the high water mark of any waters.

The Water Quality Policy also recognises the *Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance 1997* prepared by ANZECC.

Additionally, any antifoulant product used by an operator will need to be registered by the Australian Pesticides and Veterinary Medicines Authority (formally known as the National Registration Authority) in Canberra. The APVMA can be contacted on (02) 6272 5852, or by e-mail RCS@apvma.gov.au.

Fish processing

Some aquaculture facilities process fish on site and will therefore need to ensure their activities conform to the requirements of the Water Quality Policy. The main requirements are that any wastewater and waste generated from fish processing activities must be fully contained and not discharged into any waters or onto land where it may be likely to enter any waters (both surface and groundwater).

Compliance and enforcement

The Water Quality Policy sets out specific obligations and requirements; these are mandatory provisions and may be enforced on people and businesses by authorised officers in several ways:

- by issuing an Environment Protection Order (EPO) to gain compliance with the policy
- by issuing an expiation notice (on-the-spot fine) of \$300 for a breach of a mandatory provision (Category B offence)
- by prosecuting through the court (maximum penalty \$30,000).

Fines may apply if the action has been shown to be negligent, even if the offence was accidental.

Failure to comply with specific requirements in a code of practice or guideline linked to the Water Quality Policy may result in the issuing of an EPO. An EPO may require that a person or agency take specified action within a defined period.

Provisions of the Water Quality Policy are enforceable by the Environment Protection Authority, local councils, and other government authorities.

In summary

All aquaculture operators are obliged to comply with the Water Quality Policy. In effect, this will require aquaculture operators to:

- avoid the discharge or deposit any waste into any waters or onto land where waste is likely to enter waters
- comply with the water quality criteria specified in the Water Quality Policy
- not cause environmental harm by discharging or depositing any pollutants (including nutrients and sediment) into waters or on land where waste is likely to enter waters
- apply the 'waste management hierarchy' to their aquaculture operation.

Non-compliance with these and some other requirements set out in the Water Quality Policy is an offence which may attract an on-the-spot fine and/or prosecution in court.

The aquaculture industry is encouraged to promote best environmental practice in their operations by adopting the 'waste management hierarchy'. This may be achieved by using management practices that incorporate, for example, biological and/or mechanical filtration, settlement ponds or irrigation. The EPA also encourages industry to investigate alternative options that may be appropriate in preventing or minimising the discharge of pollutants into the environment.

Table A: Summary of clauses within the Environment Protection (Water Quality) Policy that are directly applicable to the aquaculture industry including case studies.

Clause	Summary / case studies	Offence*
Clause 11 General obligation to avoid discharge etc. into waters.	This clause states that any activity must attempt to avoid discharge of waste into any waters or onto land that may result in waste entering surrounding waters. If the activity requires discharge of waste, it must be done in a manner that will prevent or minimise environmental harm.	
	<i>Example: An abalone farm must avoid discharge of waste into the marine environment. If discharge must occur, the farm must incorporate management practices that will prevent or minimise environmental harm and ensure the relevant water quality criteria are met—i.e. by sediment removal and nutrient stripping.</i>	
Clause 12 Obligation not to cause certain environmental harm	This clause provides some examples of environmental harm.	Category B offence
	<i>Example: The smothering and subsequent loss of seagrass due to sediment produced by finfish farms would be deemed environmental harm.</i>	
Clause 13 Obligation not to contravene water quality criteria (Schedule 2)	Discharge of waste from an aquaculture site must not increase (or in some cases decrease) any of the water quality criteria specified within the policy in Schedule 2 (e.g. ammonia, chlorine and nitrate are some parameters that are referred to in the Policy).	Category B offence
	<i>Example (land based): Should water from a recirculation system be discharged into any waters, it should not cause change in the water quality criteria of the receiving waters beyond what is specified in Schedule 2.</i>	
	<i>Example (marine based): Cage culture of fish must not contravene the water quality criteria specified in the Policy outside their lease area.</i>	
Clause 14 Exemption from water quality criteria in surface waters—mixing zones	This clause permits the creation of a mixing zone within an area of surface water in which waste from an aquaculture venture can be discharged (i.e. create an exemption from Clause 13). Certain criteria must be considered when granting a mixing zone, so mixing zones cannot be granted for all circumstances.	
	<i>Example: If a culture system must discharge wastewater into marine or fresh waters, the point at which the water is discharged may be classified as a mixing zone if the water quality criteria cannot be met at the point of discharge. Before this exemption is granted, a number of criteria as referred to in Clause 14 must be met.</i>	
Clause 15 Exemption from water quality criteria in underground water—attenuation zones	Similar to Clause 14 but refers to discharge of waste into underground water rather than surface waters.	

* Definition of Category B offence—expiation (on-the-spot fine) for a breach of a mandatory provision.

Clause	Summary/case studies	Offence*
Clause 16 Obligation not to exceed discharge limits fixed by Policy (Schedule 3)	Discharge limits for specified pollutants listed in the Water Quality Policy (Schedule 3) must not be exceeded unless an exemption is granted.	Category B offence
	<i>Example: An abalone farm may only be allowed to discharge a particular concentration or annual load of pollutants specified in the policy unless an exemption is approved.</i>	
Clause 17 Obligation not to discharge or deposit listed pollutants into waters or onto certain land (Schedule 4)	Fish farmers must not deposit any pollutants listed in Schedule 4 into any waters or on land that may result in the pollutant entering any waters.	Category B offence
	<i>Example: If a fish farm is using waste water to irrigate surrounding crops, orchards or paddocks, they must ensure that water containing pollutants does not drain into any surrounding waterway or enter groundwaters.</i>	
Clause 18 Wastewater storage lagoons	According to the Water Quality Policy, settlement/discharge ponds are classified as wastewater storage lagoons. There are a number of requirements regarding the construction and management of wastewater lagoons that must be considered by fish farmers.	Category B offence
	<i>Example: The establishment of new settlement ponds used in land-based fish farming (e.g. recirculation systems, abalone farms) must conform to the requirements specified in the Water Quality Policy.</i>	
Clause 19 Obligation not to discharge listed pollutants or waste into bores, mine shafts, etc. (Schedule 4)	Similar to Clause 17 but refers to discharge of pollutants into underground water sources, including bores, wells, quarries or other similar structures, rather than surface waters.	Category B offence
	<i>Example: Land-based aquaculture farms must not discharge nutrient rich or other polluted water into underground water sources such as bores, wells, sinkholes etc.</i>	
Clause 22 Antifoulants	There are specific requirements in the Water Quality Policy regarding the application of approved antifoulants and cleaning of equipment that has been treated with an antifoulant.	Category B offence
	<i>Example: The cleaning of a sea-based cage that has been treated with an approved antifoulant may only be permitted if cleaning occurs above the high water mark of any waters.</i>	
Clause 27 Fish processing works	Requirements for the management of fish processing for the primary purpose of trade or business are specified in this clause.	Category B offence
	<i>Example: A fish farm processing fish on site for wholesale trading will need to ensure that waste water is disposed of properly and an appropriate wastewater management system is incorporated in the premises. Wastewater must not be discharged into any waters or onto land where it is reasonable likely to enter any waters.</i>	

* Definition of Category B offence—expiation (on-the-spot fine) for a breach of a mandatory provision.

Environmental values identified in the Water Quality Policy include aquatic ecosystems (both marine and fresh), potable, recreational and aesthetic, agricultural/aquacultural and industrial. For the purpose of this information sheet, only pollutants that are commonly produced by aquaculture operations will be listed; however, aquaculture operations should note that all other parameters listed in Schedule 2 of the Water Quality Policy will apply to any operator that discharges them. Where a particular water body has more than one environmental value designated, the most stringent value will apply.

Aquaculture operators must not exceed or, if already exceeded, further exceed the water quality criteria specified in Schedule 2 of the Water Quality Policy by discharging or depositing a pollutant into any waters as a result of any aquaculture activity.

Table B: Examples of the water quality criteria expressed in Schedule 2 of the Water Quality Policy that will be applicable to aquaculture.

Pollutant	PROTECTED ENVIRONMENTAL VALUES (mg/L)	
	<i>Fresh aquatic ecosystems</i>	<i>Marine aquatic ecosystems</i>
<i>Inorganic pollutants</i>		
Ammonia (total as nitrogen)	0.5	0.2
Ammonia (NH ₃ as nitrogen)	0.01	0.05
BOD (5 day test)	10	10
Chlorine (total)	0.003	0.0075
Oxidised nitrogen (as nitrogen)	0.5	0.2
Phosphorus (total as phosphorus)	0.5	0.5
Phosphorus (soluble as phosphorus)	0.1	0.1
Salinity (% variation)	10%	
Sulfide	0.002	0.002
Suspended sediment	20	10
Total nitrogen (as nitrogen)	5	5
Total organic carbon	15	10
Turbidity (NTUs)	20	10
Colour (Hazen Units)	30	15
<i>Other parameters</i>		
Oxygen (dissolved)	>6	>6
pH (pH units)	6.5–9	

Aquaculture operators should note that aquaculture has also been designated as a protected environmental value. This means that other activities undertaken within the vicinity of aquaculture development must conform to the water quality criteria specified for aquaculture. Examples of these values are also listed in the table below. Refer to Table 1, Schedule 2 of the Water Quality policy for the complete list.

Table C: Examples of protected environmental values for aquaculture listed in the Water Quality Policy.

Pollutant	PROTECTED ENVIRONMENTAL VALUES (mg/L)		
	<i>Marine aquatic ecosystems</i>	<i>Fresh aquatic ecosystems</i>	<i>Aquaculture</i>
<i>Metal pollutants</i>			
Arsenic	0.05	0.05	0.02
Beryllium (total)	0.004		0.0001
Chromium (total)			0.02
Manganese (total)			0.1
Mercury (total)	0.0001	0.0001	0.0005
Nickel (total)	0.15	0.015	0.1
Zinc (total)	0.05	0.05	0.005
<i>Organic pollutants</i>			
Benzene	0.3	0.3	0.4
Polychlorinated biphenyls (PCBs)	0.000001	0.000004	0.0005
<i>Microbiological pollutants</i>			
Faecal coliforms or <i>E.Coli</i>			0

Further information

Legislation

Legislation may be viewed on the Internet at: www.parliament.sa.gov.au/dbsearch/legsearch.htm

Copies of legislation are available for purchase from:

Government Information Centre

Telephone:

13 23 24

Internet:

www.info.sa.gov.au

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