E N V I R O N M E N T P R O T E C T I O N A U T H O R I T Y

Code of Practice for **Milking Shed Effluent**

Government of South Australia

EPA South Australia

WATER

Code of Practice for

Milking Shed Effluent

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ISBN 1 876562 54 4

MAY 2003

Printed on recycled paper

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FOREWORD

This document represents a translation of the *Environment Protection (Milking Shed Effluent Management) Policy 1997* into a code of practice linked to the *Environment Protection (Water Quality) Policy 2003* (the Water Quality Policy). An operator of a milking shed must comply with this code as described by section 28(3) of the Water Quality Policy.

The Environment Protection Authority (EPA) recognises that most dairy farmers will not want to read the Water Quality Policy and the Code in parallel with each other. The Code brings together the components of interest to dairy farmers concerning the Water Quality Policy as well as the requirements of the Code itself.

Within this Code, the mandatory requirements, which are drawn from the Water Quality Policy, are clearly referenced. In addition, terms that have a legal definition can be found in the definitions section of the Code.

It is intended that this Code will be revised and updated over time in light of changes in the dairy industry, changes in dairy waste management technology, the results of environmental monitoring programs, and experience with administration and enforcement of the Water Quality Policy and this Code. However, it should be recognised that this Code will not be amended without consultation with the South Australian Dairy Farmers Association and agreement by the Minister for Environment and Conservation.

DEFINITIONS

In this Code of Practice, the terms used have the following meanings:

bore	an opening in the ground excavated for the purpose of obtaining access to underground water, or an opening in the ground for some other purpose that gives access to underground water
construct	in relation to a building, includes: to build, rebuild, erect or re-erect the building; to repair the building; to make alterations to the building to enlarge or extend the building; to underpin the building; to place or relocate the building on land construction has a corresponding meaning
development	has the same meaning as in the Development Act, and includes building work or a change in the use of land; the division of an allotment; an act or activity in relation to land (other than an act or activity that constitutes the continuation of an existing use of land) declared by regulation under the Development Act to constitute development.
dryland pasture	pasture grown without the aid of irrigation using surface or underground water, and includes pasture irrigated with milking shed wastewater
geotechnical membrane	any artificial membrane or material used to decrease the natural permeability of a milking shed wastewater lagoon
irrigation drainage channel	any artificial channel used to convey irrigation drainage water back to a watercourse
lagoon	any dam, pond or lagoon that is constructed from earth, whether lined with a geotechnical membrane or not, and used for the storage or treatment of milking shed wastewater
milking shed	any structure, whether roofed or not, at which operations for the milking of animals are carried on, including any associated yard areas at which animals are confined prior to or following milking
milking shed wastewater	manure, urine, washdown water or contaminated runoff from milking shed operations, and includes components of such matter produced by storage and evaporation in a lagoon or some other treatment process, but does not include natural runoff from stock races
operator	of a milking shed includes an owner of the milking shed
pollutant	has the same meaning as in the Environment Protection Act. Examples include any solid, liquid or gas (or combination thereof) including waste, smoke, dust, fumes, odour, noise or heat
sink hole	a natural opening in the ground that may give access to underground water
solids separation pit	a structure designed specifically to separate manure and other settleable solids from the liquid component of milking shed wastewater

underground water	water occurring naturally, or stored, below ground level
wastewater management system	a system that is designed and operated for the purpose of collecting wastewater and disposing of it to land, or storing it and subjecting it to evaporation in a wastewater storage lagoon or some other treatment process so as to minimise any adverse impacts on the environment
wastewater storage lagoon	any dam, pond or lagoon constructed and used for the purpose of storing wastewater and subjecting it to evaporation or some other treatment process, but does not include a sediment retention basin
watercourse	any of the following (whether or not temporarily dry): • a river, creek or other natural watercourse (whether modified or not) • a dam or reservoir that collects water flowing in a watercourse • a lake, wetland or other body of water through which water flows • the Coorong • an artificial channel • a public stormwater disposal system • part of a watercourse
water protection area	a part of the State, for the time being declared to be a water protection area (see part 8 of the Environment Protection Act)
water quality criteria	in relation to protecting a particular protected environmental value, means the maximum concentrations of certain substances permitted by this policy to be in water, or the minimum or maximum levels permitted for certain characteristics of water
waters	waters to which the Water Quality Policy applies (see clause 4 of the Policy)

1 INTRODUCTION

The surface and underground waters of South Australia are an extremely important component of our natural environment. Their value to both society and the environment includes such uses as:

- providing raw[1] drinking water
- supporting the aquatic ecosystem
- supplying water for aquaculture, agriculture and industry
- supporting a wide range of recreational pursuits.

Milking shed wastewater and associated sludges and solid wastes have a very high nutrient and microbiological concentration and can have a major adverse impact on water resources if poorly managed. Experience has shown that most dairy farmers in South Australia have now installed wastewater management systems and recognise the importance of continuing to operate such systems to avoid water pollution and land degradation. Most dairy farmers have also recognised the value in retaining the nutrient and water components of their milking shed wastewater, associated sludges and solid wastes, and using them on their farms.

As the trend towards larger milking herd sizes continues in South Australia, the potential 'point source' of pollution posed by milking shed activities increases. The Code will provide the basis for reviewing compliance with the general environmental duty and the *Environment Protection (Water Quality) Policy 2003*.

2 ENVIRONMENT PROTECTION ACT AND WATER QUALITY POLICY

The principal legislation addressing pollution in South Australia is the *Environment Protection Act 1993* (the Act). In particular, section 25 imposes the general environmental duty on all people undertaking an activity that can pollute, to take all reasonable and practicable measures to prevent or minimise any resulting environmental harm. The Act also provides for the creation of environment protection policies, which may include both recommended and mandatory requirements for the protection of a particular aspect of the environment, such as water quality.

The *Environment Protection (Water Quality) Policy 2003*, hereafter referred to as the 'Water Quality Policy', aims to improve or protect the quality of water in our creeks, rivers, lakes, wetlands, estuaries, seas and underground waters. The Water Quality Policy defines the levels of protection considered necessary for the waters of the State. Codes of practice for specific activities provide information that will help people meet the requirements of the Water Quality Policy.

Section 28(3) of the Water Quality Policy states that the operator of a milking shed must comply with the EPA's *Code of Practice for Milking Shed Effluent* 2003 (i.e. this Code).

[1] *Suitable for potable consumption following treatment.*

3 APPLICATION AND PURPOSE OF THIS CODE

This Code of Practice applies to the management of liquid, semi-solid and solid wastes derived from milking activity in structures where cows, sheep or goats are milked in any number and at any frequency in any part of South Australia.

The principal purpose of the Code is to ensure that:

- the operator of a milking shed complies with the mandatory provisions of the Water Quality Policy
- milking shed wastewater and associated sludges and solid wastes do not pollute the environment unless all reasonable and practicable measures have been taken to prevent or minimise any resulting environmental harm.

This Code is to be utilised as a guide, and contains techniques which will enable owners or operators of milking sheds to satisfy the general environmental duty by achieving the 'standards of care' outlined in the Code. If an owner or operator has alternative techniques that can be shown to meet the general environmental duty requirements, then these will be deemed to be acceptable.

4 NEW MILKING SHED DEVELOPMENTS

4.1 Application

This section applies to a milking shed and its operations if the development is undertaken on or after the commencement date of the Water Quality Policy.

4.2 Milking sheds and associated yards

Any proposal for the construction of a new milking shed and associated yards in South Australia must be approved under the *Development Act 1993* by the relevant local planning authority (i.e. council). Any proposed milking shed development which will be used for the milking of more than 100 cows at any one time in a water protection area, as declared under the Environment Protection Act, must be referred by the local planning authority to the EPA for advice. A map showing the location of water protection areas is contained in Appendix 1.

Any new milking shed should be located:

- a minimum of 100 m, and further if possible, from watercourses, wetlands, sinkholes, irrigation drainage channels and other sensitive water resources
- a minimum of 100 m, and further if possible, from houses on neighbouring properties
- on high ground so that wastewater can be conveyed into waste treatment facilities by gravity rather than pumping regimes
- away from land which is prone to waterlogging or flooding.

A wastewater irrigation management plan should be provided with any new milking shed development application.

Any applicant for a new milking shed should also try to incorporate the following environmental management design features into their application:

- construction of a concreted yard area of sufficient size to hold all of the milking herd prior to, during and after milking, and from which all yard drainage can flow to the milking shed wastewater management system
- capture of clean milking shed roof runoff for use in the milking shed and/or diversion away from the milking shed yard or milking shed wastewater management system
- diversion of external runoff from the milking shed yard, stock races or the milking shed wastewater management system
- sizing of the milking shed wastewater management system to cater for the peak wastewater generation rate from yard areas, including during storm events, without spillage onto surrounding land or into watercourses
- if wastewater is to be stored in a lagoon(s), provision of sufficient capacity for storage of wastewater for at least six months of the year (to avoid the need for spreading in late autumn, winter or early spring)
- if wastewater is to be pumped continuously onto land, inclusion of a solids separation system to be used to reduce the concentration of solids in pumped liquids
- if wastewater is to be pumped continuously onto land, inclusion also of a backup system to contain any wastewater during likely periods of pump, pipe or sprinkler failure
- availability of sufficient suitable land on the property to provide for ecologically sustainable wastewater irrigation (refer to wastewater spreading requirements as specified in section 5.3 of this Code)
- avoidance of irrigating with wastewater during the periods of the year where weather conditions result in saturation of the soil profile and/or reduced plant growth (i.e. winter months), through either the incorporation of wastewater storage lagoon(s) or ceasing of milking
- provision of the maximum opportunities for water reuse (recycling of water, reusing wastewater for yard washdowns, etc.)
- suitable fencing that prevents stock, visitors or children from entering the wastewater treatment systems area.

4.3 Lagoons

Any new development application involving milking shed wastewater lagoons which is referred to the EPA will be assessed according to the following criteria.

A milking shed wastewater lagoon must not be located:

- on a flood plain that is subject to flooding that occurs, on average, more often than once in every 100 years
- within 20 m of a public road or road reserve
- within 50 m of a water supply bore, a sink hole or the bank of a watercourse
- within 200 m of a residence built on land that is owned by some other person
- in an area where the base of the lagoon would be below any seasonal water table
- within 500 m of the tidal high water mark.

In addition, it is a mandatory requirement under the Water Quality Policy that a wastewater lagoon be constructed with a barrier that minimises, as far as practicable, leakage from the

lagoon (section 19). In relation to the storage of milking shed wastewater in lagoons, the following criteria should satisfy this legal requirement:

- if the lagoon does not incorporate a geotechnical membrane, it should be lined with clay that has a minimum compacted thickness of 600 mm, has been protected from drying out during construction and has a maximum in-situ permeability not exceeding 0.1 mm/day
- where the lagoon incorporates a geotechnical membrane, the manufacturer's information indicates that:
  - the permeability through the membrane will not exceed 0.1 mm/day
  - the membrane has been installed according to the manufacturer's specifications.

It should be recognised that any development approval involving the construction of a milking shed wastewater lagoon may require the applicant to provide documentation satisfying the EPA that the lining criteria outlined above has been achieved.

4.4 Solids separation pits

The proposed construction of milking shed solids separation pits may not constitute development for the purposes of the Development Act (proponents should check with their local planning authority). However, where the EPA receives referrals of development applications incorporating such facilities, they will be assessed using the following criteria:

Solids separation pits should not be located:

- within 50 m of a house on a neighbouring property
- within 25 m of a water supply bore, a sink hole or the bank of a watercourse
- on a flood plain that is subject to flooding that occurs, on average, more often than once in every 10 years.

5 OPERATIONAL REQUIREMENTS

5.1 Application

This section applies to all milking shed operations, regardless of their development commencement date.

5.2 Need for an operating wastewater management system

It is mandatory under the Water Quality Policy that the operator of a milking shed ensures that:

- the premises incorporate a wastewater management system
- the system is effectively operating in respect of any wastewater generated at the premises while the premises are being used as a milking shed (section 28(2)).

In order to comply with this mandatory requirement:

- all areas where milking cows are confined prior to, during and following milking, should be concreted and drained to a wastewater management system
- any wastewater management system must be capable of handling the volume of wastewater generated from the milking shed and associated yards at all times of the year

- the wastewater management system chosen for use at the milking shed must be operational at all times, or a backup system must be in place while the primary system is being repaired, maintained or upgraded.

5.3 No wastewater discharges into waters

The Water Quality Policy makes it an offence for any person to discharge or deposit milking shed wastewater into any waters or onto land from which it is reasonably likely to enter any waters (section 17(1)).

A person found to have breached this provision could be issued with an expiation notice (on-the-spot fine) or be prosecuted by the EPA.

To ensure compliance with this mandatory requirement, dairy farmers must avoid the discharge at all times of milking shed wastewater into any river, creek, wetland or dam capturing general catchment runoff, or any irrigation drainage channel or sinkhole.

The EPA recommends that dairy farmers incorporate additional safeguards into their milking shed wastewater management system to provide for containment of wastewater in case of mechanical breakdown, power failure or extreme wet conditions. These safeguards could take the form of backup pumps, earth bunds below pumping sumps, or large storage sumps capable of holding several days' worth of wastewater production.

5.4 Wastewater lagoons

It is an offence under the Water Quality Policy for any person who discharges milking shed wastewater into a lagoon to allow the water in the lagoon to rise to a level that is less than 600 mm from the maximum carrying capacity of the lagoon (section 18). Again, if an operator of a milking shed is found to have breached this provision they could be issued with an expiation notice or be prosecuted by the EPA.

To ensure compliance with this mandatory requirement, dairy farmers need to continuously monitor the volume of wastewater held in their wastewater lagoon(s) and take action to draw down liquid levels in the lagoon(s) well ahead of the 600 mm freeboard level being reached. Ideally, wastewater lagoon(s) should be drawn down to empty, or nearly empty, in early autumn in order to provide sufficient storage capacity for milking shed wastewater and any contaminated yard stormwater generated during the late autumn, winter and early spring periods. In this way there should be no need for forced spreading of milking shed wastewater on land at wet times of the year.

If dairy farmers choose to have small wastewater lagoons, which may only hold several weeks' or months' worth of wastewater, they will need to monitor storage levels and take action to draw down levels on a very regular basis. The same may apply to wastewater lagoons that are substantially filled with accumulated sludge, although dairy farmers should also aim to remove sludges well before liquid storage capacity is dramatically affected.

5.5 Solids storage and disposal/utilisation

When manure and other sludge material is removed from lagoons or solids separation pits for temporary stockpiling and/or drying before spreading on land, this should be done in a manner which avoids environmental harm. One method considered suitable to achieve this objective is to place the extracted manure and sludge material on an impervious surface (such as a concrete base) that allows any excess wastewater to drain back into the wastewater lagoon or solids separation pit.

Any land spreading of milking shed sludge or dried solid wastes should be done in accordance with the criteria contained in the next section of this Code.

5.6 Waste disposal

This section of the Code applies to the disposal of wastewater directly from milking sheds, wastewater from storage lagoons, and sludges/dried solid wastes from solids separation pits and lagoons.

As highlighted earlier in this Code, the Water Quality Policy makes it an offence for any person to discharge or deposit milking shed wastewater into any waters or onto land in a place from which it is reasonably likely to enter any waters (section 17(1)).

Similarly, dairy farmers have an obligation under the Water Quality Policy to avoid the disposal of milking shed waste in a manner that may lead to the entry of these wastes into any waters or onto land in a place from which it is reasonably likely to enter any waters.

There are various ways of avoiding breaches of these provisions according to the unique soil, topography, surface drainage network and groundwater environment of individual dairy farms. However, there are certain minimum acceptable criteria for milking shed waste application onto land, as outlined below.

5.6.1 Setback distances

Milking shed wastes should not be applied or discharged onto land:

- within 50 m of an irrigation channel containing water or a watercourse, bore or sink hole
- within 10 m of a dry irrigation channel
- within 100 m of a house on land not owned by the owner of the milking shed
- within 10 m of land not owned by the owner of the milking shed.

5.6.2 Type of land

Milking shed wastes should not be applied or discharged onto land that:

- has a tendency to become waterlogged (i.e. classified as poorly drained or very poorly drained)
- is subject to flooding more than one in every 10 years
- is steep sloping (i.e. greater than 1 in 5, or 20%)
- is rocky or has a very shallow soil depth (i.e. less than 30 cm)
- has no vegetative cover
- lies above an unconfined groundwater aquifer in any area where soil permeability exceeds 300 mm/year.

5.6.3 Application rates

Where milking shed wastewater and any associated sludges or solids are spread onto land, it is important that this is conducted in an ecologically sustainable manner. This means that milking shed wastewater should be applied to the land at a rate that enables the nutrients contained in the wastewater to be utilised for plant growth. This will avoid water pollution through nutrients leaching beyond the root zone of the plants, or from excess surface water runoff with high nutrient concentrations.

Dairy farmers should periodically have samples of their milking shed wastewater, any associated sludges or solids, and soils within the proposed land spreading area chemically analysed so that a sustainable spreading rate can be determined. Such sampling and analysis would also give dairy farmers a greater understanding of the fertiliser equivalents contained in their milking shed wastes and the benefits or impacts they may be having on soils in spreading areas.

A technical publication and software package (available in CD-ROM format) entitled *A Manual for Spreading Nutrient Rich Wastes on Agricultural Land* has been prepared by the Department of Primary Industries and Resources and the EPA. It can be used to help dairy farmers and their consultants devise sustainable waste spreading practices. This publication and software package can be obtained by telephoning the EPA Customer Services on (08) 8204 2004, or from the Environment Shop, Ground Floor, 77 Grenfell St, Adelaide.

This technical information takes account of waste characteristics, soil type and chemistry, vegetation to be grown in spreading areas, and land area available, and provides a scientific and easily used basis for determining ecologically sustainable waste spreading rates onto land in South Australia. However, compliance with the following broad waste spreading criteria should also be adhered to:

Milking shed wastewater should not be applied or discharged:

- so as to result in surface ponding such that permeation into the soil will take one hour or more
- onto dryland pasture in the South-East Water Protection area at a rate that contributes to a total concentration of 100 kg of nitrogen per hectare on such pasture per year.

In addition, if land is irrigated with milking shed wastewater, the land must not be flood irrigated within two clear days after the application of the wastewater.

6 FURTHER READING

The following references are recommended for further information regarding the management of milking shed wastewater:

- ARMCANZ/ANZECC, 1998. National Water Quality Management Strategy: Effluent management guidelines for dairy sheds. Joint publication of Agriculture and Resource Management Council of Australia and New Zealand, and the Australian and New Zealand Environment and Conservation Council. Printed in Canberra. 33 pages.
- EPA. Draft Separation Distance Guideline.
- Lower Murray Irrigation Action Group, 1994. *Guidelines for the management of milking shed wastewater and intensive stock use areas on dairy farms - Lower Murray irrigation area*. Adelaide, SA. 52 pages.
- South Australian Government, 1993. *Guidelines for the management of milking shed wastewater and intensive stock use areas on dairy farms in the Mt Lofty Ranges*. Adelaide, SA. 41 pages.
- South-East Dairy Effluent Guidelines Group, 1995. *Guidelines for the management of dairy shed effluent in the South-East of South Australia*. Printed in Adelaide, SA. 61 pages.
- Wrigley, Roger, 1994. *Managing dairy-shed wastes - Volume 2*. Dairy Research and Development Corporation. Victoria. 120 pages.

APPENDIX 1

Water protection areas in South Australia