MAF

Ministry of Agriculture and Fisheries
Dalmuir House, 114 The Terrace
Private Bag, Wellington
New Zealand
Telephone (04)739-080, Telex NZ 31448
Facsimile No: 729070

Circular

86/3/5 86/14/15

Ref: 15/4/10/l

26 November 1986 CP

to:

Export Slaughterhouses (ME's)
Packing Houses (PH's) processing meat, game meat or game (PH's processing fish only are excluded)
Canneries
Casings Factories (CF's)
Deer Slaughtering Premises (DSP's)
Game Packing Houses (GPH's)
Export Stores (S's) with refrigerating facilities

subject: AMENDMENT TO MDC 86/3/2 ON SURVEILLANCE OF POTABLE WATER IN MEAT AND GAME EXPORT PREMISES

previous circular or manual ref: 86/3/2, 86/14/5

The first five pages of MDC 86/3/2 86/14/S dated 2 October 1986 have been amended. This amendment is attached.

Please remove pages l-5 inclusively from the MDC in your possession and replace with the attachment.

The 26 November 1986 version of MDC 86/3/2 86/14/S shall be implemented immediately.

D.AG Breton.

DAG Breton
Acting Director
Meat Division

Ministry of Agriculture and Fisheries
Dalmuir House, 114 The Terrace
Private Bag, Wellington
New Zealand
Telephone (04) 739 080, Telex NZ 3144B Facsimile No: 729M

Circular

86/3/2, 86/14/5

Ref: 15/4/10/1

26 November 1986 CP

To: Export Slaughterhouses (ME'S)
Packing Houses (PH's) processing meat, game meat or game (PH's processing fish only are excluded)
Canneries
Casings Factories (CF's)
Deer Slaughtering Premises (DSP's)
Game Packing Houses (GPH's)
Export Stores (S's) with refrigeration facilities

Subject: SURVEILLANCE OF POTABLE WATER IN MEAT AND GAME EXPORT PREMISES

Previous circular or manual ref:

84/3/1, 84/14/10 are hereby cancelled Manual 3 and Manual 14

1 PREAMBLE

The various regulations promulgated under the Meat Act 1981, including those relating to meat and game, require licensees of premises to provide potable water for processing.

Managers must conduct regular microbiological, chemical and physical examination of their water supplies to ensure potability. Where premises have a history of suspect water or environmental factors predispose to the water being suspect, the managers should install an approved treatment or disinfection system. Potable water must meet the minimum microbiological, chemical and physical criteria laid down in this circular. These criteria are based on the current World Health Organisation (WHO) recommendations.

Meat Division's role is that of monitoring the licensees' water surveillance programmes.

2 AIM

To describe the requirements for the surveillance of potable water supplies in export premises.

3. PROCEDURES

3.1 All export premises to which this circular is addressed are to comply with the requirements set out herein.

3.2 Routine Surveillance

The following procedures apply to existing water supplies/installations in licensed premises.

3.2.1 Microbiological Tests:

The manager shall sample water at the point of usage and test for:

(a) Total coliforms.

(b) Faecal coliforms.

(c) Total aerobic bacteria at 20-25°C and at 35-37°C.

In accordance with the appropriate minimum sampling plan in Table 1 of Appendix A. The results must be countersigned by the Inspector. A record of the results of all examinations carried out on water samples must be retained for at least three years.

The Inspector shall sample the water at the point of usage and test for total coliforms in accordance with the appropriate minimum, sampling plan in Table 1 on Appendix A. Whenever a suspect "coliform" colony appears on the culture medium (e.g., Millipore membrane), the medium shall be sent to the nearest Animal Health Laboratory for further examination to ascertain if the colony is "total coliform" or "faecal coliform".

Where the water supply is likely to ' contain other organisms such as algae, protozoa, helminths and pathogenic organisms, the manager shall ensure that the water is routinely tested for these organisms to monitor the water's potability. Algae are likely to be present in water that has passed through a condenser with an "open" cooling chamber or a cooling tower, without any treatment (e.g. filtration, chlorination) prior to its use for food processing.

The other criteria set out in Appendix A for sampling, testing and acceptance/rejection of the water supply shall be complied with.

3.2.2 Physico-chemical Tests:

The manager shall arrange with an independent and competent laboratory (e.g. a laboratory with specific TELARC registrations for the physico-chemical tests) to routinely test the physical and chemical parameters of the water at the point of usage in accordance with the criteria set out in Appendix B. The results must be countersigned by the Inspector. A record of the results of all examinations carried out on water samples must be retained for at least three years.

NB: The cost of sampling and testing the water shall be borne by the manager.

3.2.3 Chlorine tests:

Where water is chlorinated within the premises, the total and/or free available chlorine levels in the water shall be monitored by the manager and the inspector in accordance with the criteria in Appendix C. This surveillance is to ensure that the chlorination plant complies with the performance standards outlined in Appendix C, and should not be construed as a measure of the water's potability. Potability of water is to be verified by the microbiological and physico-chemical criteria specified in Appendices A and B.

Where water is chlorinated: by the local supply authority and not further chlorinated in the premises, routine monitoring of the total and tree available chlorine levels is not compulsory. However, experiences in several premises have shown that positive coliform test is often followed a nil chlorine reading in such water supplies. In these cases, both managers and inspectors have found it valuable to routinely check the chlorine levels. The chlorine standards in Appendix C shall not apply to this situation, but nil reading should be noted with an appropriate follow-up on the water supply (e.g. bacteriological tests).

3.2.4 Performance checks on water treatment system:

Where water is treated (e.g. sand-filtered, flocculated, softened etc.) in the premises, routine physical/chemical/microbiological tests shall be conducted by the manager in accordance with the criteria in Appendix D, to ensure that the treatment plant is operating satisfactorily. These tests are additional to the tests required in 3.2.1 and 3.2.2.

3.3 Premises Applying for Licence

3.3.1 Before a premises is licensed, the water supply at the source or at the point of usage as appropriate shall be surveyed (see 3.3.2, 3.3.3 and 3.3.4) to ensure that it is potable. Survey of the supply at the source should be carried out by the applicant in early stages of planning or construction, so that any water treatment required can be incorporated into the plans or construction with minimal problems at later stages.

3.3.2 Water to be supplied by the local authority:

The survey of water supply required in 3.3.2 is not necessary if the applicant can furnish a written guarantee from the local supply authority that the supply to the proposed premises will be potable (as defined by the criteria in Appendices A and B). Otherwise, the supply shall be surveyed at a point as close to the proposed premises as possible, in accordance with the criteria in Appendix E.

3.3.3 Ground water from a deep well in the premises:

The water shall be surveyed at the well in accordance with the criteria in Appendix E.

3.3.4 Surface water derived from a river without any treatment:

Sanitary surveys at the source of the water shall be conducted in accordance with the criteria in Appendix E. Based on the physico-chemical and microbiological qualities of the water at the river intake, the, water at the source shall be classified and given the appropriate treatment as laid down in the appendix.

Note: Once licensed, it is an operational requirement to ensure that the water is potable at the point of usage, before production can commence. Routine microbiological and physico-chemical tests shall be carried out as per 3.1.1 to 3.1.4.

3.4 Changes to Existing Water Supply/Installation in Licensed Premises

3.4.1 New source of water:
New well or river supply shall be surveyed in accordance with 3.3.2 or 3.3.3 and verified as being potable (as per Appendices A and B), before it can be approved by Meat Division for connection to the existing distribution system in the premises.

Alterations to Existing Water Installation

Where alterations to existing reticulation system (e.g. extension of pipeline, replacing a screen or pump in the well) or treatment plant (e.g. adjusting the levels of the chemicals currently in use) have occurred, appropriate physical, chemical or microbiological tests of water shall be conducted by the licensee after these alterations and prior to use, to verify that the alterations have not affected the potability of the water.

3.5 Construction and Maintenance of Water Supply System

The manager shall ensure compliance with the criteria in Appendix E Section E3 in respect of:

(a) Constructional requirements for well heads, chlorination systems, storage tanks, pipelines etc.

(b) Routine maintenance of the system.

(d) Disinfection of new system.

3.6 Interagency Communication

The Inspector supervising each premises is to approach the relevant people in the local authorities (e.g. catchment board, health inspector, farm advisory officer) to enlist their co-operation to:

(a) Ensure that the manager and the Inspector are promptly notified of any events (e.g. farm pollution, industrial accident, breakdown in the local treatment plant, bad water test results), which are likely to have some bearing on the potability of the water supply in the premises.

(b) Assist in determining the causes of water problems in the premises.

(c) Carry out ad hoc testing of water where necessary (e.g. by health inspector) in conjunction with the manager and the Inspector.

DAG Breton
Acting Director
Meat Division

cc Regional Pleat Veterinarians
Regional Meat Inspectors
Supervising Veterinarians
Nominated Veterinarians
Supervising Meat Inspectors
Sole Charge Meat Inspectors
Travelling Meat Inspectors
Engineers
Scientist (Food Technology)
Advisory officers (Meat)
Administration Officers (Meat

Appendix A Microbiological Surveillance of Potable Water

A1 Introduction

Drinking/process water must not contain any micro-organisms known to be pathogenic. It should also be free from bacteria indicative of faecal pollution, and other organisms such as protozoa, helminths and algae.

To ensure that a supply of drinking/process water satisfies the World Health Organisation (WHO) guidelines, it is important that samples be examined regularly for indicators of faecal pollution. The primary bacterial indicator recommended for this purpose is the coliform group of organisms. Although as a group they are not exclusively of faecal origin, they are universally present in large numbers in the faeces of human beings and other warm-blooded animals, thus permitting their detection after considerable dilution. The detection of faecal (thermotolerant) coliform organisms, indicates possible faecal pollution of the water supply. Supplementary indicator organisms, such as faecal streptococci and sulphite-reducing clostridia, may sometimes be useful in determining the origin of faecal pollution, as well as in assessing the efficiency of water treatment processes.

The methods used to detect and confirm the presence of coilform organisms are designed to demonstrate one or more of the properties in the following working definitions - which are practical rather than taxonomic:

> Total coliforms refers to any rod-shaped, non-spore-forming, Gram-negative bacteria capable of growth in the presence of bile salts or other surface-active agents with similar growth-inhibiting properties, which are cytochrome oxidase negative and able to ferment lactose at either 35 or 37°C with production of acid gas and aldehyde within 24-48 hours.
>
> Faecal coliforms refers to those organisms which have the same properties as the "total coliforms" at a temperature of 44 or 44.5°C.

Routine enumeration of "total bacteria" by way of standard plate counts at 20-25°C and 35-37°C is useful in that an abnormal increase in the counts may provide an early indication of pollution of the water supply or breakdown of the supply and/or treatment system. High levels can also affect the detection of coliforms in the supply.

Whenever there is an unsatisfactory water report, the following general approach must be taken by the Manager and the Inspector:

(a) Verify the report (e.g.: retest water from the same sampling point).

(b) Test water samples from other parts of the system to assess the magnitude of the problem and to assist the action in (c).

(c) Conduct physical examination at strategic parts of the system to locate and remove the cause(s) of the unsatisfactory report.

A2 Frequency of Routine Sampling

Examination of drinking/process water should be both frequent and regular. It should be conducted even if there is no manufacturing activity in the premises, so that a history of the supply can be compiled to facilitate assessment of the water quality. The frequency with which samples should be collected will depend on the quality of the source, the treatment the water receives, the risks of contamination, the rate of water consumption and the previous history of the supply.

A new source of water supply should be monitored more frequently than it would be under normal circumstances so that variations in quality can be observed under a variety of weather and climatic conditions.

Appendix A-Table 1 gives the minimum sampling frequencies required of Managers of premises and Inspectors. Where there has been a history of water problems, the frequency of water sampling by the Manager and the Inspector shall be increased accordingly.

A3 Collection, Storage and Transport of Water Samples

Care must be taken to ensure that samples are representative of the water to be examined, and that no accidental contamination occurs during sampling.

As an unsatisfactory test result may cause the production to be stopped and/or product, retained, sample collectors should therefore be made aware of the responsible nature of their work and be adequately trained.

A3.1 Sampling Points

Routine water samples shall be taken from the points of usage in the premises, e.g.: slaughter-board, boning room, further processing area, etc. Where necessary, samples should also be taken at the source. The sampling points should be rotated so that all outlets in the premises are tested from time to time, as well as being strategically located in those parts of the distribution system to monitor potential hazards in the system.

In a cannery, it is mandatory that the water to be used for cooling retorted cans be routinely sampled for microbiological tests at the point where it enters the cooling tank/retort. This requirement is additional to the routine surveillance of water in other parts of the premises.

A3.2 Sampling Technique

When sampling from a tap, external fittings such as filters, rubber or plastic nozzles and other anti-splash devices should be removed, and the water be allowed to run to waste for 3-5 minutes to ensure that stagnant water is flushed from the pipe-work before the sample is taken. Flaming of the tap before the sample is taken should be considered a desirable procedure but care should be taken to avoid the destruction of tap washer/valve seat.

For microbiological examination, samples shall be collected in clean, sterile, glass or autoclavable plastic bottles. If the supply has been chlorinated by the local supply authority or in the premises, the bottles should contain an appropriate amount of sodium thiosulphate solution [e.g.: 1 mg sodium thiosulphate ($NaS_20_3.5H_20$) per 100 ml of sample containing up to 1.5 ppm FAC] to neutralise any residual chlorine. The thiosulphate solution should be added to the clean bottles and sterilised with the bottles.

Samples should be kept in the dark and cool, preferably between 4-10°C, and transported to the laboratory within 6 hours of collection for examination.

A4 Techniques for Microbiological Examination of Water

Water samples shall be examined in accordance with the procedures prescribed in "Standard Methods for the Examination of Water and Wastewater" 16th edition, American Public Health Association, New York.

The tests shall only be carried out by trained personnel.

A5 Microbiological Criteria

The water supply shall meet the criteria specified in Appendix A-Table 2.

A6 Non Compliance with Microbiological Criteria

The procedures set out below shall be followed by the Manager and the Inspector.

A6.1 Unsatisfactory SPC22 / SPC 37 Only

(a) The Manager and the Inspector immediately retest water samples from the same point of usage that the original positive was derived, as well as from other points of usage:
and

(b) the Manager and the Inspector immediately carry out a thorough investigation to determine the causes of the unsatisfactory water report;
and

(c) the Manager takes effective remedial action to the satisfaction of the Inspector without delay;
and

(d) retest results:

(i) if all results are satisfactory, licensee is to continue the intensified daily testing of water until 5 successive satisfactory results are recorded; or

(ii) if only SPC22 and/or SPC37 are unsatisfactory, the Manager and the Inspector are to take actions as detailed in A6.1 (b) and (c): or

(iii) if total coliform counts are unsatisfactory but faecal coliform counts are satisfactory, the Manager and the inspector are to take actions as detailed in A6.2; or

(iv) if faecal coliform counts are unsatisfactory, the Manager and the Inspector are to take actions as detailed in A6.3.

A6.2 Unsatisfactory Total Coliform Counts (but not faecal coliform counts)

(a) Whenever coliforms are detected in a water sample the Manager and the inspector shall immediately retest water from the same point of usage that the original positive was derived as well as from other points of usage; and

(b) if the counts exceed 3 per 100 ml, or if 1-3 coliforms were detected more than once in the fast 20 samples or in any 2 consecutive samples, the licensee shall carry out procedures in A6.2(a) as well as thoroughly flushing the entire water system (including storage tank and distribution pipes) with superchlorinated water (containing at least 40ppm free residual chlorine) for at least 30 minutes, and subsequently fill the system with potable water. (NB: Other approved disinfection procedure may be used.) Water shall be retested at several points of usage after the superchlorination procedure; and

(c) the Manager and the Inspector shall immediately carry out a thorough investigation of the entire system to determine the causes for the unsatisfactory water report; and

(d) the Manager shall take effective remedial action to the satisfaction of the Inspector without delay; and

(e) retest results:

(i) if all results are satisfactory before and/or after the superchlorination procedure, the Manager shall continue the intensified daily testing of water until 5 successive clear results are recorded; or

(ii) if only SPC22 and/or SPC37 are unsatisfactory before or after the superchlorination procedure, repeat A6.1 (a), (b) and (c); or

(iii) if total coliform counts but not faecal coliform counts are unsatisfactory before and/or after the superchlorination procedure, the Manager shall repeat procedures in A6.2(b), (c) and (d). Product is to be retained as in A6.3(b) and a full report as per A6.3(g) made; or

(iv) if faecal coliform counts before or after the superchlorination procedure are unsatisfactory, the Manager and the Inspector shall take action as per A6.3.

A6.3 Unsatisfactory Faecal Coliform Counts

(a) The Manager and the Inspector shall retest water at a large number points of usage before and after superchlorination procedure (referA6.3(c)); and

(b) the Inspector shall retain all production, as from the date of the last clear test, that are still present on the premises; and

(c) the Manager shall flush the entire water system (including storage tank and distribution pipes) with superchlorinated water (containing at least 40 ppm free residual chlorine) for at least 30 minutes, followed by overnight soaking of the entire system with the superchlorinated water. The Manager may elect to carry out the overnight soaking at the end of the day's production in which case the soaking shall be immediately preceded by a 30-minute flushing with superchlorinated water.

(d) After the overnight soaking, the water is to be examined for free residual chlorine at the point of usage and drained out. If no residual chlorine is detected, the superchlorination procedure (i.e.: 30 minute flushing and 12 hour soaking) is to be repeated. Otherwise, the system is then filled with potable water. (NB: Other approved disinfection procedure may be used.) The Manager is to retest water at several points of usage after the superchlorination procedure; and

the Manager and the Inspector shall immediately carry out a thorough investigation to determine the causes of the unsatisfactory water report; and

(e) the Manager shall take effective remedial action to the satisfaction of the Inspector without delay; and

(f) retest results:

(i) if all results obtained after the superchlorination procedure are satisfactory, normal production can resume. The Manager shall continue the intensified daily testing of water until 5 successive clear results are recorded; or

(ii) if SPC22 and/or SPC37 only are unsatisfactory before and/or after the superchlorination procedure, repeat procedures in A6.1 (a), (b), and (c); or

(iii) if total coliform counts or faecal coliform counts obtained before and/or after the superchlorination procedure are unsatisfactory, repeat procedures in A6.3(a), (b), (c), (d) and (e); and

(g) the Inspector shall submit to the Regional Meat Veterinarian and the Assistant Director (Technical Services), a comprehensive situation report for a decision on release of the retained production. The report shall contain all relevant information including:

(i) the investigation carded out by the Manager and the Inspector;

(ii) evidence collected;

(ii) nature and causes of the problem identified;

(iii) remedial action carried out by the Manager;

(v) inventory of the products retained.

Appendix A
Table 1 Minimum Sampling Frequencies for Routine Microbiological Surveillance of Potable Water

Average daily consumption (cu.metre/day)	**Tests***	**Minimum sampling frequency ****	
		Licensee	**Meat Division**
Export stores			
- on town supply	TC	1/6 months	1/6 months
	FC	1/6 months	where necessary
	SPC22	1/6 months	where necessary
	SPC37	1/6 months	where necessary
- on own supply	TC	1/3 months	1/3 months
	FC	1/3 months	where necessary
	SPC22	1/3 months	where necessary
	SPC37	1/3 months	where necessary
Other premises			
<2,000	TC	1/month	1/month
	FC	1/month	where necessary
	SPC22	1/month	where necessary
	SPC37	1/month	where necessary
2,000 to 10,000	TC	1/week	1/fortnight
	FC	1/week	where necessary
	SPC22	1/week	where necessary
	SPC37	1/week	where necessary
> 10,000	TC	2/week	1/week
	FC	2/week	where necessary
	SPC22	2/week	where necessary
	SPC37	2/week	where necessary

TC = total coliform count; FC =faecal coliform count SPC22 standard plate count at 20-25°C (total bacterial count) SPC37 standard plate count at 35-37°C (total bacterial count)

Additional tests for such organisms as faecal streptococci, Clostridium perfringens, helminths, protozoa, algae, etc shall be conducted by the Manager where necessary.

** The Manager may adjust the sampling frequency corresponding to the average daily water consumption in the off season.

Appendix A
Table 2 Microbiological Criteria

Organism/Test	Criteria
Total coliforms	No 100 ml sample shall exceed 3 coliforms. Coliforms, shall not be detected in any 2 consecutive samples taken on different days. Counts of 1 to 3 coliforms per 100 ml sample shall not be detected more than once in the last 20 samples.
Faecal coliforms	No 100 ml sample shall contain any faecal coliform.
SPC22	No 100 ml sample shall contain more than 10,000 colony forming units.
SPC37	No 100 ml sample shall contain more than 1,000 colony forming units.

**Note: Faecal streptococci, sulphite-reducing clostridia, helminths, protozoa, algae and other pathogenic organisms shall be absent in any water sample.

Appendix B Routine Surveillance of Physico-chemical Parameters of Potable Water

B1 Introduction

Besides meeting the microbiological criteria specified in Appendix A, water for food processing must also meet the physical and chemical standards set for "drinking water". The standards set out in this appendix are primarily based on the guidelines recommended by the World Health Organisation (1984), which have also been adopted by the Department of Health. Additional standards stipulated by the European Community have been included hereto ensure that the premises are eligible for exporting meat and game products to those markets.

It is acknowledged that some of the physico-chemical standards such as those related to aesthetic quality of water and inorganic parameters of no public health importance are, when exceeded, not likely to impair the wholesomeness and safety of the processed food. Nevertheless, it is necessary for the Manager of the premises and/or the local supply authority to correct the defects to comply with the regulations.

B2 Frequency of Sampling

Whereas frequent sampling and appraisal is necessary for microbiological parameters, sampling and analysis for physical and chemical parameters of water is required much less frequently.

A thorough appraisal should be made whenever a new water source is to be brought into service or immediately following any major change in water treatment processes. Subsequently, samples should be analysed periodically, the frequency being determined by local circumstances. In addition, local information on developments in the catchment area (especially agricultural and industrial activities) should be gathered (preferably with assistance of the local health inspector and catchment board engineer) to predict likely contamination problems and thus determine the need for more frequent monitoring of specific physico-chemical parameters.

Appendix B-Table 1 sets out the recommended physico-chemical parameters for routine and periodic/special monitoring.

Appendix B-Table 2 sets out the "action" levels for a comprehensive list of physico-chemical parameters, some of which are not routinely monitored. Whenever the water quality is suspect (e.g.: high turbidity, discoloration, farm pollution), the Manager shall send additional samples taken from the source and point of usage to an officially recognised laboratory for comprehensive analyses.

Appendix B-Table 3 sets out the minimum sampling frequencies to be carried out by the Manager.

B3 Nomination of Testing Laboratory

In premises where facilities are available, Category A physico-chemical tests may be conducted in the company's own laboratory with TELARC registrations for the specified physico-chemical tests.

Few premises, if any, have laboratory facilities for conducting the full range of physico-chemical tests specified under Category B in Appendix B-Table 1. As Category B tests are regarded as formal verification of the potability of the premises' water supply, they shall be performed by an officially recognised laboratory.

Currently, DSIR Chemistry Division in Christchurch has TELARC-registered facilities for handling the full range of tests; other TELARC laboratories have limited registrations for some of the tests. The latter laboratories will only be recognised for the tests for which there are current TELARC registrations.

Once the Manager has nominated an officially recognised laboratory for carrying out the tests, he shall arrange with that laboratory for the supply of special sampling bottles.

B4 Collection & Handling of Water Samples

The Manager shall carry out sampling of water under supervision of the Inspector. All samples shall be sealed with a MAF carton seal prior to dispatch to the laboratory.

Care must be taken to ensure that samples are representative of the water to be examined, and that no accidental contamination occurs during sampling. Samples shall be dispatched to the laboratory as soon as possible.

Under normal circumstances, samples shall be taken from the point of usage (e.g.: slaughter-board boning room). Where necessary, additional samples should be taken at the source. The sampling points should be strategically located in the distribution system to monitor potential hazards in the system.

B5 Method of Analysis

Water samples shall be examined in accordance with the methods prescribed in "Standard Methods for the Examination of Water and Wastewater" 16th edition, American Public Health Association, New York, or those specified in Annex III of the EC Directive 80/778/EEC.

The tests shall only be carried by technically qualified personnel.

The Manager shall provide the inspector with a copy of the test results without delay.

B6 Physical & Chemical Criteria

The water supply shall meet the criteria in Appendix B - Table 2.

B7.1 Remedial Measures

The criteria given in Appendix B - Table 2 represent the 'trigger points' for the Manager's and the Inspector's investigatory and remedial action.

When any criterion is exceeded, the Inspector shall ensure that appropriate actions are taken by the Manager based upon such considerations as the toxicity of the contaminant and the likelihood of product containing an unacceptable level of the contaminant. The suitability (potability) of the water for drinking and of the processed product for human consumption should be assessed separately by the Inspector.

B7.2 Manager's Responsibility

(a) Install a treatment system capable of correcting the problem as a temporary measure while investigation into the causes of the water defects is being conducted.

(b) If required by the Inspector, send water samples from the source and point of usage to an officially recognised laboratory for further analysis. The Manager shall bear the cost of sampling and analysis.

(c) Provide the inspector with a copy of the test results without delay.

(d) Take effective remedial action without delay when the causes have been identified.

Test products if required by the inspector ascertain their fitness for human consumption.

B7.3 MAF-Meat Division's Responsibility

(a) Investigate causes of water defects in conjunction with the Manager, including communicating with local health inspector, catchment board and DSIR Chemistry Division, Christchurch.

(b) Consult with the Regional Meat Veterinary [RMV] and the Assistant Director (Technical Services) [AD (TS)] via telephone/telex/MAFCOM and if instructed by the latter retain the specified products that are still present on the premises.

(c) Submit to the RMV and AD (TS), a comprehensive situation report as per A6.3 (9) in Appendix A, for a decision on product testing and release of the retained products.

Appendix B
Table 1 Surveillance of Physico-chemical Parameters

Routine monitoring (Category A)	**Periodic/special monitoring** (Category B)
Odour Taste Turbidity (appearance) Temperature Conductivity pH Nitrate Nitrite Ammoniacal nitrogen Other contaminants likely to be present in the supply	Colour Conductivity pH Turbidity (NTU) Total hardness Free $C0_2$ Alkalinity as $C0_3$ Total alkalinity as HCO_3 Chemical oxygen demand Ammoniacal nitrogen Chloride Fluoride Nitrate Nitrite Reactive phosphorus Sulphate Aluminium Arsenic Boron Cadmium Calcium Chromium Copper Cyanide Iron Lead Magnesium Manganese Mercury Potassium Sodium Selenium Zinc Chlorinated alkanes Polynuclear aromatic hydrocarbons (PAH) Pesticides Chiorobenzenes Chlorinated phenols Benzene and alkylaromatics Trihalomethanes Other contaminants

Appendix B
Table 2 Physical and chemical criteria

Parameter	Unit	Criterion ("Action" level)
1. General Qualities		
Aluminium	g/cu.m	0.2
Ammonium	N g/cu. m	0.39
Calcium	g/cu.m	100
Chloroform extract (dry residue)	g/cu.m	0.1
Colour	True colour unit	15
Conductivity	mS/m at 20°C	40
Copper	g/cu.m	0.05
Dissolved/emulsified hydrocarbon (after extraction with pet ether)	g/cu.m	0.001
Dry residue	g/cu.m	1500
Hydrogen sulphide		Organoleptically undetectable
Iron	g/cu.m	0.2
Kjeldahl nitrogen (excl. nitrogen in nitrate and nitrite)	g/cu.m	1.0
Manganese	g/cu.m	0.05
Magnesium	g/cu.m	50
Odour	Dilution No.	2 at 12°C 3 at 25°C
Oxidizability by $KMn0_4$	0_2 g/cu M	5
pH	-	6.5-8.5
Phosphorus	P_20_5 g/cu.m	5
Potassium	g/cu.M	12
Sodium	g/cu.m	200
Sulphate	g/cu.M	400
Surfactants (react with methylene blue)	lauryl sulphate g/cu.m	0.2
Taste	Dilution No.	2 at 12°C 3 at 25°C
Total dissolved solids	g/cu.m	1000
Total hardness	$CaC0_3$ g/cu.m	200
Total organic carbon (TOC)	g/cu.m	Any increase in usual amount
Turbidity	NTU	5
Zinc	g/cu.m	5

Parameter	Unit	Criterion ("Action" level)
2. Inorganic chemicals of health significance		
Antimony	g/cu.m	0.05
Arsenic	g/cu.m	0.05.
Barium	g/cu.m	0.1
Boron	g/cu.m	1.0
Cadmium	g/cu.m	0.005
Chromium	g/cu.m	0.05
Cyanide	g/cu.m	0.1
Fluoride	g/cu.m	1.1
Lead	g/cu.m	0.05
Lithium	g/cu.m	0.05
Mercury	g/cu.m	0.001
Nickel	g/cu.m	0.05
Nitrate	N g/cu.m	10
Nitrite	N g/cu.m	0.03
Selenium	g/cu.m	0.01
Silver	g/cu.m	0.01
3. Organic chemicals of health significance		
Aldrin and dieldrin	mg/cu.m	0.3
Benzene	mg/cu.m	10
Benzo[a]pyrene	mg/cu.m	0.01
Chlordane	mg/cu.m	0.3
Chloroform	mg/cu.m	30
2, 4, 5-T	mg/cu.m	10
2, 4-D	mg/cu.m	100
DDT and breakdown products	mg/cu.m	1
Diquat	mg/cu.m	60
Gamma-HCH (lindane)	mg/cu.m	3
Paraquat	mg/cu.m	10
Pentachlorophenol	mg/cu.m	10
Phenol index	mg/cu.m	0.5
Tetrachloroethene	mg/cu.m	10
Trichloreothene	mg/cu.m	30
2, 4, 6-trichlorophenol	mg/cu.m	10
4. Radioactive constituents		
Gross alpha activity	Bq/1	0.1
Gross beta activity	Bq/1	1

Appendix B
Table 3 Minimum Sampling Frequencies for Physico-chemical Testing of Potable Process / Drinking Water

Average daily potable water consumption (cu.metre/day)	**Physical/chemical tests** (refer Table 1)	**Licensee's responsibility**
Export stores		
on town supply	Category A	1/year
	Category B	1/3 years
on own supply	Category A	1/year
	Category B	1/2 years
Other premises		
<2000	Category A	2/year
	Category B	1/2 years
2000 - 10000	Category A	6/year
	Category B	1/year
>10000	Category A	12/year
	Category B	2/year

Note: For periodic monitoring of water (i.e.: Category B tests), the Manager and the Inspector of each premises will be notified in writing by Meat Division Head Office when a water sample is required to be taken.

Appendix C Routine Monitoring of Chlorinated Water Supply

C1 Introduction

In general, the primary factors that determine the biocidal efficiency of chlorine areas follows:

(a) Chlorine concentration - the higher the concentration the more effective the disinfection and the faster the rate of disinfection.

(b) Type of chlorine residue - free chlorine is a much more effective disinfectant than combined chlorine.

(c) Contact time between the organism and chlorine - the longer the time, the more effective the disinfection.

(d) The pH of water in which contact is made the lower the pH, the more effective the disinfection.

(e) The level of impurities in water the higher the amount of inorganic and organic compounds, the higher the amount of chlorine required for disinfection.

Fluctuation in the chlorine level of chlorinated water supply occurs in both manual and automatic chlorination systems. Frequent daily monitoring of the level is desirable to ensure a satisfactory performance of the system used (see also Appendices D and E).

C2 Frequency of Sampling

Where chlorination of water is carried out in the premises, tests for free and total chlorine (or chlorine dioxide) levels shall be conducted. The Manager and the Inspector shall test the supply in accordance with the minimal testing frequencies specified in Appendix C - Table 1. The Manager and the Inspector shall increase the testing frequency whenever the chlorination system is not performing satisfactory. Where the water is chlorinated by the local authority and not subjected to further chlorination in the premises, chlorine tests are not compulsory but are desirable. The testing frequencies given below are guidelines.

In meat/game canneries, it is a mandatory requirement that samples of the water for cooling canned product be routinely taken from the Inlet and outlet of the cooling tank/retort for chlorine tests. The Manager and the Inspector shall test the water at least once a day during production.

C4 Collection and handling of samples

Chlorine in aqueous solution is unstable. The chlorine content of samples or solutions, particularly weak solutions, will decrease rapidly. Exposure to sunlight or other strong light or agitation will accelerate the reduction of chlorine. Therefore, samples shall not be stored and shall be analysed immediately after collection.

Chlorinated water samples shall be taken from the point of usage and only after the supply has had the 30 minute chlorine contact time. Samples shall be collected in clean bottles and protected from contamination and strong light.

C5 Methods of analysis

Water samples shall be examined in accordance with the procedures prescribed in "Standard Methods for the Examination of Water and Wastewater" 16th edition, American Public Health Association, New York, or EC Directive 80/778/EEC, or MAF - Meat Division Manual 8.

C6 Performance criteria

The performance criteria for chlorinating systems are based on free available chlorine residuals in the treated water (see Appendix C - Table 2). However, any abnormal increase in total chlorine value which relates to the quality of the raw water should be investigated (see section C8 below).

C7 Records and reports

The Manager shall record all test results and copy to the Inspector without delay. Where the results are outside the criteria, the Manager shall notify the Inspector immediately.

C8 Remedial actions

Whenever the results are outside the criteria, the Manager and the Inspector shall investigate the problems. Total coliform and/or faecal coliform tests shall be conducted by both the Manager and the Inspector on water samples taken from the points of usage, immediately after the discovery of a chlorination problem. If required by the Inspector, the Manager shall have the water tested for the Category A or B physico-chemical parameters (refer Appendix B - Table 1 of this circular).

Where the water supply is chlorinated in the premises, the Manager shall correct the chlorine level without delay.

Appendix C
Table 1 Minimum sampling frequencies for routine chlorine testing of potable water

Peak water consumption (cu.metre/day)	**Test***	**Licensee's responsibility**	**Meat Division responsibility**
Export Stores			
on town supply or own supply	FAC	1/week	1/4 months
Other Premises			
<2000	FAC TC	1/day 1//day	1/week Nil
>2000	FAC TC	1/day 1/day	2/week Nil

*FAC - free available chlorine;
TC- total chlorine.

NB: TC may be carried out occasionally rather than routinely if the supply has a good history of potability.

Appendix C
Table 2 Free Available Chlorine Criteria for Chlorinated water

Type of supply	**FAC at the point of usage**
Premises' own chlorinated supply	0.3ppm*
Chlorinated water from local authority	Level controlled by local authority; normally a trace level should be detected.
Cooling water for canned food	5ppm* at inlet to retort or cooling tank and 0.5ppm at the outlet

* The criterion applies to chlorinated water which has had the 30 minute chlorine contact time. Where chlorine dioxide is used as the chlorinating agent, the same criterion shall be complied with.

Appendix D Routine Monitoring of Water Treatment Plant

D1 Types of water treatment and common problems

Sedimentation

Process	Gravity settling and deposition of comparatively heavy suspended material in water.
Common problem	Inadequate settling.

Coagulation - flocculation

Process	Forming flocculent particles in water by the addition of a chemical such as alum (hydrated aluminium sulphate); the floc or larger particles will settle to the bottom of the tank.
Common problem	Carry over of flocculent or floc into the supply.

Filtration

Process	Removing suspended matter from water as it passes through beds of porous material, e.g: slow sand filter, pressure sand filter, diatomaceous earth filter.
Common problem	Clogging up of filter, leakage of bacterial biomass, inadequate filtration capacity or inadequate cleaning.

Softening

Process	Removal of the minerals, primarily calcium and magnesium, which cause hardness; water may be softened by ion-exchange or lime-soda ash process.
Common problem	Clogginq up of ion-exchange column; hiqh sodium level in supply.

Activated carbon treatment

Process	Removal of off-odour and tastes, as well as dissolved gasses,soluble organics and finely divided solids.
Common problem	Clogging up of filter or leakage of bacterial biomass.

Algae control

Process	Periodic addition of copper sulphate in ponds or reservoirs. Maintenance of a continuous and adequate chlorine residue will also control the growth of algae in storage facilities.
Common problem	Incorrect dose of algicide.

Diatom control

Process	Periodic dose of copper sulphate.
Common problem	Incorrect dose of chemical.

Iron/manganese removal

Process	A combination of automatic chlorination and fine filtration, or aeration and filtration, or ion-exchange with greensand to name a few.
Common problem	Inadequate treatment especially filtration.

pH adjustment

Process	This is done with an acid or alkali.
Common problem	Inadequate pH adjustment.

Disinfection by chlorine or other approved method

Refer Appendix C and Appendix E - section E3.5.

The Manager shall ensure that any treatment plant is operated or supervised by a technically qualified person.

D2 Supervision of Water Treatment Plants

The Manager shall ensure that any treatment plant is operated or supervised by a technically qualified person.

D3 Routine Process Control

(a) The Manager shall test appropriate physico-chemical parameter(s) of the treated water at such a frequency as to ensure that the treatment process is satisfactory, and that treated water meet the potability criteria specified in Apendices A and B of this circular.

(b) Such tests shall be conducted by trained personnel in accordance with the procedures prescribed in "Standard Methods for the Examination of Water and Wastewater" 16th edition, American Public Health Association, New York.

(c) The Manager shall maintain an up-to-date record of routine test results for inspection by the Inspector.

(d) The Inspector shall monitor company's supervision of the treatment process and routinely inspect and endorse the plant records. Where the potability of the treated water supply is in doubt, the Inspector shall require the Manager to have the water supply tested in accordance with the procedures laid down in Appendix A and/or B of this circular.

Appendix E Preliminary Sanitary Survey of a new source of water for an export premises

E1 Introduction

The purpose of a preliminary sanitary survey of any new source of water, be it anew well or a new connection to a town's water mains, is two-fold:

(a) To assess potability of the water.
(b) To determine the need for special water treatment.

The sanitary survey is an on-site inspection of all conditions, devices, and practices in the water supply system that affect, or could affect potability of the water. It also includes microbiological, physical and chemical testing of the proposed water supply.

E2 Procedures

Each new source shall be inspected prior to its approval as a source of potable water.

The inspection shall be carded out by the Manager and the Inspector and where necessary, the local authorities (eg: catchment board engineer and health inspector). The local authorities would be able to assist with Identification of geologically related hazards and sources of human, agricultural and horticultural pollutants located in the surrounding area.

Refer to sections E3-E6

E3 Guidelines for on-site inspection

E3.1 Groundwater

Generally speaking, when good quality groundwater is available in sufficient quantity it is to be prefered. More frequently than water from other sources, groundwater can be expected to be clear, colourless, and of better bacterial quality. Clahty does not automatically guarantee bacterial purity. Because most well water is unchlorinated, a well's sanitary protection is particularly important. Three factors are particularly important in evaluating the sanitary quality of groundwater:

(i) geology -safety of the aquafer;
(ii) distance from sources of pollution;
sealing of the well from surface contamination.

Geologically related hazards frequently arise when aquafers are shallow with water-tables close to the surface or when "shortcut" routes exist (eg: faults or channels in soluble rock such as limestone) through which polluted waters reach wells.

A safe distance between awe ll and a source of pollution is difficult to define except as "a distance that ensures that no pollutant will reach the well". The distance should be the maximum that economics, land ownership, geology, and topography permit: as a guideline, a minimum of 10 metres is frequently suggested. The well should be situated on a surface elevation above surrounding sources of contamination and should be protected from flood waters.

The third common hazard, that of contamination by surface waters, can be largely avoided by proper construction of wells, eg: construction of well seals and covers, extension of well casings to at least 15 cm above the well-house floor and into the impermeable stratum immediately above the aquafer, the provision of proper venting, watertight pump connections, and locks in wells and pump houses, and the disinfection of new construction work.

E3.2 Surface water

For surface water (eg: water from a river, creek or an open pond), the water shed to be used to supply untreated water should be sparsely inhabited, have no source of pollution, generally be at or near the point of rainfall or snowfall, and consistently yield clean, clear water. Even though samples of water from such sources are certified "potable", water entering the distribution system should be chlorinated in order to maintain residual chlorine in case of chance or sporadic contamination of the source.

The waterworks staff must never take the attitude that because the water is subject to treatment or disinfection they are absolved from the necessity of maintaining the best possible raw water quality at the intake. Even the most complete, best operated treatment plant cannot be relied on to operate perfectly at all times; the selection of the purest possible raw water must therefore be considered a necessary preliminary to treatment. This is particularly true of intakes from large rivers or open bodies of water.

The siting and depth of the point at which water enters the supply system may greatly affect waterquality. Draw-offs should be sufficiently far below the surface to avoid floating matter. Conversely, an intake set too low may draw in mud and sediment from the bottom; this may interfere with the proper working of pumps and filters. **Intakes should be well upstream of sewer outfalls.**

In cases where the risk is apparent but unavoidable, micro-strainers or coarse sand roughing filters can be installed as a **pre-treatment precaution** or the intake can be changed to an infiltration gallery along the bank. Another possibility is to construct a raw-water holding reservoir with a capacity of several days' supply where settlement and some die-off of bacteria may take place. Such devices may not only improve the quality of the raw water but also, by reducing the load on the treatment plant and stabilising the quality of the water to be treated, increase the capability of the plant.

Most surface water will require filtration, but filtration is often preceded by storage, coagulation, or sedimentation or other processes that, while effecting some purification, have the advantage of conditioning the water to improve the efficiency of the filtration stage. Filtration must be followed by disinfection, chlorine being the most frequently used disinfecting agent. In a well-designed and well-operated water supply system, disinfection provides the final defence against water-borne bacteria. The aim should be to produce clean, clear water from the filter and then to add sufficient chlorine to ensure bacteriological purity and provide a protective chlorine residue within the distribution system.

The EC Directive 75/440/EEC stipulates the various tests to be carried out on surface water during the sanitary survey of the source, and the appropriate **water treatment(s) required on the basis of the test results.** The relevant details are given in E4, E6 and Appendix E-Table 1.

E3.3 New connection to local water mains

Many failures to meet the microbiological criteria are directly related to the use of poor operating and maintenance procedures for distribution systems or of the presence of sanitary defects in the system. Some factors that contribute to poor bacteriological quality are:

(i) insufficient treatment of water;

(ii) cross connection;

(iii) improperly protected storage system;

(iv) inadequate disinfection of water mains and failure to maintain chlorine residuals in the system;

(v) unsatisfactory construction and repair of water mains;

(vi) close proximity of sewers and water mains;

(vii) improperly constructed, or located blow-off, vacuum, or air relief valves;

(viii) negative or low pressures and intermittent or interrupted flows in the distribution system;

(ix) improper consumer plumbing practices (eg: direct connection of booster pump, failure to install non-return valve or vacuum breaker where necessary);

(x) leakage, especially when combined with low pressures;

(xi) dead-end mains;

(xii) faulty hydrant;

(xiii) poor maintenance.

The system should be designed to provide an adequate supply of water under ample pressure and should be operated to prevent conditions leading to the occurrence of negative pressure. Steps to prevent negative pressure should Include minimising planned shutdowns, providing adequate supply capacity, replacing undersized piping, and selecting and locating booster pumps correctly to prevent the occurrence of a negative head in piping subject to suction. Continuity of service and maintenance of an adequate pressure throughout the water supply system are essential for preventing back-syphonage.

Unlike the source, treatment and storage installations, much of the distribution system is placed underground and cannot be examined directly. For a sanitary survey, therefore, the maintenance and review of water system records is even more important. Residual chlorine and bacteriological records, both the results of tests and the points of sampling, should be closely inspected. Sampling should cover fringe areas and dead-ends within the system. Another

useful record series, if available, is a comparison of treated water pumped and water distributed to consumers. If losses in volume exceed about 10%, and certainly if they exceed 30%, leakage's and the control of leakage merit further investigation. Records of system pressures, if available, should also be reviewed. Low pressure may result in a f low of polluted water through leaks into pipes and in back-syphonage through leaks or improper connections.

Evidence that may directly or indirectly lead to the location of a leak includes:

(i) knowledge of other services crossing the line of the mains;

(ii) existence of recent excavations for other services',

(iii) discoloration of walls or buildings;

(iv) uneven and discoloured road surfaces;

(v) uneven pavements;

(vi) recent. severing of water supply to old services;

(vii) reports on hydrants recently used by contractors, fire brigades, and other persons;

(viii) loss of supply or reduction of pressure in adjacent premises:

(ix) noise in services, water mains, and household plumbing;

(x) presence of surface water;

(xi) growth of vegetation;

(xii) abnormal reduction of residual chlorine;

(xiii) consumer compliants about dirty water.

E3.4 Storage Installations

Reservoirs for storing finished waters (service reservoir) should be located above probable groundwater levels and well away from surface run-off and underground drainage. Provisions should be made to guard against sanitary hazards related to the location; groundwater levels, movements, and quality; the character of soil; the possibility of pollution by sewage; and overtopping by floods. Sites in ravines or low-lying areas subjected to periodic flooding should be avoided. Good practice indicates that sewers located within 15 m of a storage reservoir with a floor below ground level should be strongly constructed with sound, tested, watertight joints. No sewer should be located closer than 3 m to a reservoir.

The ground surface above the reservoir should be graded to drain surface water away from the reservoir and prevent pooling of surface water in the vicinity.

Any overflow, blow-off, or clean-out pipe from a storage reservoir should discharge freely into an open basin from a point located not less than 3 discharge pipe diameters above the top or spill line of the open basin. All overflow, blow-off, clean-out, or vent pipes should be turned downwards to keep out rain and should be screened with removable fine-mesh screens to exclude vermin and contaminating materials. All inlet and outlet pipes of storage reservoirs

should be properly supported and constructed to minimise the effects of settling, and wall castings should be provided with suitable collars to ensure watertight connections.

A suitable and substantial cover should be provided for any reservoir, elevated tank, or other structure used for storing finished water. Covers should be watertight, constructed of permanent materials (**NB**: use of wood is prohibited), provided with handles and **locks,** and designed to drain freely and prevent contamination of the stored water. Manhole covers should be provided with a sturdy locking device and should be kept locked when not in use.

Reservoirs and elevated tanks in the distribution system should be disinfected (eg: with 40 ppm free available chlorine) before being put into service or after extensive repairs. A schedule should be prepared for regular maintenance and inspection.

E3.5 Treatment Installations

Common water treatments and some of the associated problems have been mentioned in Appendices C and D. Literature on water treatments is available in many public libraries. The following references are held in Meat Division Head Office and may be borrowed by any Meat Division Inspector on request:

(i) "Handbook of water purification" ed Walter Lorch, McGraw-Hill Book Co, London, 1981;

(ii) "Water quality and treatment - a handbook of public water supplies" American Water Works Associations Inc, McGraw-Hill Book Co, London, 1971;

(iii) "The Nalco water handbook" ed Frank N Kernmer and John McCallilon, McGraw-Hill Book Co London 1979.

In a sanitary survey of treatment plant, the following items should be examined:

(i) is the treatment plant constructed to an acceptable standard (consult Meat Division engineers if necessary),

(ii) is the treatment plant adequate for supplying water of consistent potability;

(iii) are the operators qualified;

(iv) does the company maintain adequate laboratory facilities for monitoring the treatment plant and records of plant's performance.

If supply is chlorinated or rechlorinated within the premises, an automatic system for the addition of chlorine or other approved disinfectant with the minimum possible manual intervention and fitted with an alarm in case of failure is required. If sodium hypochlorite is used as a chlorinating agent, the containers must be clearly marked with an expiry date which must be observed.

E4 Laboratory Tests

E4.1 Microbiological tests:

(a) The Manager shall arrange for microbiological samples of the proposed water supply/source to be taken by an approved laboratory for analysis. The cost of sampling and testing of the samples shall be borne by the company.

(b) The samples shall be taken from the following location(s): -

(i) New well -sample water from the wellhead.

(ii) Surface water (eg: river water) -sample water at least 30 mm below the water surface at the proposed point of intake.

(iii) New connection to public mains - sample water from the mains either within the premises or close to the premises.

(iv) Reservoir - sample water at the outlet of the reservoir.

(c) The samples should be taken, where practicable, at a such time that would include the worst possible situation in respect of water quality; for example:

(i) New well - at a time when the water table is low, but after the well installation has been flushed and given its initial disinfection.

(ii) Surface water - at the flood level as well as at the lowest level when the degree of contamination is likely to be high.

(d) The minimum number of water samples required is related to the type of water supply:

(i) surface water (river) - a set of duplicate samples taken at flood level and another set taken at low level. (NB: Company should plan for the sanitary survey well in advance to allow time for analysing these samples);

(ii) New well - a set of duplicate samples;

(iii) New connection to public water mains - a set of duplicate samples.

(iv) Reservoir/pond - a set of duplicate samples.

(e) The samples shall be collected, transported and analysed in accordance with the procedures in Appendix A of this circular. For ground water and public water supplies, SPC22, SPC37, total coliform count and faecal coliform count shall be conducted. For surface water (eg: river and open pond), the microbiological tests specified in Table 1 below shall be conducted.

E4.2 Physico-chemical tests:

(a) The Manager shall arrange for samples of the water to be analysed by an approved laboratory (e.g.: one with TELARC registrations for specific physico-chemical tests for potable water). The cost of sampling and testing of water shall be borne by the Manager.

(b) The samples shall be taken from locations(s) stipulated in E4.1 (b).

(c) The samples shall be taken at such time(s) as stipulated in E4.1 (c).

(d) The minimum number of samples to be taken is related to the type of supply:

(i) new well -one sample;

(ii) surface water (river) -one sample at flood level and one at low river level;

(iii) new connection to public water mains -one sample;

(iv) reservoir/pond -one sample.

e) The sample(s) shall be collected, transported and analysed in accordance with the procedures in Appendix B of this circular. For supplies to be derived from new well and public supply, Category B tests (refer Appendix B of this circular) shall be conducted. For supplies to be derived from surface water (e.g.: river or open pond), the tests listed in Appendix E-Table 1 below shall be carried out.

E5 Reports

The Manager shall provide the Inspector with reports of on-site sanitary survey and laboratory results. If required by the Inspector, the Manager shall provide additional information or tests to verify suitability of the water supply, and/or the water treatment requirements.

E6 Criteria for approval of a new water supply

A new supply may be approved for use by the Director, Meat Division if it meets the following requirements:

(a) A satisfactory on-site sanitary survey report prepared by the Inspector based on the guidelines in E2 and E3.

(b) Compliance with the appropriate microbiological, physical and chemical criteria specified below:

Groundwater and public supplies - criteria given in Appendix A - section A5 and Appendix B - section B6.

Surface water- criteria given in Appendix E - Table 1 below.

E7 Treatments

Surface water shall be disinfected, prior to use, with chlorine or other approved disinfectant to guard against water-borne bacteria, whether or not the water tests conducted during the sanitary survey have exceeded the microbiological criteria specified in Appendix E - Table 1.

Where the sanitary survey and water tests show the ground water or public supply to be subject to microbial contamination, the Manager shall install an approved disinfection system for the new supply.

Where a physical or chemical parameter exceeds the specified criterion, the Manager shall install an approved treatment system appropriate to the defect (e.g.: coagulation, flocculation, filtration, sedimentation, ion-exchange, chlorination, or a combination of these treatments), and shall ensure that the water at the point of usage consistently meet all the specified criteria.

Appendix E
Table 1 Criteria for assessing suitability of surface water for use in food processing

Parameters to be assessed	Unit	Criterion
pH		6.5-8.5
Colour:	True Colour Unit	15
Total suspended solids	g/cu.m	25
Temperature	°C	25
Conductivity	mS/m at 20°C .	40
Odour	Dilution factor at 25°C	3
Nitrates	N g/cu.m	10
Fluorides	Fg/cu.m	1.1
Total extractable organic chlorine	Cl g/cu.m	*
Dissolved iron	Fe g/cu.m	0.2
Manganese	Mn g/cu.m.,	0.05
Copper	Cu g/cu.m	1
Zinc	Zn g/cu.m	5
Boron	B g/cu.m	1
Berryllium	Be g/cu.m	*
Cobalt	Co g/cu.m	*
Nickel	Ni g/cu.m	0.0 5
Vanadium	V g/cu.m	*
Arsenic	As g/cu. m	0.05
Cadmium	Cd g/cu.m	0.005
Total chromium	Cr g/cu.m	0.05
Lead	Pb g/cu.m	0.05
Selenium	Se g/cu.m	0.01
Mercury	Hg g/cu.m	0.001
Barium	Ba g/cu.m	0.1
Cyanide	CN g/cu.m	0.1
Sulphate	SO_4 g/cu.m	400
Chlorides	Cl g/cu.m	200
Surfactants	rx with methylene blue, g/cu.m lauryl sulphate.	0.2
Phosphorus	P_2O_5 g/cu.m	5
Phenol index	mg/cu.m	0.5
Polycyclic aromatic hydrocarbon	g/cu.m	0.0002
Total pesticides	g/cu.m	0.001
Chemical oxygen demand	O_2 g/cu.m	30
Dissolved oxygen saturation rate	% O_2	70
Biochemical oxygen demand	BOD_5 at 20°C without nitrification, O_2 g/cu.m	<3
Nitrogen by Kjeldahl method	Except $N0_3$, N g/cu.m,.	1
Ammonia	N g/cu.m	0.39
Substances extractable with chloroform	SEC g/cu.m	0.1
Residual organic carbon after flocculation and 5u membrane filtration	C g/cu.m	*
Total organic carbon	C g/cu.m	*
Total coliforms	@37°C per 100ml	*
Faecal coliforms	per 100 ml	*
Faecal streptococci	per100 ml	*
Salmonella		Absent in 5000 ml

* Limits for these parameters have not been set. However, the levels of these parameters determined from the sample will be considered by Meat Division and DSIR Chemistry Division in respect of the potability of the proposed water supply and/or the treatments(s) required.